Small Animal Emergency and Critical Care:

Case Studies in Client Communication, Morbidity and Mortality

Lisa Powell, Elizabeth Rozanski and John Rush

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Contents

Contributor list xi
Preface xiii

Part One: Medical and Treatment Errors **1**

1. Coming Up for Air: *When equipment failure can be fatal* 3
2. Alistair and the UTI: *Sometimes antibiotics ARE indicated!* 6
3. Double-Check the RX: *How a simple math error cost a dog his life* 8
4. Holey Chest Tube!: *How some inadvertent complications led to a change in standard operating procedure* 11
5. Count Your Sponges: *A simple procedure can sometimes result in disaster* 14
6. First Off, Do No Harm: *Always check tube placement, by many methods!* 17
7. Right is Wrong: *An example of a tragic outcome due to unmarked radiographs* 21
8. Sabrina the Good Witch: *The importance of using the correct syringe* 25
9. Friends in High Places: *An illustration of how imperative it is to correctly prepare and administer medications* 28
10. Midnight: *A case describing the consequences of technical complications* 31
11. Sam and the Muscle Medicine: *When you should listen to your gut and not your clients' wishes* 35
12. A Shot in the Dark: *The importance of discussing all potential complications prior to performing the procedure* 38

Part Two: Medical Judgment Errors **43**

13. Another Down Dog: *Sometimes things are not as they seem!* 45

14. It HAS to Be Blasto!: *Surprise endings* 47
15. Can You Tap That Cat for Me?: *Complications of common procedures* 50
16. Chief's Complaint: *Entertain all differential diagnoses* 52
17. But He's Been Fine!: *The importance of assessing thoracic radiographs in patients experiencing blunt force trauma* 54
18. Would You Like Water with That? A Tale of Two Dogs: *The dangers of hypernatremia!* 57
19. The Great Pretender: *ALWAYS consider hypoadrenocorticism as a differential diagnosis in dogs with nonspecific symptoms* 60
20. A Lack of Concentration: *Another example of how Addison's disease can masquerade as a disease with a much worse prognosis* 63
21. Unlucky Lady: *Remember to consider ALL possible differential diagnoses for your patient!* 67
22. But She Has Heart Disease!: *All aspects of a patient's history should be carefully considered when presenting for an illness* 69
23. Pennies from Heaven: *ALWAYS perform abdominal radiographs in patients presenting with signs of intravascular immune-mediated hemolytic anemia!* 71
24. Seeing Red!: *All ocular abnormalities should be examined promptly and completely, as irreversible disease may be present* 74
25. Sepsis the Next Day?: *An illustration of the importance of analyzing effusions yourself if the results will not be reported the same day, and to ALWAYS look under the tongue of a vomiting cat!* 77
26. Anxious to Breathe: *Care must be taken when performing diagnostics on brachycephalic, apprehensive dogs* 81
27. The Lost Acorn: *A complicated case gets more perplexing!* 83
28. The Lost Puppies: *How the inexperience of a junior veterinarian caused the demise of two puppies* 85
29. Don't Be Too Cavalier: *A full abdominal exploratory should always be performed during an abdominal surgical procedure* 88

30. Too Much Sugar: *All causes, pulmonary and extrapulmonary, should be investigated in patients with respiratory distress* 90

31. Tyler: *Dehiscence of enterotomy sites should always be considered as a cause of illness in the 3–5 days following the operative procedure* 92

32. Whiskers: *Immunosuppression from administered medications can result in the development of secondary infections* 94

33. Would You Like Some Salt?: *The importance of monitoring fluid therapy* 96

34. Bambi?: *Things to think about when coming into contact with wild animals* 100

35. The Big C: *The dangers of making a pathologic diagnosis without obtaining a biopsy* 102

36. To Stent or Not to Stent?: *New technology isn't always the answer* 104

37. It Isn't Asthma?: *Noting when it is important to look past the suspected client situation and focus on the patient* 106

38. Hoping History Doesn't Repeat: *An illustration of the importance of good history taking* 108

Part Three: Lessons in Client Communication **111**

39. Not All Albumins Are Equal: *When transfusing nonautologous fluids, possible allergic reactions should always be considered and discussed with the client prior to administration* 113

40. Believing the Client: *Listen to the client! They know their pets the best!* 116

41. But I Thought He Would Be Fine?: *The importance of communication about prognosis and risk—junior clinician errors* 119

42. If It's Not in the Medical Record, Did It Happen?: *The importance of a medical director addressing any and all client concerns* 124

43. Hemangiosarcoma Is Bad: *Failure to completely evaluate patients can result in a misdiagnosis* 130

44. The Internet Can Be a Dangerous Thing: *One must take into consideration the availability of information on the Internet, whether it be true or not, when discussing disease diagnosis and treatment* 134

45. Is there Some "Wiggle" Room?: *An illustration of how essential it is to offer a variety of options to clients* 138

46. But CPCR Was Successful!: *Clear, timely communication about changes in patient status* 142

47. Rosie and the Platelets: *Novel therapies require a firm discussion of risk and benefit* 144

48. The Receptionist's Dog: *Family and friends' pets can be particularly stressful for clinicians* 147

49. We'll Take Good Care of Maxwell!: *Unexpected deterioration of a pet after admission* 149

50. A Diagnosis to Stand By: *A case highlighting why things are not always as they seem* 151

51. The Confused Setter: *Making sure that all presenting clinical complaints are addressed* 154

52. Tasty Fungi: *Working within financial constraints when the disease and prognosis are unknown* 157

53. Watch What You Write!: *A lesson on how to always be professional* 160

54. But She Was Just Vomiting!: *The importance of organization in the midst of chaos* 162

55. Peroxide Puppy: *A case discussing the potential concerns of phone advice* 164

56. Too Tight!: *An illustration of possible complications associated with bandage placement* 167

57. What Was That Popping Sound?: *What to do when a routine procedure goes wrong* 169

Part Four: Communication Issues between Colleagues and Hospital Staff **173**

58. Bandit: *A case documenting stresses around the holidays, and illustrating different clinical approaches* 175

59. Check the Medicines: *A case describing a very busy day, with an inadvertent distribution of the wrong medications* 178

60. Cricket and the Insidious Radiograph: *Understanding the right and wrong ways to teach and learn* 180

61. Go Team!: *Highlighting the role of experienced technicians in management of cases* 183

62. Not Just Another Blocked Cat: *Outlining conflict between client cost constraints and clinician wishes* 186

63. Whose Fault?: *Highlighting communication between a primary care hospital and an emergency clinic* 190

64. Shelby and the Needles: *What to do when a situation has changed dramatically since the last physical examination* 193

65. Slow and Easy: *The problems of "selling" an unfamiliar procedure to a client* 197

66. The Bandage: *An example of noncollegial behavior* 200

67. We'll See What the Blood Work Shows: *The importance of timely client communication* 202

68. What Antibiotic Is Best?: *Highlighting communication issues between senior veterinary clinicians* 204

69. Molly and the Chicken Bone: *A case outlining the importance of reevaluating patients referred for a second opinion* 206

70. Know the Nodes: *Why physical examination is so important* 208

71. Nancy's Neck Pain: *A case outlining why a specialist may be helpful* 210

Appendix: How to Set Up Your Own Morbidity and Mortality Conference 215

Index 217

Contributor list

The following is a list of contributors to this book. We asked general practitioners, office managers, medical directors, and other specialists to submit pertinent cases. The variety of experiences offered by this diverse group of veterinary professionals enhanced the scope of the cases and provided insight from many different perspectives. In the spirit of M&M Round's confidentiality, the contributors are not assigned to the authored case. Many thanks to all of the contributors for sharing their cases!

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Preface

Mistakes are painful when they happen, but years later a collection of mistakes is what is called experience.

Denis E. Waitley, PhD
Author of *The Psychology of Winning*

The Morbidity and Mortality conference, or M&M rounds, was first established as a training and educational tool for medical doctors in training. A book published in 2002 by Hanley and Belfus, Inc., authored by Frank J. Edwards, MD, FACEP, entitled "The M&M Files: Morbidity and Mortality Rounds in Emergency Medicine," described various clinical case errors and doctor–patient miscommunications, with added case assessment and learning points. Based on experience in human medicine, M&M rounds have been adopted as a forum for case review and learning opportunities in veterinary medicine. The objectives of the scheduled conferences include:

- Learning from complications and errors
- Modifying behavior and judgment based on previous experiences
- Preventing repetition of errors leading to complications
- EDUCATION, especially for veterinarians in training

Case discussions, usually presented by interns and residents, are critiqued by a variety of specialists. The case in question therefore receives a thorough review, with differing perspectives. The reviewers are often faculty clinicians, with many years of experience between them. All cases do not necessarily contain an error, but recommendations for improved patient care, new research or techniques, or experienced methods of varying diagnostics and treatments are often presented. M&M rounds are also confidential, and all participants sign into an

agreement to not discuss cases outside of the rounds forum. In addition, M&M rounds often include discussions of owner perspectives, and how communications between clinicians and owners can be optimized to allow veterinarians to better meet owner expectations. It is a method of teaching and learning from a strong perspective of experience, evidence-based medicine, effective communication techniques, and retrospective evaluation of all aspects of a patient's clinical course.

The purpose of this book is to provide real case examples from a variety of experienced veterinarians, primarily specialists in veterinary emergency and critical care. In addition, there are contributions from veterinarians and client communication liaisons from different specialties, general practice, universities, and private institutions. In the spirit of M&M conference confidentiality, the cases presented in this book will not have the author attached; rather, all contributors will be listed together at the beginning of the book. In addition, all names of patients and patient owners have been changed to maintain the privacy of the doctor–patient–owner relationship.

Academicians are always investigating new ways to teach, to illustrate the art of veterinary medicine, and to help explain complex physiologic processes. In a time with significant veterinary specialization, a conference with many different specialists in attendance has elevated the teaching and practice of medicine through in-depth case analysis. The goal of this book is to highlight a number of common clinical problems and communication issues that either did or may lead to difficulties in case management.

I hope you find the cases illustrated in this book both interesting and educational. Enjoy!

Lisa L. Powell, DVM, DACVECC

Part One

Medical and Treatment Errors

1

Coming Up for Air

When equipment failure can be fatal

Barney had been vomiting for 2 days, but this was not usual. Mr. and Mrs. Thompson explained that Barney vomits about once a day, so they were originally not that worried about the vomiting. When Barney failed to stop vomiting and refused his dinner, they knew it was time to get him checked out. Dr. Crane was working emergency that night, and the clinic had been slow to that point in time. Compared with many 4-year-old domestic shorthair cats that Dr. Crane had seen, Barney was clearly overweight but his vital signs were normal. Barney was a bit quiet and somewhat dehydrated, and Dr. Crane suspected that Barney's abdomen was a bit uncomfortable; however, no clear abnormalities were noted on abdominal palpation. If not for the complete oral exam, Dr. Crane might not have found the string trapped under the base of the tongue.

A presurgical workup was quickly completed, and Barney was given intravenous fluids and antibiotics. Plication of the small intestines was suspected based on abdominal radiograph, and Dr. Murray was called in to perform the surgery so Dr. Crane could continue to manage the evening's slowly increasing emergency caseload. Anesthesia induction was smooth, Dr. Murray quickly found the plicated region of the small intestinal track, and the entire string was removed with only three enterotomies. Surgery was completed without any complications, and Barney was returned to the intensive care unit for anesthesia recovery

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and ongoing care. Postoperative point-of-care testing identified mild hypokalemia, and Barney was still mildly dehydrated so intravenous fluids were prescribed. Louise, the technician working at the emergency clinic that night, was busy with other cases, so Dr. Murray added potassium to the fluids, labeled the bag, then inserted the fluid administration set. When Louise was free to help, Dr. Murray left to telephone Mr. and Mrs. Thompson with the surgical findings and the postsurgical plans, including the recommendation that Barney stay a night or two for ongoing supportive care.

The technician started the fluids, and a few minutes later, Barney collapsed, stopped breathing, and had no pulse. Cardiopulmonary resuscitation (CPR) was initiated, and Barney was immediately intubated and external cardiac compressions were begun; CPR was continued for 15 minutes until bloody edema fluid was seen pouring from the endotracheal tube without any evidence of any response to CPR.

Resuscitative efforts were unsuccessful, and Dr. Murray returned to the phone to advise the Thompsons of the catastrophic development. The Thompsons could not understand how Barney could have survived the surgery, and how they could have been given such an optimistic postoperative update, only to be called 15 minutes later with notification of Barney's death.

The individuals involved reviewed the case to determine what might have happened. Iatrogenic hyperkalemia was entertained as a possibility, but Dr. Murray was certain she had added the correct amount of potassium to the fluid bag. Neither Dr. Murray nor Louise could recall purging the intravenous fluid line of air, and this was a point in transfer of care between two individuals on the health-delivery team. Heart disease was considered as a possible complicating factor because of the bloody fluid noted from the endotracheal tube; however, no cardiac abnormalities had been noted on exam, there were no abnormalities on the electrocardiogram during anesthesia monitoring, and Barney was not short of breath just prior to the cardiopulmonary arrest. It was suspected that the intravenous fluid line had not been purged of air prior to the infusion pump being started and the cat had therefore received an intravenous air bolus of approximately 15–18 mL. A postmortem thoracic radiograph confirmed air in the right atrium.

The Thompsons called the next day and filed a complaint with the hospital director. After meeting with the director and Dr. Murray, the Thompsons had a better understanding about the events and, although they had lost their pet, they appreciated the full disclosure, honesty, and obvious remorse shown by Dr. Murray during this face-to-face conversation.

Key Points

- The diagnosis was not delayed, in part due to Dr. Crane's thorough examination. If the string under the tongue had been missed, diagnosis might have been delayed and peritonitis could have been a complicating outcome.
- In this case, a simple technical error cost Barney's life. This highlights the recommendations of having a simple procedural check-off, such as all fluid sets being checked for air by the person connecting them to the patient, especially due to the more widespread use of fluid pumps. The point in time where there is a transfer of duties from one individual to another is a key situation where mistakes are especially likely to happen; communication between team members regarding what has been done and what still needs to be done is essential.
- Catastrophic and unexpected developments are difficult for most clients to accept, especially when such events are in direct contrast to a recent communication. Clinicians have individual preferences in how to approach these situations, but honesty about the events is always best. Some clinicians start the conversation with "I have some very sad news about Barney," while others might approach it with a longer version culminating with the loss of Barney. The trajectory of the conversation will vary from case to case, but most owners want to hear specific information about what transpired just prior to and at the time of the crisis. In many cases, the unexpected nature of the event and the grief associated with loss of the pet means that the subject of charges for care is best avoided in this first conversation, unless it is brought up by the owner. Some owners need time to accept this information, and a subsequent conversation is required to determine disposition of the body, whether or not to perform a necropsy, and other details. Financial decisions should be made by the hospital owner or practice manager, in consultation with their liability insurance carrier.
- Meeting personally with all parties involved allowed this case to be resolved in a professional manner, and it allowed the Thompsons to fully express their concerns. In addition, Dr. Murray was able to explain the situation and express his true remorse about the outcome. In this case, the Thompsons were not charged for any of the hospital services, and they left knowing that the doctors and administrators truly cared for their cat and were very sorry about what had transpired.

2

Alistair and the UTI

Sometimes antibiotics ARE indicated!

Alistair was a giant ginger-and-white cat. He had been previously healthy, but last night was in and out of the litter box and this morning his owner (Ms. Bristol) found him collapsed on the floor. Alistair was rushed to the veterinarian and was found to have a urethral obstruction. The obstruction was easily relieved, but Dr. Patrick decided to keep him in the hospital for a few days until he had completely recovered. It had been relatively hard to pass the original catheter, and Dr. Patrick wanted to make sure he would not reblock. The routine laboratory work was normal; a urinalysis showed no evidence of infection, but there was a high pH and many struvite crystals.

After 2 days, Alistair seemed to be well recovered, the urinary catheter was removed, and the plan was to discharge him later that same day. He was treated with only intravenous fluids and no antibiotics; Dr. Patrick was careful to always explain to clients that a urinary infection and urethral blockage were very different and that cats with urethral blockage rarely, if ever, had an associated infection.

However, as the day wore on, it was clear that Alistair was not totally fixed. He was straining a lot and by 4 P.M. he had not produced a drop of urine. His bladder was lemon sized. Dr Patrick recatheterized Alistair and elected to keep him in the hospital another few days. The urine looked a bit cloudy, which Dr. Patrick attributed to inflammation.

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Two days later, the catheter was pulled again and Alistair was discharged home on canned food (Hills C/D) and prazosin (a medication to help decrease urethral spasm), with instructions to carefully monitor his urinations. Ms. Bristol listened carefully to the directions, but because she had already spent a lot this week on Alistair, she decided to not to tell Dr. Patrick that she was going to out of town for 36 hours and Alistair was going to be on his own.

When Ms. Bristol returned from her trip, she found Alistair collapsed, in a puddle of urine. He was immediately brought back to the hospital. On examination, he was hypothermic, was icteric, was painful in the abdomen, and had a strong smell to him. Laboratory testing documented 2000 white blood cells with 1000 bands (a degenerative left shift). A chemistry profile was supportive of mild azotemia (creatinine 1.9 mg/dL) and an elevated bilirubin value. A urinalysis showed "too numerous to count" white blood cells and 4+ rods, and a urine culture ultimately identified a sensitive *Escherichia coli*. Alistair was treated aggressively for urosepsis and, after 7 days in the hospital, made a full recovery.

Key Points

- As believed by Dr. Patrick, the feline lower urinary disease or obstruction is typically sterile, and careful antibiotic selection is advisable to prevent multi-drug-resistant organisms from developing.
- Alistair developed a severe urinary tract infection (UTI). The most likely scenario is that, although the urine was initially sterile, the first somewhat difficult catheterization had resulted in colonization of the bladder. In most cats, the urinary system will rapidly clear itself of organisms; however, in this case, when Alistair reobstructed, there was ample time for infection to develop.
- Dr. Patrick should have more closely evaluated the urine when it was noted to be cloudy; infection was already present at this point, and earlier treatment might have limited the development of overwhelming sepsis.
- While not clearly his responsibility, Dr. Patrick ideally should have confirmed with Ms. Bristol that she would be home for the weekend and would be able to care for Alistair.

3

Double-Check the RX

How a simple math error cost a dog his life

A 15-month-old, male intact Akita named Dakota was presented to an emergency doctor for an acute onset of respiratory distress and with severe lethargy. He had a history of having prednisone-responsive weakness and collapsing episodes for several months. When the episodes increased with decreasing dosages of prednisone, he was scheduled to be referred to an internist for further diagnostic tests. Due to his acute signs of disease, he was evaluated through the emergency service, then hospitalized and transferred to internal medicine for therapy and diagnostic testing. In addition to the collapsing episodes, Dakota was having intermittent difficulty prehending food.

On admission, his body temperature was 103.7°F (39.8°C), his heart rate (HR) was 156 beats per minute (bpm), and he was panting. His mucous membranes were mildly cyanotic. No murmur or arrhythmia was auscultated, and his peripheral pulse quality was weak. Increased lung sounds were auscultated in all lung fields. Neurologic examination revealed normal cranial nerve function and no conscious proprioceptive deficits. The next morning, he was fully and strongly ambulatory, but 6 hours later he was found to have difficulty walking, with significant hindlimb weakness. He had a mild amount of muscle wasting in his head and thigh regions.

Thoracic radiographs showed a megaesophagus, along with an interstitial to alveolar pulmonary infiltrate in the left cranial, right cranial,

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and right middle lung lobes. A pulse oximetry reading on presentation was 86% on room air. A transtracheal wash was performed, and cytology was consistent with septic, neutrophilic inflammation in the lungs.

Because of his historical clinical signs and diagnostic findings, myasthenia gravis was suspected. To confirm this diagnosis, a tensilon test was performed. He was administered 2 mL atropine intramuscularly, followed by 5.8 mg of edrophonium (tensilon) intravenously. Following tensilon administration, Dakota immediately rose and strongly ambulated around the exercise yard for 2 minutes, before becoming weak again. The test, therefore, was considered a strong positive for a diagnosis of myasthenia gravis. Definitive diagnosis of myasthenia gravis is based on results of an antiacetylcholine receptor antibody test, performed on patient serum, with results available in 10–14 days.

Neostigmine was prescribed as a therapy for the myasthenia gravis. Neostigmine is a parasympathomimetic that helps myasthenic patients by competing with acetylcholine for acetylcholinesterase, therefore allowing prolongation of acetylcholine effects at parasympathetic receptor sites. The dose Dakota was supposed to receive was 1.5 mg as an intramuscular injection. However, he accidentally received 15 mg, 10 times the appropriate dose. An overdose of neostigmine can cause a cholinergic crisis, exhibited as nausea, vomiting, diarrhea, excessive salivation, miosis, lacrimation, increased bronchial secretions, bronchospasm, bradycardia, hypotension, muscle weakness, restlessness, and agitation.

Ten minutes after receiving the neostigmine, Dakota immediately rose, ate some food, then began vomiting profusely, and seizured. At this time, the medication error was recognized, and atropine was administered as an antidote, following a dose of valium to treat the seizure. Dakota then became severely cyanotic with accompanying significant respiratory distress. Severe bronchoconstriction was suspected. He was then treated with terbutaline subcutaneously and inhaled albuterol. When these treatments did not improve his respiratory status, he was administered epinephrine subcutaneously. It was then decided to sedate, intubate, and place Dakota on a mechanical ventilator for respiratory support. When intubating, food particles were noted within the tracheal lumen, indicating aspiration.

Dakota was placed on a ventilator and treatment for bronchoconstriction continued. The effects of neostigmine last about 4 hours in humans, when given parenterally. Despite aggressive respiratory support, Dakota experienced cardiopulmonary arrest 13 hours after receiving the overdose of neostigmine. Resuscitative efforts failed.

Key Points

- Administering an inappropriate dose of medication can have disastrous effects. An estimated 770,000 people are injured or die each year in US hospitals from adverse drug events (ADEs), defined as an injury resulting from medical intervention related to a drug.[1] Many of these adverse drug events are preventable. Incidence of ADEs is not available for veterinary patients; however, medication errors are known to occur, potentially resulting in some degree of morbidity and, as in Dakota's case, mortality.
- Client communication and incidence reporting are necessary and ethical when medication errors occur. Mistakes do occur, and by being honest and straightforward about the incident, many owners are more understanding and, although they may be angry, realize that it was an accident that is currently being addressed. Dakota's owners were immediately contacted and informed of the mistake made by the hospital. Because it is not a medication that is used very often, the excessive volume administered did not bring about alarm. The attending veterinarian continued to stay in very close contact with the owner throughout the day and into the night. Although the outcome was fatal, because the owners were kept informed of the full clinical course and details about Dakota's case, they were more forgiving in the end. The owners of Dakota were not responsible for the final bill of $4200.
- Before administering any medication, the dose should be calculated and checked by another person, especially if it is a drug that is not used regularly.
- Mistakes occur, and open communication with the owners is paramount to the success of the case and in future contacts with the clients.
- Good faith compensation, open communication, and honesty about the error help to maintain a solid reputation and may prevent future litigation.

Reference

1. Agency for Healthcare Research and Quality. Reducing and preventing adverse drug events to decrease hospital costs. Research in action, Issue #1, March 2001. [Available via www.ahrg.gov/aderia/aderia.htm (accessed April 2010).]

4

Holey Chest Tube!

How some inadvertent complications led to a change in standard operating procedure

Bruno, a 4-year-old neutered male Husky, presented to the emergency service with a history of acute respiratory distress. He had no history of trauma and was closely supervised at all times. He had no history of prior medical, surgical, or traumatic disease.

On physical examination, Bruno was distressed, tachypneic, and orthopneic. His mucous membranes had a grayish-muddy discoloration. The capillary refill time was normal. His heart rate was 160 beats per minute, with an auscultatable regular rhythm and moderate femoral pulse quality. Lung sounds were bilaterally muffled in all fields, especially dorsally. Abdominal palpation was unremarkable; he was fully ambulatory, with no evidence of gross traumatic injury.

Pulse oximetry readings were between 88% and 90% on room air, improving to 92% with oxygen flow-by. Emergent thoracic radiographs revealed a severe pneumothorax. Thoracocentesis yielded 1200 mL of air from the left hemithorax and 800 mL of air from the right hemithorax. The patient stabilized following thoracocentesis and was admitted to the intensive care unit.

Blood work, including a complete blood cell count and serum chemistry profile, was within normal limits. An arterial blood gas was performed following thoracocentesis and yielded a normal acid–base status, a partial pressure of oxygen (PaO_2) of 95 mmHg, and an oxygen saturation of 97%.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Two hours after initial presentation, Bruno became tachypneic again, with increased respiratory effort. Blood oxygen saturation at that time was 88%, as measured by pulse oximetry. Dull lung sounds were noted bilaterally, and thoracocentesis was performed once more. At this time, no endpoint to the air production could be obtained, and thoracostomy tube placement was recommended.

Bruno was placed under general anesthesia, with propofol induction and maintenance on inhaled isofluorane. A thoracostomy tube was placed by making a small skin incision, then forcing the tube into the pleural cavity by direct pressure. The chest tube entered the pleural cavity, and continuous air was obtained. Postplacement thoracic radiographs showed proper placement of the tube, and a mild pneumothorax. The tube was then attached to a continuous pleural suctioning unit (Pleurovac®) in the intensive care unit. Recovery from anesthesia was uneventful.

Significant amounts of air were produced from the chest tube over the next 48 hours. At this time, because the primary differential diagnosis was a spontaneous pneumothorax due to underlying pulmonary bullae, exploratory thoracotomy was performed.

During surgery, the previously placed thoracostomy tube was found to be impaling one of the lung lobes (see Figure 4.1). No other areas of air leakage were noted. A partial lung lobectomy was performed, and another thoracostomy tube was placed surgically, for postoperative monitoring. No air production occurred over the next 24 hours, and the chest tube was removed.

Figure 4.1 An intraoperative picture of the chest tube piercing the lung lobe.

Bruno was discharged from the hospital the following day. He has had no further problems attributed to this hospitalization.

Key Points

- There are many different ways to place percutaneous thoracostomy tubes. The method often used and taught to veterinary students includes the forceful "punching" of the tube into the pleural space. The disadvantages of this method include skin drag from the subcutaneous tunneling, misplacement of the tube (including into the abdominal cavity), and impalement of intrathoracic structures, including the lung parenchyma, heart, and great vessels. Although these risks exist, the procedure often goes smoothly, with no clinical consequence. However, because there is a risk of damaging intrathoracic structures or of misplacement of the tube, care and skill are required when using this method of chest tube placement.
- After analyzing Bruno's case with the veterinarians in the hospital, a new method of placing percutaneous thoracostomy tubes became standard. This method includes placing the patient under general anesthesia, pulling the skin forward, then incising through the skin and into the pleural cavity with a scalpel blade. The chest tube is then placed through the incision directly into the chest cavity. The person pulling the skin forward then releases the skin, allowing for a subcutaneous tunnel to form from the pleural cavity incision to the skin. This method allows for direct placement of the tube into the chest cavity, decreasing skin drag, and virtually eliminates the risk of impalement of intrathoracic structures.
- Sometimes, "tried and true" diagnostic and therapeutic methods involve high risk to the patient, especially when there is less experience involved.
- Although adverse events in one patient may not support a drastic change in procedural methods, if there exists a technique with much lower risk, efforts should be made to adapt to this new procedure.

5

Count Your Sponges

A simple procedure can sometimes result in disaster

Molly, an 18-month-old female German Shorthaired Pointer, presented to the primary care veterinarian for an ovariohysterectomy (OHE). The surgery was complicated by some hemorrhage at the ovarian pedicles, and it was difficult to visualize the source of bleeding due to the patient's size and deep chest conformation. The hemorrhage was eventually controlled using extra ligatures at the ovarian pedicles and the dog recovered uneventfully.

Molly re-presented to the clinic 3 weeks later for vomiting and lethargy of 2 days' duration. She had a mild fever (temperature 103.0°F, 39°C) and a palpable abdominal mass. Radiographs confirmed the presence of a 4×6 cm midabdominal mass and some abdominal effusion. She was referred to the local emergency clinic for possible exploratory surgery.

Surgery was performed and four gauze sponges were removed from the abdomen. Due to the presence of necrosis and adhesions, the surgeon removed 10 cm of jejunum as well. Molly remained at the emergency clinic for 2 days, at a total cost of over $3000.

The original surgeon (who was out of town when the dog re-presented for the sponge foreign body) contacted the owners via telephone shortly after the dog was discharged from the emergency clinic. Molly was doing well, but the owners were concerned about any long-

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

term complications from the intestinal resection. A claim was submitted to the veterinary clinic's professional liability insurance company, who agreed to reimburse the owner for the emergency clinic bill. The practice also reimbursed the owner for the cost of the original OHE.

An issue arose during discussion with the liability insurance carrier because the practice had a claim one year prior for a similar situation. A Pug had died several months after a Caesarian section was performed by the clinic (a different veterinarian was involved), and necropsy showed the presence of surgical gauze in the abdomen, resulting in a severe peritonitis. Because the practice had not instituted any protocols to prevent this mistake from occurring again after the initial claim was made, they threatened to drop the clinic after reimbursement for the second claim.

The clinic did institute a new protocol to help prevent surgical sponge complications. A set number (15) of sponges were placed in each pack. Immediately after opening the pack, the surgeon would count and confirm the presence of 15 sponges. All sponges were saved and counted immediately after surgery to make sure there were still 15 sponges accounted for, prior to final abdominal closure.

Key Points

- Both veterinarians involved with the mistake of accidentally leaving surgical sponges in the abdomen were experienced and confident surgeons who had never personally encountered this complication before. In fact, the second surgeon was not even aware that the clinic she worked for had had the insurance claim for the same problem the year prior.
- It has been several years, and Molly has shown no long-term complications from her surgeries. However, it is unfortunate that she had to undergo several days of illness and pain, and a second surgery, for a completely preventable medical error. Of course, for the Pug, the outcome was much more tragic.
- No surgery should be considered "routine," as even an OHE can have serious complications.
- It is absolutely imperative that all surgical sponges be accounted for. It is easier than one would think to lose a sponge in an abdomen, even in a small dog.
- Sponge foreign bodies often result in a severe peritonitis, and the damage may be permanent. The animal may become sick a few days or a few months after the surgical procedure has occurred.

(*Continued*)

Key Points (Continued)

- Communication between doctors in the same clinic, especially after medical or surgical errors are made, can help to prevent future mistakes. Strict protocols and morbidity and mortality rounds are two methods that can reduce the number of errors made by veterinary staff.
- No veterinarian is immune from medical errors, no matter how much experience he or she has.

6 First Off, Do No Harm

Always check tube placement, by many methods!

Jade, a 10-year-old, spayed female Beagle, had been diagnosed with kidney disease 2 years ago; she also had a heart murmur. In addition, she had just been placed on enalapril, to help with hypertension. Jade's owners travel to Europe for a month every year, and a close friend always takes care of her while they are gone. The caregiver brought Jade into an emergency clinic one evening, as she hadn't eaten in two days and had started vomiting multiple times. In addition, she was very lethargic, just wanting to lie around, which is very unlike her.

On presentation at the emergency clinic, she was noted to be about 7% dehydrated, with some ulcerations in her mouth. She had been drinking more than usual, and urinating frequently. Blood tests showed that she was significantly azotemic, with a blood urea nitrogen of 175 mg/dL (62.4 µmol/L; reference range 15–30 mg/dL, 5.3–10.6 µmol/L) and a creatinine of 13.5 mg/dL (1193.4 µmol/L; reference range <1.8 mg/dL, 160 µmol/L). A urine sample obtained via cystocentesis was very cloudy and, when analyzed, revealed many white cells and rod bacteria. Jade was hospitalized on intravenous fluids, antibiotics, antiemetics, and gastric protectants.

The following morning, Jade was transferred to a specialty hospital for continued hospitalization and care. She still refused to eat, although

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

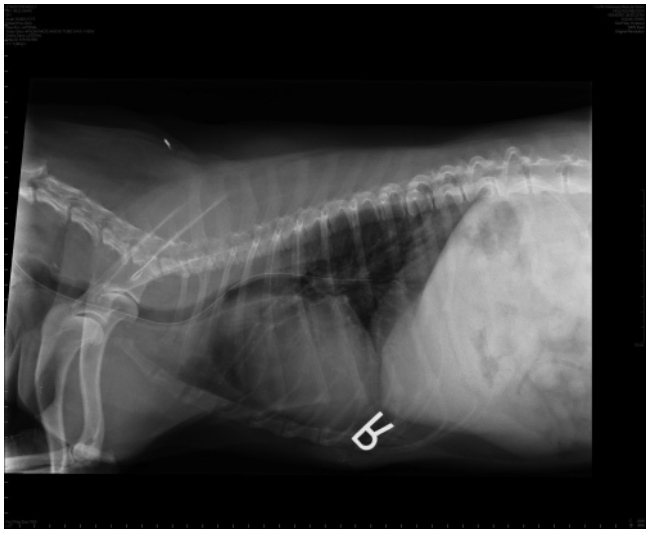

Figure 6.1 The initial thoracic radiograph to assure proper placement of NE tube.

she had stopped vomiting. Treatment continued, with intravenous fluids and antibiotics, gastric protectants, and antiemetics. When she still hadn't eaten by that evening, a nasoesophageal tube (NE tube) was placed for nutritional support.

To verify correct placement of the NE tube, negative pressure must be obtained with a syringe, and a lateral thoracic radiograph is taken to assure proper placement within the esophagus and 2–4 cm cranial to the cardiac sphincter of the stomach. The intern on the evening shift was unsure if the tube was in the esophagus based on the radiograph, but negative pressure was obtained via syringe suction, and no coughing was noted. The intern had one of the staff veterinarians assess the radiograph, and both agreed it was likely in the correct position (Figure 6.1).

The next morning, Jade was noted to be coughing, with an increased respiratory rate and effort, and with an oxygen saturation of 89%. Thoracic radiographs showed significant alveolar infiltrate in the caudodorsal lung lobes (Figure 6.2). The radiologist on duty was concerned that the NE tube placed the night before was actually within the trachea. To verify this, contrast was injected into the tube, and the subsequent radiograph verified inadvertent tracheal placement of the NE tube (Figure 6.3).

Jade was immediately treated for aspiration pneumonia, with broad spectrum antibiotics, oxygen supplementation, nebulization, and chest

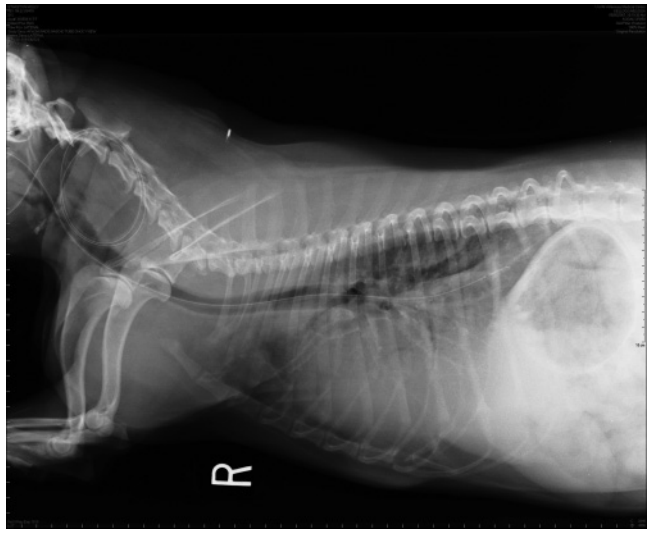

Figure 6.2 Lateral thoracic radiograph showing caudal lung lobe infiltrate.

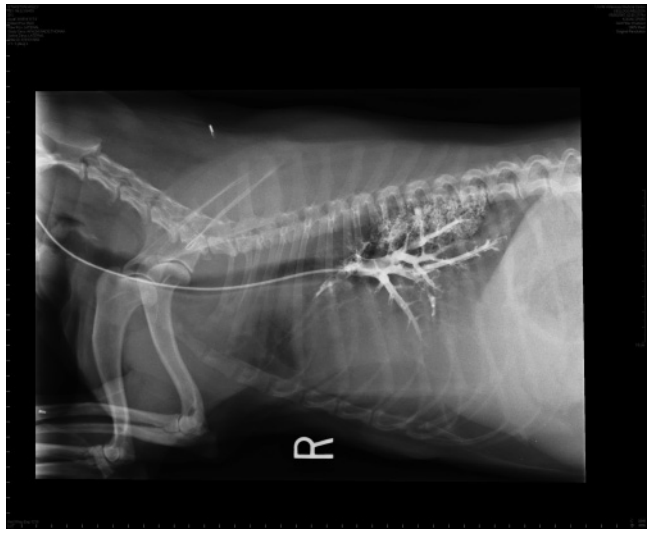

Figure 6.3 Contrast-enhanced radiograph verifying incorrect placement of the NE tube into the trachea and lungs. It is *very* uncommon to give contrast to prove the tube is incorrectly placed. This should be considered contradicted.

coupage. Despite this intensive therapy, Jade continued to clinically decline, and she died of respiratory arrest 36 hours after the pneumonia diagnosis. A necropsy showed acute, marked, fibrino-suppurative bronchopneumonia, with widespread intrahistiocytic basophilic foamy material, likely aspirated food.

Key Points

- Even the most well-meaning medical and surgical interventions can result in complications. Although there were many safeguards in place, the NE tube was still placed incorrectly, resulting in severe, fatal pneumonia in this patient. With any intervention, it is best to discuss potential complications with the pet owner, no matter how small the risk. If all risks are explained and a complication occurs, the pet owner has at least some knowledge of the possible outcome.
- The lateral chest radiograph in this case was not assessed by a radiologist as it was performed after-hours. The next morning, the radiologist was concerned about the placement and recommended a lateral radiograph to include the upper neck region. If the NE tube is located in the trachea, it is clearly seen in the neck region as it passes through the laryngeal area.
- Because of this case, a new protocol was developed to assure proper placement of NE tubes. The radiograph performed to check tube placement MUST include the upper neck region, to help prevent inadvertent tracheal intubation. If the clinician is unsure of proper placement based on radiographs and the syringe aspiration test, the tube should be removed and replaced until the clinician is absolutely sure that the tube is in the proper place.
- The owners were informed of the complications with NE tube placement, and all hospital charges were credited to the owner because of the error.

7

Right Is Wrong

An example of a tragic outcome due to unmarked radiographs

Ginger Snap, a 13-year-old, spayed female Golden Retriever, was referred to a veterinary oncologist for evaluation of a probable bone tumor in her hip. She had been slowing down recently and was on a nonsteroidal medication chronically for what the primary veterinarian assumed was worsening arthritis. However, she still loved to chase squirrels, and after one afternoon of running after a few, she came up non-weight-bearing lame on the right rear leg. After she did not improve with rest and nonsteroidal anti-inflammatory drugs (NSAIDs), the owner took her to the veterinarian. Radiographs performed by the primary care veterinarian showed a lytic area in the proximal right femur, with bony proliferation noted in the right acetabulum (Figure 7.1).

The appointment with the oncologist occurred about 2 weeks after the initial severe lameness began. She was better on the right leg, but was still limping. A surgical consult found a Grade III/IV lameness on the right hind limb. Thoracic radiographs did not show any obvious metastatic disease, and it was decided to take Ginger to surgery for a right hemipelvectomy and biopsy of the lytic lesions.

Surgery went quite smoothly, and Ginger recovered in the intensive care unit on intravenous opioids for pain control, and postoperative

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Figure 7.1 The initial ventral–dorsal radiograph of the coxofemoral joints. Note that this radiograph is not marked as to which side is left or right.

monitoring. She was discharged 36 hours postoperatively, on oral analgesics.

Biopsy results were reported 3 days after submission. Amazingly, no abnormal tissue was noted. There were no neoplastic cells seen, and no note of inflammation in the soft tissues surrounding the coxofemoral joint, nor in any of the samples of bone submitted. Concerned about these results, the surgeon and the oncologist reviewed the original radiographs that were performed by the primary care veterinarian and noticed that the ventrolateral view was not labeled as to which side was right or left. The owner was contacted and was asked to bring Ginger back to the hospital for new radiographs of her pelvis (Figure 7.2).

After assessing the postoperative radiographs, the surgeon and the oncologist called Ginger's primary care veterinarian to tell them that the right rear leg was amputated, but the lesion was in the left rear leg. All noted that Ginger's lameness was on the right rear leg. Then, it was time to talk to Ginger's owner, Mrs. Snap.

The oncologist and the surgeon brought Mrs. Snap into a private room to show her the radiographs, and confess to the mistake that was

Figure 7.2 Postoperative ventral–dorsal radiograph illustrating the continued presence of disease in the remaining coxofemoral joint.

made. Mrs. Snap was shocked and did not know how to respond at first. However, she was very impressed at how the veterinarians admitted to their mistake, and although nothing could bring the amputated leg back, they discussed possible next steps. It was then decided to do a magnetic resonance image (MRI) scan of the remaining pelvic region, to try to better assess the lesion in the left hip.

The MRI showed a chronic, long-term femoral neck fracture, with some disruption, and areas of healing. There was no enhancement to suggest a neoplastic process.

Ginger was subsequently treated with regular weekly physical therapy, and all previous charges were removed. In addition, all treatments associated with the hip were not to be charged for in the future.

Thankfully, Ginger responded well to the weekly physical therapy sessions and continued NSAID administration. She returned to her daily activity of chasing squirrels within 6 months of the surgery and continues to do well, to the delight of her owners!

Key Points

- Appropriate marking of radiographs is imperative, especially when only the limbs are present, making it impossible to differentiate the left from right sides with organ landmarks. In addition, situs inversus, although rare, may be present, so that the patient's descending colon is located on the right side instead of the left. In humans, it has become common practice for surgeons to sign the affected limb with permanent marker with the patient awake, assuring that the surgical procedure is performed on the appropriate limb.
- Client communication in this case was the key to a good outcome, in the face of such a disastrous mistake. Everyone was open and honest with what had happened and, thankfully, the lesion turned out to be benign. Strong communication skills, forgiveness of any charges involved, and the willingness to do anything and everything to help Ginger maintain a good quality of life prevented the owner from pursuing legal recourse in this case.

8

Sabrina the Good Witch

The importance of using the correct syringe

The Nardelli family loved Sabrina and took great care of her—maybe a bit too much "good care." Sabrina loved to eat, and over the years she put on some excess weight. So, it was not really a big surprise to Dr. Sarno when, after Sabrina developed polyuria, polydipsia, and weight loss at 13 years of age, her blood glucose also peaked out above 400 mg/dL (>22 mmol/L). Dr. Sarno started Sabrina on a regimen of dietary manipulation (Purina DM®) and PZI insulin. Sabrina's diabetes had been quite difficult to control over the first 6 months, and her current dose of insulin was 5 units of PZI subcutaneously every 12 hours.

Sabrina started vomiting on Friday, and over the ensuing 24 hours she got sicker and stopped eating. Dr. Sarno's calls were being forwarded to the emergency clinic, and so the Nardelli family brought Sabrina in. Dr. Quinn examined Sabrina and explained that her diabetes was "out of control" and that she was dehydrated, had ketones, and needed fluids. Dr. Quinn also explained that she was worried about the possibility of a secondary infection. Sabrina needed to be admitted to the hospital for fluids, antibiotics, and supportive care. Dr. Quinn also indicated that she planned to call Dr. Sarno to discuss the case and consider the option of switching to a different type of insulin, to see if this could better control the diabetes.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Within 36 hours of aggressive care, Sabrina's ketoacidosis had resolved and her clinical appearance was much improved. She had stopped vomiting and was starting to eat. A urinary tract infection was suspected to be a complicating factor in her disease, and a culture was still pending. Dr. Quinn called Dr. Sarno to discuss the difficulty in managing Sabrina's diabetes. They both agreed that it would be reasonable to discontinue PZI and begin insulin glargine. Dr. Quinn ordered 2 units of insulin glargine given subcutaneously, with a plan to regularly measure blood glucose levels over the ensuing 12-hour period. A nurse administered the prescribed dose of insulin, after the patient was observed to eat a complete meal without complications. Five hours after insulin administration, Sabrina was visibly lethargic and her blood glucose level had dropped to 49 mg/dL (2.7 mmol/L). Another nurse reviewed Sabrina's medical record to discover the insulin glargine had been administered via a U-40 insulin syringe (advised for use with PZI) instead of the U-100 insulin syringe. Since U-100 syringes are designed to dose insulin that contains 100 units/mL, and U-40 syringes are manufactured to deliver insulin that contains 40 units/mL, Sabrina had inadvertently received 5 units of insulin glargine, 2.5 times the desired dose.

Dr. Quinn was alerted to the error, which resulted from confusion in dosing using the U-40 syringe. Sabrina's hypoglycemia was promptly treated via an intravenous dextrose administered as a continuous rate infusion. After speaking with the hospital administrator, Dr. Quinn called the owners to discuss the error in insulin administration and outline the possible outcomes from the error. Dr. Sarno was then contacted by Dr. Quinn, to give an update on Sabrina's care and to explain the medication error. Sabrina was weaned from the dextrose infusion within 24 hours, and she eventually received 2 units of insulin glargine, administered with a U-100 syringe, without incident. Sabrina was subsequently discharged from hospital without long-term complications from the insulin overdose. The Nardelli family was not responsible for charges accrued during the last 48 hours of Sabrina's hospitalization. The owners were originally very upset at the error, but Dr. Sarno, who had been Sabrina's trusted veterinarian for many years, was quite helpful in explaining the situation to them.

Key Points

- Administration of the proper dose of insulin in the appropriate insulin syringe is critical to achieving adequate glycemic control in a timely manner. Most important, proper dosing and administration will reduce the occurrence of hypoglycemia and the potential for long-term neurologic dysfunction that can result from severe hypoglycemia. All staff members responsible for giving medications to patients must be familiar with each drug (dose, route of administration, vessel of administration) to help minimize the incidence of adverse drug reactions. In addition, because of this error, it became hospital policy to have one other staff member check the insulin dose and look at the insulin-filled syringe to verify accurate dosing prior to administration.
- Documentation of all patient treatments is instrumental for allowing adequate assessment of a patient's response to therapies. In this case, one nurse administered insulin glargine via a U-40 syringe, and this was properly noted in the nurses' notes. When Sabrina developed inappropriate hypoglycemia, the next nurse reviewed the nurses' notes and was subsequently able to determine the cause of the patient's hypoglycemia and lethargy. The mistake was brought to the attention of the attending clinician, and appropriate corrective interventions were employed.
- The attending clinician openly discussed the mistake with Sabrina's owners, and a good working relationship between the emergency clinic and the primary care veterinarian helped smooth over this challenging situation.

9

Friends in High Places

An illustration of how imperative it is to correctly prepare and administer medications

A six-year-old, male neutered Golden Retriever was presented to the emergency service for being obtunded, ataxic, and severely lethargic. He was a healthy dog and had never had any previous medical problems. He was closely supervised and lived indoors, but he did spend some unsupervised time outdoors in a fenced-in, secured yard. He was up to date on vaccines and current on preventative flea, tick, and heartworm medication. Upon noticing the behavioral change and ataxia, the owner took him immediately to the referring veterinarian, who performed routine blood work (complete blood cell count and chemistry panel) and abdominal radiographs, all of which were normal. The dog was then referred for neurologic evaluation due to its progressive obtundation and for conscious proprioceptive deficits. Upon arrival, the client expressed that she was a close friend of the Dean of the Veterinary College, and within minutes the Dean was also in the emergency room overseeing management of the case.

On presentation to the emergency services on a late Friday afternoon, the dog was normothermic (100.3°F, 37.9°C), was mildly bradycardic (heart rate 68 beats per minute; normal 70–120 beats per minute), and had a normal respiratory rate (12 breaths per minute). The dog was weakly ambulatory but very ataxic. His mucous membranes were pink

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

and moist, and no murmur or arrhythmia was detected. Abdominal palpation and the remaining physical exam were unremarkable aside from profound ataxic, slow conscious proprioception in all four limbs, and obtundation. Cranial nerves were normal.

An intravenous (IV) catheter was placed, and a blood sample was drawn for an ethylene glycol (EG) test. Meanwhile, recommendations included admitting the dog into the intensive care unit (ICU) for supportive care, IV fluid therapy, and monitoring. Traditionally, according to standard operating procedures of the hospital, only urgent or life-threatening conditions warrant emergency anesthesia, computerized axial tomography (CT scan), or magnetic resonance imaging (MRI) after-hours or over the weekend. Due to the stability of the patient, the owner was instructed that monitoring and supportive care would be initiated, and that advanced imaging would occur on the following weekday. Due to the owner's relationship with the Dean, this traditional decision was overturned by the Dean, and an urgent anesthesia and CT was performed hastily and immediately.

While the dog was whisked off to anesthesia and CT, the results of the EG test came back positive an hour later. In an attempt to not miss the narrow 8-hour window for treatment of EG with the antidote, fomepizole (4-MP), the drug was ordered from pharmacy by a technician, who was told to prepare it for immediate administration. The emergency room doctor took the reconstituted syringe from the technician and ran down to CT to start administration of the 4-MP slowly via the IV fluid port line. Meantime, the CT was completed, and no significant findings were detected. The dog recovered uneventfully in the ICU and was continued on IV fluid therapy and supportive care. The patient remained normotensive and, upon recovery, was bright, alert, and progressively more ambulatory.

The following midday (approximately 20 hours after initial presentation, and 24 hours after clinical signs), after the dog had already received two doses of 4-MP, it was noted by another ICU technician that the small 1.5-mL vial (containing 1.5 grams) of 4-MP was intact and was never reconstituted with the 28.5-mL container of saline. It was sitting intact in the bottom of the box of antidote. Typically, there are two different bottles in the box of 4-MP (one of saline, one of the 4-MP). Because of how busy the previous day's emergency shift had been, the technician had failed to read the instructions and had not seen the bottle of the concentrated 4-MP at the bottom of the box. The technician had only drawn up saline, which was administered to the dog. Up to this point, the dog had never received any true antidote and was now 24 hours out from initial development of clinical signs; more

important, the dog was now outside the window of effective treatment of EG with 4-MP.

At this time, a venous blood gas was performed, which revealed a normal anion gap and no evidence of a metabolic acidosis (normal pH, base excess, bicarbonate). Typically, with EG intoxication, a profound, severe metabolic acidosis is present based on the presence of glycolic, glyoxalic, and oxalic acids. Based on these normal values, the dog was continued on aggressive IV fluid therapy and supportive care (such as free catch urine output monitoring, repeat venous blood gas analysis). The dog was clinically improving and, within 36 hours of initial presentation, had physical examination parameters within normal limits. All of the neurologic abnormalities had resolved.

In this situation, the dog was suspected to have gotten into a nontoxic dose of either propylene glycol or ethylene glycol. Upon further questioning of the owner, no other drugs interfering with a false positive EG test had occurred. The unintentional, inadvertent medication error was explained to the owner (and the Dean), and open communication was maintained. The owner was not held financially responsible for any additional costs related to the medication error and was grateful for the candid discussion and the fortunate outcome. Thankfully, within 36 hours, the dog was clinically normal, as were venous blood gas and serum chemistry parameters. The dog survived without incident and was discharged home 48 hours later.

Key Points

- Prior to administration of any drug, the reconstitution protocol should be carefully reviewed and verified, and the drug then mixed accordingly.
- The contents of any medical container should be carefully opened to make sure the proper contents are available and are neither broken nor expired.
- Preferential treatment should never occur, particularly if it bypasses traditional standard operating procedure. Rushed decision making results in mistakes, and it adds additional pressure to faculty and support staff, resulting in hasty errors.
- Serious consideration should be given to whether it is in the animal's best interest to have a test or procedure accomplished on an overnight shift or weekend versus regular working hours in a more routine fashion.

10

Midnight

A case describing the consequences of technical complications

On a busy Friday night of emergency work, among seemingly millions of other emergencies, an 11-year-old, female spayed black domestic shorthaired cat called Midnight was admitted to the hospital. She had been diagnosed with diabetes mellitus approximately 9 months earlier and has been treated with twice-daily doses of U-100 insulin since that time. Initially her clinical signs of polyuria and polydipsia were challenging to get under control; however, after frequent rechecks with her veterinarian and progressive up-titration of her insulin dose, they had finally achieved balance, and Midnight had been relatively stable for months now.

A couple of days prior to presentation Midnight's owners had abruptly swapped her cat food, because the grocery store was out of stock of her normal food and they bought something that seemed equivalent. Midnight had seemed to do fine with the new food over the last couple of days, but on the morning of presentation she didn't eat a full meal. Nonetheless her owners thought she had eaten enough, so they administered the regular insulin dose.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

That night when they got home from work they found Midnight laterally recumbent and barely responsive, so they rushed her straight in to the emergency veterinary hospital, arriving at about 6:15 p.m. On examination at the time of presentation Midnight was mentally obtunded, bradycardic (heart rate 140 beats per minute) and hypothermic (temperature 95.2°F, 35.1°C). She was immediately triaged back into the treatment room, where the technicians had diligently placed an intravenous (IV) cephalic catheter and measured a blood glucose level (BG). Her BG was too low to read on the glucometer, and so 5 mL of 25% dextrose was administered to Midnight over a couple of minutes. Following the dextrose bolus her demeanor seemed to improve and her heart rate returned to a normal rate, so she was placed in a cage with heat support.

A BG was rechecked about 30 minutes later and was 80 mg/dL (4.4 mmol/L). At that time she was commenced on IV fluids at 2 mL/kg/hr supplemented to a final concentration of 2.5% dextrose, as it was thought that her BG should be higher at this time. Her temperature, pulse, and respirations were monitored hourly for the first few hours; her temperature was gradually coming up and her heart rate was also within a normal range.

For a few hours she seemed stable, and at 9 P.M. the nurses checked her BG again. Despite the dextrose supplementation her BG was down to 65 mg/dL (3.6 mmol/L), so additional dextrose was added to her fluid bag to achieve a final concentration of 5% dextrose. By this time, the results of a complete blood cell count, biochemical profile, and thoracic radiographs were also back; these screening tests were ordered to rule out a concurrent underlying disease that may have contributed to Midnight's current condition. Fortunately no new abnormalities were detected on her blood work and there was no evidence of underlying metastatic disease, pulmonary parenchymal disease, or cardiac disease on her thoracic radiographs.

At 11pm, as the ER doctor was entering surgery for a cat with a gastrointestinal linear foreign body, the nurses reported that Midnight's BG was still only 67 mg/dL (3.7 mmol/L) and she was still fairly depressed, although more responsive than at admission. This just didn't make sense; while it still seemed most likely that Midnight had received a relative overdose of insulin resulting in hypoglycemia, it was expected that her BG would now be higher after an initial dextrose bolus and then an ongoing infusion of dextrose-containing fluids. At this time, the ER doctor asked if the nurses could offer Midnight some food, as mildly to moderately hypoglycemic animals usually have a desire to eat. Unfortunately, Midnight did not want to eat and was

becoming fractious and difficult to handle. The dextrose supplementation was then increased to 7.5% with the plan to reevaluate her in a few hours.

Just as the ER doctor was finishing up with the multiple enterotomies and gastrotomy in the linear-foreign-body cat, a five-year-old Weimaraner presented with a gastric dilatation-volvulus (GDV). His owners knew what was going on and gave permission for surgery. He was fluid resuscitated, and the ER doctor was back in the OR, derotating his stomach and performing a gastropexy. Toward the end of this surgery, at around 1 A.M., Midnight's nurse came into the OR to notify the doctor that the BG was only 45 mg/dL (2.5 mmol/L). The ER doctor was mystified and began troubleshooting other causes, such as a mechanical or technical error with the fluids or the intravenous catheter. The nurse reported back to confirm that the IV was okay and the fluids were running (she had received a total of 54 mL since admission). Not knowing what else to do, the ER doctor ordered an increase of the dextrose to 10% in her fluids and planned to check on her as soon as the current surgery was complete.

The GDV surgery went fine and as soon as the ER doctor scrubbed out and called the Weimaraner's owners, he finally had a chance to check on Midnight. Although she was a little difficult to examine due to her fractious attitude, it was evident, much to the doctor's dismay that her IV catheter had become dislodged from the vein, and a large volume of fluid (containing a high concentration of dextrose) had extravasated into the subcutaneous space.

This necessitated calling Midnight's owner in the middle of the night to explain what had happened and warn them that having such highly osmolar fluid in the subcutaneous tissues could result in extensive tissue damage, such that she could slough the affected skin and end up with a huge skin defect requiring surgical reconstruction or, at worst, amputation. Her owners were understandably dismayed. The doctor advised the owners to continue supportive care, monitor the site, and treat any complications as they arose.

Fortunately, other than experiencing discomfort and swelling at the affected site, Midnight did not lose any skin. A cephalic venous catheter was placed in the other leg, and she required only 2.5% dextrose supplementation for the remainder of the night and following day to maintain normoglycemia. Within a few days she was eating normally again (with temporary discontinuation of insulin) and was discharged into the care of her owners, with a plan to recheck with her primary care veterinarian a few days later to revise her long-term management plan.

Key Points

- Catheter complications are common. If a therapy is not having the desired effect, the catheter and fluid line should always be investigated.
- If things aren't going as planned, it is vital to take the time to reexamine your patients and reevaluate to make sure that things aren't being missed. In this case, when the technician was asked to evaluate the cat's IV, she did not get the cat out and palpate the leg or flush the catheter; rather she just observed the cat in the cage, presumably because the cat resented handling. She could not see any swelling, and she read the pump, which was still pumping at the appropriate rate; then she made the assumption that it must be working fine.
- Always when a mistake is made, particularly one that could result in substantial patient morbidity, it is vital to notify the pet's owners as soon as possible. In this case the client was informed of the complication, any possible sequelae that may occur, and steps to be taken to minimize the risk of further morbidity. Fortunately, Midnight did well and did not experience any long-term problems associated with the error.

11 Sam and the Muscle Medicine

When you should listen to your gut and not your clients' wishes

Sam, a 5-year-old, male neutered yellow Labrador Retriever, was referred to a university teaching hospital critical care service for ongoing management of oliguric renal failure. Sam had ingested an entire bottle of alpha-lipoic acid tablets 5 days prior (~200 tablets). The dog's owner took the tablets for their reported muscle-building properties.

Following the tablet ingestion Sam had started vomiting. Sam had a history of eating things he shouldn't and usually vomited until they were out of his system, so his owners didn't think too much of it. The vomiting continued overnight and so Sam was seen by his primary care veterinarian the following day. Sam was actually quite sick by the time of presentation. He was 8% dehydrated and profoundly lethargic. He was admitted to the hospital for supportive care and diagnostics. An intravenous cephalic catheter was placed and he was started on intravenous fluids at 5 mL/kg/hr to provide for maintenance and to start to correct his dehydration. His fluid rate was adjusted over time in order to account for ongoing losses in the vomit and subsequent diarrhea that he developed. Famotidine, sucralfate, and maropitant were administered and Sam was kept NPO. A complete blood cell count and biochemistry profile were performed, revealing evidence of hemoconcentration (hematocrit 65%; total solids 8.5 g/dL) and azotemia (blood urea nitrogen 90 mg/dL; creatinine 3.5 mg/dL); this was

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

presumed to be prerenal associated with dehydration; however, a urine specific gravity was not confirmed to rule out renal azotemia.

The following day Sam was no longer clinically dehydrated but remained depressed and profoundly nauseated and continued to have intermittent vomiting. Sam's packed cell volume and total solids (PCV/TS) and a minichemistry profile were repeated. His PCV was down to 45% and his TS was 6 g/dL; however, his azotemia had worsened (blood urea nitrogen 140 mg/dL; creatinine 6 mg/dL). This led to concern that Sam's azotemia might be renal rather than of prerenal origin. His urine specific gravity at that time was 1.008.

Given concern regarding possible acute renal failure, Sam's fluid rate was further increased to encourage diuresis. Gastroprotectants were provided as previously. Sam's veterinarian consulted with an internal medicine specialist at the closest university veterinary school for advice regarding management of acute renal failure (ARF). Case management was discussed but referral for 24-hour care was encouraged given how tricky ARF can be to manage. The veterinarian passed on the recommendation for referral but Sam's owners were hoping that he could continue to be treated locally as the veterinary hospital was 4–5 hours away.

The veterinarian had wanted to pass a urinary catheter to quantify urine output and evaluate his fluid balance better, as it was hard to know how much Sam was urinating; however, this was not done as the practice did not have a catheter long enough (they just stocked short red rubbers for blocked cats). Instead high rates of intravenous fluids were continued. By the third day of hospitalization, Sam had apparently gained 16 pounds since presentation but his blood urea nitrogen was now off the scale of their chemistry analyzer and his creatinine was 11 mg/dL. He was also markedly hyperphosphatemic (phosphorus 20 mg/dL) and his electrolytes were all abnormal. Upon further consultation with the university, Sam's local veterinarian was finally able to convince the owners that he needed to be treated at a 24-hour specialist hospital, but they could not pick him up and transport him until that evening. Given evidence of fluid overload the intravenous fluids were stopped.

That evening Sam's owners transported him to the university hospital. On examination at the time of presentation Sam was laterally recumbent and mentally obtunded. He was markedly fluid overloaded, as evidenced by generalized subcutaneous edema, ascites, pleural effusion, pulmonary crackles, and serous nasal discharge (in addition to the aforementioned weight gain).

Sam was instrumented with a urinary catheter and a central venous catheter to facilitate monitoring of his central venous pressure. Sam was given a 2-mg/kg bolus of furosemide and started on a furosemide constant rate infusion (CRI) in an attempt to encourage urine output. Treatment with a fenoldopam CRI (0.8μg/kg/min) was also commenced. Given the severity of his fluid overload and azotemia, peritoneal dialysis was begun. Hemodialysis (either intermittent or as continuous renal replacement therapy) would have been ideal but was not available at that institution, and Sam was not stable enough for transport to the nearest veterinary dialysis center. The doctors in the intensive care unit worked intensely on Sam overnight; however, at around 6.30 A.M. the following morning (only about 12 hours after presentation) Sam had a grand mal seizure, and his owners elected euthanasia given the severity of his underlying disease.

Key Points

- Acute renal failure can be a rapidly progressive disease that should never be underestimated.
- It is important in an azotemic patient to immediately differentiate renal from prerenal azotemia with a urine specific gravity, such that appropriate management can be initiated for acute renal failure, if diagnosed.
- It is vital to be able to accurately determine urine output in a patient with ARF (ideally with an indwelling urinary catheter and closed collection system), as the progression from polyuria to oliguria then anuria can occur rapidly. While aggressive intravenous fluid therapy is important in a dehydrated and/or hypovolemic patient, once rehydration is achieved, fluids should only be administered if the patient is polyuric, and inputs and outputs should be vigilantly monitored. Any indication of oliguria should prompt administration of diuretics (such as furosemide and/or fenoldopam). Lack of response to these agents is an indication for dialysis (either peritoneal dialysis or, ideally, hemodialysis).

12

A Shot in the Dark

The importance of discussing all potential complications prior to performing the procedure

A 9-year-old, female spayed Labrador Retriever presented as a referral for abdominal pain, lethargy, decreased appetite, and possible abdominal masses on radiographs. The dog had been unwell for 1 month prior to presentation and had 3 weeks of tenesmus and narrow-diameter bowel movements. The only previous medical problem noted was arthritis that was being treated with nonsteroidal anti-inflammatory medications.

Clinical exam revealed a quiet, alert, and responsive patient with normal heart and respiratory rates, normal temperature, and no abdominal pain on palpation. She had nonreproducible lumbosacral pain on palpation, poor anal tone, and no anal reflex; however, no other neurologic deficits were noted. Multiple imaging procedures followed, including an initial review of the referral radiographs. No definitive abnormalities were noted on the abdominal radiographs. Thoracic radiographs, spinal radiographs, and abdominal ultrasound followed as further workup in this patient. The thoracic radiographs revealed subjective mild cardiomegaly and a vertebral heart score of 11.25 (normal[1] is less than 10.2); however, with no history of a murmur this was unlikely clinically significant and was not evaluated further. The spinal radiographs and abdominal ultrasound were normal.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

In light of the patient's poor anal tone and spinal pain a lumbosacral region magnetic resonance imaging (MRI) was performed. The MRI revealed a mass within the fifth lumbar (L5) vertebra (body, pedicles, and lamina all had been infiltrated and had bone lysis). The mass was within the spinal canal and was compressing the spinal cord. Additionally, the meninges at this level were thickened and contrast enhancing. A presumptive diagnosis of neoplasia in the L5 vertebra was made with differential diagnoses of osteosarcoma, plasmacytoma, or metastatic disease, and the owner was offered further diagnostics to identify the underlying disease.

Further diagnostics could be performed, including the following: surgical decompression and tumor biopsy; computed tomography (CT) for biopsy and acquiring a radiation therapy planning study; or CT simply for radiation therapy planning. Risks associated with all of the options were discussed. The risk of CT biopsy was considered less invasive than surgery and less likely to lead to complications, such as transverse process fracture. Radiotherapy without cytologic or histopathologic identification prior to treatment would limit the ability of the clinician to prognosticate for this dog. The owner elected CT-guided sampling and acquisition of appropriate imaging in case radiation therapy was indicated.

The patient returned to the hospital for the CT-guided biopsy procedure. The dog was anesthetized and initial 10-mm-thick helical slices through L3–L7 were obtained to determine the biopsy site and included the potential radiation therapy field. This was followed by 2-mm axial slices just through L5 to prepare for the biopsy procedure. Similar findings of bone lysis and mass in L5 were noted. Three small-gauge needles were placed percutaneously into the patient's subcutaneous tissues to provide guidance markers. A scan was repeated, and an 18-gauge Jamshidi needle was placed percutaneously on the lateral, right side and directed toward the vertebral body. Multiple intermittent scans were performed as the bone sampling needle was advanced until the position was acceptable for needle advancement through the bone. Upon application of force to drive the Jamshidi needle through the bone, a sudden loss of resistance was felt; no further movement was made to the needle, and a CT scan was performed to evaluate position of the biopsy instrument. This scan revealed that the Jamshidi needle had been deflected by the curvature of the vertebral pedicle down toward and through the transverse process. The needle had been advanced through the transverse process and into the retroperitoneal space, where it could be seen penetrating the caudal vena cava and deforming the dorsal aspect of the colon (Figure 12.1).

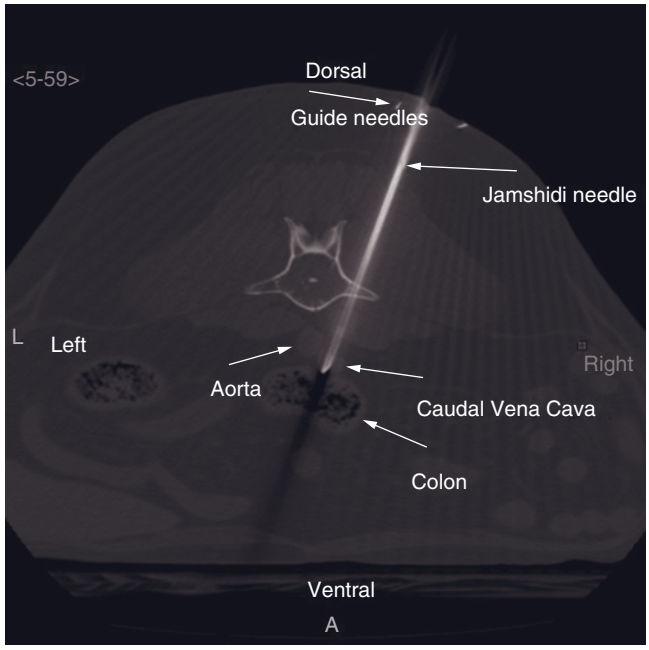

Figure 12.1 A 2-mm axial image through the L5 vertebral body, showing the biopsy needle and penetration of the caudal vena cava (window level 800 and width 3000).

The overseeing clinician was alerted and contacted the owners to explain that a life-threatening complication had occurred and immediate surgical exploration of the abdomen was necessary. This clinician also informed the owner of the potential for fatal perioperative outcome. The owner elected to move forward with surgery. For surgical preparation, the needle handle was cut away so the patient could be placed in dorsal recumbency and prepared for ventral midline approach celiotomy. Upon exploration it was noted that the needle entered the caudal vena cava but did not penetrate full-thickness, and removal and repair of the defect in the vessel was successful. The lesion at L5 was also biopsied at the time of surgery.

A diagnosis of plasmacytoma was made and the patient had a full course of chemotherapy and radiation therapy with remission of her cancer.

Key Points

- The procedure of CT-guided sampling is considered safe and accurate in humans, and in the limited number of reports in veterinary medicine it "appears to be safe and useful."[2] In percutaneous vertebral lesion sampling, complications can occur. The most common complications include minor hemorrhage or hematoma formation that is usually self-limiting and self-resolving (0.25%). Occasionally these are classed as major (0.5%) when the patient's clinical signs worsen or they require additional treatment (i.e., blood transfusion).[3] On this topic, reports in humans discuss the potential for more serious complications, including lacerating or penetrating vital structures; such an occurrence is considered rare, but it is noted that this procedure is "not without significant risk."[4] Veterinarians often do not contemplate or discuss in depth with clients all potential risks, common or rare, prior to performing procedures. In this case, a higher risk procedure was performed and some risks were discussed. Percutaneous CT-guided biopsy of vertebral bodies is not a common procedure performed at this institution. This procedure was performed by a resident with direct clinician supervision, which may have contributed to the complication; however, any uncommon procedure has a greater risk due to unfamiliarity with the technique.
- During CT-guided sampling procedures the needle advancement is performed without continuous monitoring and therefore there is greater risk.
- Uncommon procedures may have a greater degree of risk associated with them and need more in-depth discussion so that clients are completely informed.
- Some preemptive discussion of risk is important to keeping communication channels open.
- Being succinct and clear when in highly emotional situations was key to the positive outcome in this case.
- Good-faith compensation and communication helped maintain this client's confidence and willingness to continue high standard of care at our

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Part Two

Medical Judgment Errors

13 Another Down Dog

Sometimes things are not as they seem!

Snoopy, a 5-year-old Beagle, was referred to a teaching hospital for evaluation of hindlimb paresis. On physical examination, the dog was whiny and anxious and was difficult to evaluate. His temperature was slightly elevated at 103°F (39°C), the heart rate was 140 beats per minute, and he was panting. The mentation, cranial nerves, and front limbs were normal, and he was paretic in the hind limbs. The withdrawal reflex was decreased and there was equivocal deep pain in the pelvic limbs. A routine complete blood cell count, chemistry profile, and urinalysis were submitted to the diagnostic laboratory. It was late on Friday afternoon, and this was the fourth paralyzed dog that had presented in the past 2 days. Following a hallway consult with the neurosurgeons, Snoopy was rapidly anesthetized and transported to the magnetic resonance imaging (MRI) suite for diagnostic imaging of the spine. The MRI unit was new and there was great enthusiasm for using the technology. The anesthesia staff anesthetized Snoopy without incident but was unable to get any blood pressure readings from the cuff on the hind leg. However, moving the cuff to the front limb resulted in a reproducible reading of 180/110 mmHg.

The MRI scan unfortunately did not reveal any spinal cord disease, but it did show a clot in the terminal aorta (Figure 13.1). Repeating the physical examination under anesthesia showed the absence of femoral

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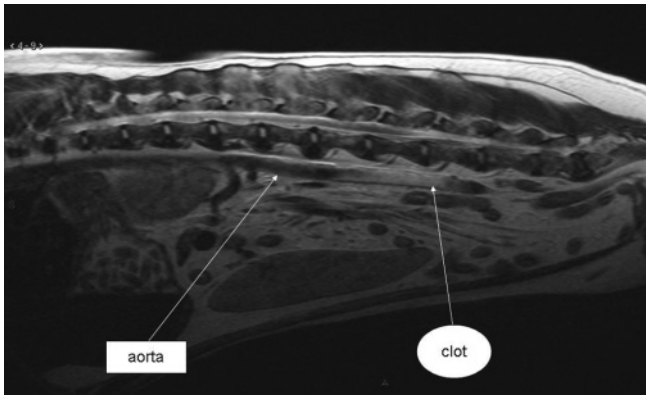

Figure 13.1 An MRI showing the presence of a significant caudal aortic thrombus.

pulses. Evaluation of laboratory results showed mild azotemia, decreased serum albumin at 1.9 g/dL (19 gm/L), increased cholesterol, and proteinuria, with a 3+ protein and hyposthenuria. A urine protein-to-creatinine ratio was elevated at 16 (reference range less than 1), consistent with a diagnosis of protein-losing nephropathy. Antithrombin, a protein that is similar in size to albumin, is lost in the urine due to glomerular disease, and this protein is necessary to prevent abnormal thrombus formation. Because of this, a large thrombus had formed in the terminal aorta, causing hindlimb paralysis.

Key Points

- A thorough physical examination should be performed in all patients, even those whose diagnosis seems clear and in whom a full examination would be problematic due to the clinical state of the patient (stressed, painful, anxious). Although aortic thromboembolism is not as commonly diagnosed in dogs as in cats, the inability to palpate femoral pulses on initial examination would have resulted in a different diagnostic and treatment plan.
- The inability to rapidly assess chemistry profiles and urinalysis after-hours can confound the diagnosis in some cases. Point-of-care testing should be available and routinely performed on cases in which the diagnosis is not clear.

14

It HAS to Be Blasto!

Surprise endings

Bud was a typical 4-year-old yellow Labrador, who was a GREAT pheasant hunting dog! His owner, Mr. Light, had taken him on two hunting adventures already this Fall, with great success. However, Bud had not been acting himself for the past few days, seemingly painful or weak, with heavy breathing. Mr. Light took him to his primary care veterinarian, who also happened to be Mr. Light's brother-in-law. Bud was found to have a pretty high fever, and chest radiographs showed a pattern very consistent with blastomycosis. Blood tests were otherwise normal, and a blastomycosis antibody titer was submitted to an outside laboratory. He was started immediately on itraconazole and some nonsteroidal anti-inflammatory medications and was kept in the hospital to watch his breathing. His pulse oximetry reading was low at 89%, but it improved to 94% when on oxygen supplementation.

Unfortunately, Bud's respiratory distress started to worsen over the next few days. It is known that when you start treating for blastomycosis with itraconazole, many patients get worse before they get better, due to the inflammation induced by the dying fungal spores. When he continued to worsen and become more oxygen dependent, he was transferred to a referral hospital for 24-hour care in an intensive care unit (ICU).

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Figure 14.1 A ventro-dorsal thoracic radiograph representing severe nodular lung disease.

On presentation to the referral hospital, Bud was breathing heavily, but otherwise seemed okay. He still did not want to eat, but his temperature was normal and he seemed bright. Repeat blood tests and an abdominal radiograph were normal. The chest radiographs were repeated, and they had worsened (Figures 14.1 and 14.2). He was admitted into the ICU and was placed in an oxygen cage. At this time, his blastomycosis antibody titer returned, and it was negative. The ICU doctor discussed trying to get a definitive diagnosis by transtracheal wash, since Bud was not responding, he did not have any other lesions consistent with blasto, and his titers were negative. It was still extremely likely that Bud was infected with blastomycosis, but it would be best to try to confirm it by finding the actual organisms. Mr. Light agreed to the transtracheal wash and left Bud in the hands of the specialists.

The transtracheal wash procedure went very smoothly. However, the sample obtained from the wash was poorly cellular, and only red cells were seen on cytology. No inflammatory cells or blasto fungal organisms were noted.

Bud continued to worsen over the next 24 hours, and it was at that time that Mr. Light decided to humanely euthanize him. It was a very

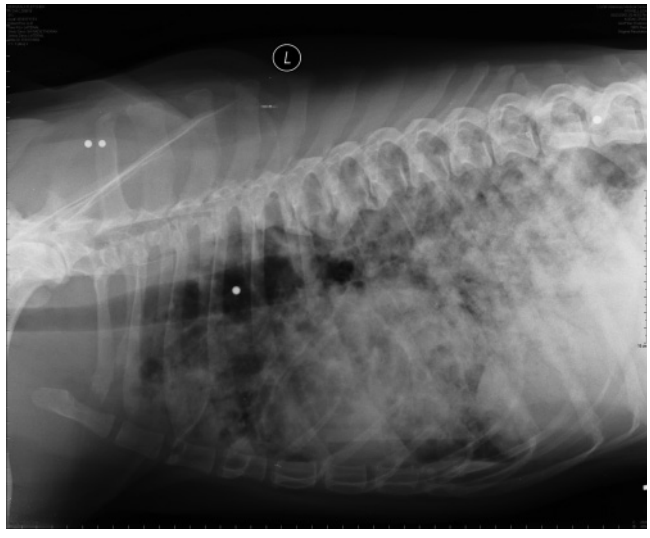

Figure 14.2 Bud's lateral thoracic radiograph.

sad moment, but Bud was really struggling to breathe, and Mr. Light just couldn't watch him in that state. Mr. Light did agree to a necropsy, to try to verify the disease, for his peace of mind.

Suprisingly, necropsy results did not show blastomycosis organisms in lungs. Instead, metastatic hemangiosarcoma was found throughout all lung lobes. The primary tumor was a 2-cm mass, located on the right auricle of the heart.

Key Points

- This case illustrates that a seemingly obvious diagnosis can sometimes be wrong. This dog lived in an endemic blastomycosis area, was a young hunting dog, and had lesions in the lungs typical of the disease. However, when the organisms could not be located on any tests performed, and the dog had no response to therapy, it was reasonable to look for another cause.
- Another diagnostic test that might have been helpful in this case is abdominal ultrasound and echocardiogram, to identify any potential primary tumor causing metastatic pulmonary disease. In this case, the tumor was so small, it might not have been visualized; however, it would have been an appropriate diagnostic to perform.
- Most of the time, a duck is a duck, but sometimes, a zebra comes along.

15 Can You Tap That Cat for Me?

Complications of common procedures

Boeing, a 12-year-old, neutered male domestic shorthair cat, was considered a "frequent flyer" since having been identified with biventricular heart failure. His heart failure was managed with furosemide and spirolactone-hydrochlorothiazide, as well as enalapril and clopidogrel. Despite these medications, Boeing still developed clinically important pleural effusion about every 6 weeks. At one point, Dr. Hurri had tried to increase his diuretics; although effective, this resulted in Boeing being admitted to the hospital for 2 days of intravenous fluids and potassium supplementation due to extreme volume contraction and profound hypokalemia (potassium 1.9 mmol/L). Boeing's owners—and, seemingly, Boeing—preferred to a have periodic thoracocentesis performed, as he seemed to tolerate them well and his quality of life was otherwise excellent.

Boeing presented one afternoon as an emergency: he had missed his last week's appointment to be tapped due to car trouble and, today, he was in trouble with marked respiratory distress. Dr. Hurri was not available due other appointments, so he asked Dr. Aire to tap the chest for Boeing. Typically about 220 mL of a modified transudate was to be expected. Dr. Aire was happy to help; she had not tapped many chests and welcomed the experience.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Boeing was held in sternal recumbency by an experienced technician. Dr. Aire prepared the site and began to tap the chest using the 21-gauge butterfly catheter she had used in other cats. However, it was apparently not long enough to reach the chest cavity. Boeing was a big cat, 22 pounds at his prime, and even now he tipped the scales at $17\frac{1}{2}$ pounds. Dr. Aire thought about checking with Dr. Hurri but, wanting to appear independent, decided to try to tap the chest with a $1\frac{1}{2}$-inch, 20-gauge needle and associated connection set. After some fishing around with the needle deep in Boeing's chest and after a small struggle, Dr. Aire removed 230 mL of a modified, almost chylous effusion. Just as she was starting to feel pleased with herself, she noted that she also got 20 mL of air. Dr. Aire checked the connection, and then reaspirated, this time getting 60 mL of air before reaching negative pressure. Now nervous, Dr. Aire stopped tapping the chest, removed the needle, and decided to watch Boeing for the next few minutes. This was clearly a bad decision, as within 5 minutes, Boeing was laterally recumbent and gasping for air. A rapid thoracocentesis was performed and 300 mL of air was removed, with no endpoint reached. Boeing did look brighter, but Dr. Aire was clearly distressed. Boeing's owners were to return shortly to pick him up, and it was not going to be an easy conversation to have with them, or with Dr. Hurri. Boeing was treated by placing a chest tube and placing him on a continuous suction unit; however, after 3 days, there was no improvement, and Boeing's owners elected to euthanize him as they did not think a thoracotomy was a reasonable option.

Key Points

- Iatrogenic pneumothorax is a REAL risk with any thoracocentesis procedure. With healthy lungs (e.g., traumatic pneumothorax), if an iatrogenic pneumothorax occurs, the lung tissue heals rapidly and with minimal intervention.
- In chronic pleural effusions, the pleura on the surface of the lung becomes thickened and fibrotic and, if torn by a needle, will not seal promptly. Inadvertently piercing the lung is more likely in cats due to their small size.
- No chronic effusion should be tapped without the owners having a clear understanding of the potential risks, even when the benefits are high!
- Using a catheter may help limit the potential for trauma.

16

Chief's Complaint

Entertain all differential diagnoses

During morning rounds, a discharge report was found on the table from the night before. The report read "We are sorry to have diagnosed Chief with pancreatic cancer; this is an untreatable disease; please take her to your primary care veterinarian for humane euthanasia after your family has visited with her." This report piqued the interest of the daytime critical care doctors, as Chief had presented to the emergency service during the night. Pancreatic cancer can be hard to diagnosis without a biopsy or more extensive testing, none of which would have been an option late on a Saturday night. Therefore, the medical record was reviewed. The record documented a 6-year-old, icteric Labrador Retriever with a 1-week history of vomiting. An abdominal ultrasound had been performed, which showed a biliary obstruction and a large and brightly echogenic pancreas. The ultrasonographer, a first year radiology resident, had suggested the obstruction was a tumor, a cholelolith, or severe pancreatitis, although he thought cancer was most likely.

The daytime veterinarian called Chief's owners to see how she was doing. They were understandably upset; slowly, the idea of further testing was introduced. Chief's owners were very interested in further evaluation, if only for their peace of mind, as she was a very good dog and a member of the family. Chief returned to the hospital and under-

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went an exploratory surgery, which confirmed biliary obstruction from a choleolith. The obstruction was relieved, and an indwelling stent was placed for 2 weeks. Chief went on to make an unremarkable recovery and was rapidly back to her regular self.

Key Points

- Consider the best possible outcome for all your differentials. While many times the outcome is less than ideal, there are many "fixable" diseases that may initially look very serious.
- While the prognosis for advanced pancreatic cancer is grim, it was not at all clear that was what Chief was suffering from. In this case, the emergency clinician failed to consider all the options for the conditions and failed to recognize the inherent limitations in some tests. In all cases where the diagnosis is even 1% in question, admission to the hospital or some other follow-up plan is warranted or at least should be discussed with the client.
- The survival rate following euthanasia is zero; as many junior clinicians are initially horrified to realize, it is often "easier" to euthanize than to struggle with the next diagnostic steps, especially with an unclear prognosis.

17

But He's Been Fine!

The importance of assessing thoracic radiographs in patients experiencing blunt force trauma

Boscoe was a very energetic, 6-month-old Pug. He had, unfortunately, learned how to dig in the yard; one day, he dug a hole so deep he was able to crawl under the fence. Once free of the yard, he started running full out and didn't see the car coming down the street. He was hit on his side, but the car thankfully was only going about 30 mph and immediately stopped when the driver saw what had happened. Boscoe had a collar and tags, and the driver called the owner to let him know what had happened. Boscoe's owner ran outside to get him, not knowing he had gotten out of the yard. He was taken to his primary care veterinarian right away.

Dr. Johnson had been taking care of Boscoe since the owners obtained him, administering his puppy shots, and was scheduled to neuter him that next week. When Boscoe presented urgently after being hit by a car, he was very concerned.

On presentation, Boscoe had pale mucous membranes and was panting heavily. He was tachycardic, with a heart rate of 180 beats per minute. His femoral pulse quality was moderately decreased. He had

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

a small laceration on the right side of his thorax but was fully ambulatory. Dr. Johnson diagnosed him with hypovolemic shock, placed an intravenous catheter, and began a 30 mL/kg bolus of crystalloid fluid. His packed cell volume and total solids were normal, and on chemistry profile his liver enzymes were elevated, but all else looked fine. Following the intravenous bolus of fluids, he began breathing more normally, and his heart rate came back down to normal. Dr. Johnson gave him an intravenous dose of opioids for analgesia, and continued monitoring.

By that afternoon, Boscoe was found to be recovering well. He was walking normally and ate some. He was very anxious in his kennel, despite the pain medication that he was given. It was decided that he should be discharged, as he would be much more comfortable at home, and he seemed to be doing fine. Instructions were given to the owner to bring him back in right away if he noticed any further problems. Dr. Johnson called and checked on Boscoe a few days later and was told that he was back to his happy, rambunctious self.

Because of Boscoe's accident, it was decided to put off neutering him for another month. However, Boscoe's owner didn't schedule him for the surgery, deciding to keep Boscoe as an intact male dog.

Six months later, near Boscoe's first birthday, the owner noticed that he was suddenly breathing very hard. He was using his whole body to breathe and looked like he was about to fall over. Once again, the owner rushed Boscoe to Dr. Johnson.

On presentation, Dr. Johnson noted that Boscoe was having severe difficulty breathing and was only saturating at 86% on a pulse oximeter reading. On thoracic auscultation, the lung sounds were very quiet on the right and seemed increased on the left. In addition, he thought he heard borborygmus in the chest cavity. He immediately placed Boscoe in an oxygen cage and prepared to take some thoracic radiographs.

Thoracic radiographs showed a diaphragmatic hernia, with intestinal loops herniated into the right side of the chest. Dr. Johnson immediately discussed the situation with Boscoe's owner, including the recommendation for immediate surgery to repair the hernia. Boscoe's owner did not understand how this could have happened, as it had been 6 months since the accident and he had seemed fine since then. Dr. Johnson then explained that sometimes a hernia occurs at the time of the accident but does not cause a problem for months, maybe even years. Boscoe was taken to surgery to repair the hernia and was neutered at the same time. The surgery went very well, and Boscoe returned home, with no further complications noted.

Key Points

- Blunt trauma is a common emergency presentation in small-animal veterinary patients. Because the rib cage of dogs and cats is very flexible (as opposed to the rigid nature of the human rib cage), many injuries can be sustained to the thoracic cavity, with no outward signs of problems. Because of this, it is ALWAYS recommended to perform thoracic radiography on all patients after blunt trauma, to identify occult diaphragmatic hernia, mild pneumothorax, and pulmonary contusions.
- If underlying pulmonary injuries are diagnosed with radiography, it is often a sign that the trauma was more severe than first thought, especially if the patient looks clinically improved. These patients may benefit from hospitalization and overnight monitoring and care, even though they appear to stabilize quickly in the emergency room.

18 Would You Like Water with That? A Tale of Two Dogs

The dangers of hypernatremia!

Wolfie

Wolfie, a 7-year-old Husky, was seen for seizures. He had been an epileptic for 4 years now and had been very hard to control. He has been receiving phenobarbital and potassium bromide for the last 3 years, but has had several episodes of status epilepticus. He presented to the emergency clinic, once again in status, and was controlled with multiple extra doses of phenobarbital and a brief propofol constant rate infusion. Despite a presenting temperature of 105°F, thought to be due to hyperthermia from seizure muscle activity, Dr. Leeds chose not to start intravenous fluids because he was concerned that the chloride in the fluids would decrease the bromide levels and could potentially increase the likelihood of seizures. Wolfie was a typical Husky, and he barked and whined while in the run. The "sheet of shame" was hung in front of his run, and even though the technicians could hear Wolfie panting and whining behind the sheet, he was thankfully a bit quieter. Dr. Leeds ordered Wolfie ad lib food and water, but Wolfie continue to spill the water and then tried to make a break for it when the run was being cleaned. Needless to say, Wolfie was not a popular patient, so the technicians were happy when, behind the sheet, Wolfie finally appeared

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

to go to sleep. About 2 hours later, Dr. Leeds returned from appointments to check on Wolfie. He had been pleased not to have been paged every 5 minutes with a complaint of how annoying Wolfie was. However, when he went to look at Wolfie, he found him mentally inappropriate and disoriented. Quick point-of-care testing showed that Wolfie's sodium level was 190 mmol/L.

Precious

Precious Kupffer was a 4-month-old, 1-kg Yorkie puppy. She was presented for failure to thrive. She had not been growing, had a poor appetite, and had more than her share of hypoglycemic episodes. Precious would often get particularly sleepy after meals and did not always seem to recognize her family. On examination, Precious was found to have dull mentation and was very thin. Dr. Wright was pleased; it seemed that Precious was a classic portovenous shunt. The Kupffers were pleased that a possible diagnosis and cure existed for Precious. Even though she had only been a member of the family for 2 months, she was dearly loved! Dr. Wright prescribed 5 mL of lactulose by mouth 3 times a day and discharged her on a low-protein diet. Blood samples were submitted for a complete blood cell count, chemistry profile, and bile acids, and an ultrasound was scheduled for 2 days later.

The morning of her appointment, Precious presented on emergency. She had been having diarrhea for the last 24 hours, was not eating well, and this morning was found collapsed and not moving. A quick blood check showed that the blood glucose was low at 36 mg/dL (2 mmol/L) and her sodium level was very high at 198 mmol/L.

Key Points

- Sodium levels most often reflect water balance. In a typical animal, voluntary water consumption and renal compensatory mechanisms control sodium levels quite tightly.
- Hypernatremia is a marker of a medical error in hospitalized pets and is a cause for alarm in pets presenting on an emergency basis.
- For Wolfie, the hypernatremia developed due to the excessive losses from panting and excessive anxiety (e.g., free water loss), which was not replaced because Wolfie was spilling the water offered to him, and he was not placed

Key Points (Continued)

on intravenous fluids. The clinical signs of hypernatremia were not detected sooner because the run was covered by a sheet, in an attempt to keep him quiet. Panting, anxious dogs have the ability to lose an excessive amount of water through the respiratory system, especially without access to water.

- For Precious, the hypernatremia developed due to free water losses from the osmotic diarrhea, caused by the lactulose medication, without adequate fluid intake. The lactulose dose for this size puppy was way too high; for a frail puppy, hospitalization is often warranted.
- Hypernatremia commonly develops in animals with preexisting polyuria–polydipsia disease that are given inadequate fluid therapy. For example even "3× maintenance" might not be nearly enough for a dog with unregulated diabetes.
- Animals that are not drinking water should have their sodium levels followed, especially if they have excessive losses through the respiratory, urinary, or gastrointestinal system.

19

The Great Pretender

ALWAYS consider hypoadrenocorticism as a differential diagnosis in dogs with nonspecific symptoms

Pepper, a 3-year-old, spayed female black Labrador, presented to the emergency clinic after she had been seizuring for 30 minutes. The owner had taken her to the primary care veterinarian that morning, as she had been vomiting and lethargic for the past 3 days. Blood tests had been taken earlier in the afternoon, and the results were to be faxed to the emergency clinic within the hour.

The emergency intern had just recently become a doctor, and this was one of his first overnight shifts. On physical examination, the intern noted that Pepper was actively seizuring. An intravenous (IV) catheter was placed, and 5 mg of diazepam was administered IV. A blood glucose taken at that time was low, at 46 mg/dL (2.5 mmol/L). A bolus of diluted 50% dextrose was given IV. She then stopped seizuring, although her mentation was still abnormal. Further assessment showed a heart rate of 100 beats per minute, hypotension with a systolic blood pressure of 78 mmHg, and a normal body temperature. Intravenous fluids were continued, and the intern went to speak with the owner.

Historically, Pepper had been ill for the past 3 days. She had noticeable lethargy and had vomited a few times. She was still eating some,

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

but with much less vigor. She is allowed outside to roam around and, this being June, had recently been out much more, due to the warm weather. She lives on a few acres of land and runs about unsupervised, about 2 hours a day. Because of the rural nature of the area, she does have access to potential toxins, including rodenticides and antifreeze.

When the intern left the examination room, the receptionist brought him the faxed blood test results and urinalysis from the primary care veterinarian. The clinician immediately noticed that the blood urea nitrogen and creatinine were elevated, with a urine specific gravity that was low. Because of the potential for toxin exposure, the seizures, and the azotemia, the intern was sure that Pepper had ingested a fatal amount of ethylene glycol.

The intern discussed the very guarded prognosis that goes along with ethylene glycol toxicity that has progressed to azotemia and seizures. Therapy could be instituted, but it was unlikely that the antidote would do any good with the advanced signs that this dog was exhibiting. In addition, the owner expressed financial constraints and felt that, since the outcome was so grim, it was probably best to euthanize Pepper. After the owner said her goodbyes, Pepper was humanely euthanized.

The next afternoon when the intern came back on shift, there was a message from Pepper's primary care veterinarian. He wanted to know how Pepper was doing, as based on her blood work, she clearly had hypoadrenocorticism. The intern raced to the medical records department to pull the record and reevaluate the blood work. Sure enough, the potassium level was elevated and the sodium low. In addition to the azotemia and mild hypoglycemia, she was also hypercalcemic. The intern felt horribly guilty and couldn't believe he had made such an obvious mistake. He called and spoke with the primary care veterinarian, explaining the situation, and it was decided not to tell the owner of their suspicions. To this day, that intern will never again leave Addison's disease off the differential list, no matter the presenting clinical signs!

Key Points

- All diagnostic tests should be completely analyzed, and all potential differential diagnoses explored. This case shows a "rookie mistake": allowing the diagnosis of toxin exposure to direct the analysis of the blood tests, not leaving open the possibility of other disease processes.

(*Continued*)

Key Points (Continued)

- An open and honest discussion with the primary care veterinarian was key in this case. The intern admitted his mistake and felt terrible that he had euthanized a pet that had a disease that was very treatable. However, the diagnosis was unverified, and you cannot undo euthanasia. Because of this, it was decided that nothing good would come out of calling Pepper's owner to explain that she might have had a disease with a better prognosis. This is a point for debate. While some clinicians would agree with this scenario, other clinicians would feel strongly that it is important that the client knows of the final diagnosis. In any case similar to this, a careful debate about the pros and cons of disclosure should be made, and hospital administration should be involved. The owner had also admitted to financial constraints, and although Addison's disease is treatable, lifelong medication is expensive, averaging about $1200–$1500 a year for a dog of Pepper's size.
- Despite these assurances, the intern felt very guilty, and it is extremely difficult to realize that you may have done harm when intending to do good. However, mistakes do occur, and as long as one learns from them, then something worthwhile can result.

20 A Lack of Concentration

Another example of how Addison's disease can masquerade as a disease with a much worse prognosis

A 5-year-old, spayed female Labrador Retriever was referred for management of acute renal failure. The dog had presented to the primary care veterinarian with a 5-day history of anorexia, lethargy, and vomiting. On physical examination, the primary care veterinarian found the dog to be uncharacteristically subdued but otherwise normal. Weight loss of 2.8 pounds since the last visit (3 weeks prior, for a urinary tract infection) was documented. The primary care veterinarian obtained abdominal radiographs, which were reported to be normal, and in-house blood work, which included blood urea nitrogen (BUN) 40 mg/dL (2.22 mmol/L; normal range 7–25 mg/dL), creatinine 1.8 mg/dL (159 µmol/L; normal range 0.3–1.4 mg/dL), potassium 6.7 mEq/dL (normal range 3.7–5.8), alkaline phosphatase 18 U/L (normal range 20–150), and normal values for total bilirubin (0.3 mg/dL), alanine aminotransferase [(ALT) 40 U/L], glucose (105 mg/dL; 5.8 mmol/L), total protein (7.2 g/dL; 123 µmol/L), albumin (2.6 g/dL; 26 gm/L), amylase (1021 U/L), and sodium (144 mmol/L), for which normal ranges were not indicated. A urinalysis showed a urine specific gravity of 1.014. Based on findings of azotemia, isosthenuria, and hyperkalemia, the primary care veterinarian made a diagnosis of acute primary renal failure and referred the dog for further evaluation and treatment.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

On admission, the dog was dull and listless with a body temperature of 100.8°F, pulse 120 beats per minute, respiratory rate 24 breaths per minute, and body condition score 4/9. Her mucous membranes were pink and moist and her capillary refill time was 2 seconds. Thoracic auscultation and abdominal palpation were unremarkable. Neurologic and musculoskeletal evaluations were normal. Her systolic blood pressure at presentation was 85 mmHg (via Doppler auditory ultrasound).

Because of the mild degree of azotemia at the time of initial presentation for this illness, additional differential diagnoses including conditions associated with prerenal azotemia and isosthenuria were considered. Because of the clinical presentation and significant hyperkalemia, hypoadrenocorticism was included as a likely differential for this dog's illness. A complete blood cell count (CBC), serum chemistry, urinalysis, baseline cortisol level, abdominal radiography, and abdominal sonography were performed. The CBC demonstrated a lymphocytosis of 5.38 K/μL. Abnormalities on the serum chemistry profile included creatinine 3.6 mg/dL (318 μmol/L; normal range 0.5–1.6 mg/dL), BUN 56.5 mg/dL (3.14 mmol/L; normal range 7.0–31.0 mg/dL), phosphorus 8.0 mg/dL (0.44 mmol/L; normal range 2.4–6.5 mg/dL), sodium 128 mEq/L (normal range 141–161), potassium 7.5 mEq/L (normal range 3.9–5.7), sodium-to-potassium ratio 17 (normal range 28–36), chloride 100 mEq/L (normal range 104–125), and cholesterol 95 mg/dL (5.28 mmol/L; normal range 109–315 mg/dL). Urine specific gravity was 1.019 with a pH of 7. Baseline cortisol was less than 27.59 nmol/L (normal range 58.0–144.0). Adrenocorticotropic hormone (ACTH) was administered and the cortisol remained less than 27.59 nmol/L. Abdominal radiographs were considered normal; previous radiographs from the primary care veterinarian were not available for review. Neither adrenal gland could be identified on abdominal sonography, presumably due to small size. The examination was otherwise unremarkable: the kidneys had a normal sonographic appearance. The dog was admitted to the intensive care unit for intravenous fluid therapy with 0.9% NaCl and continuous cardiac monitoring; she at no time demonstrated electrocardiographic abnormalities. Dexamethasone-SP (intravenously) and desoxycorticosterone pivalate [(DOCP) subcutaneously] were administered. The dog showed immediate and dramatic clinical improvement. Her blood pressure normalized, her azotemia resolved after 12 hours, and electrolyte abnormalities were corrected within 24 hours of initiating treatment. She was discharged on oral prednisone with instructions to continue daily prednisone, DOCP injections every 25 days, and electrolyte monitoring. She has

returned for subsequent rechecks and is doing exceptionally well, "better than ever" per the owners. She has gained weight and is able to concentrate her urine (specific gravity 1.040).

Hypoadrenocorticism may appear clinically similar to renal failure, especially acute, oliguric renal failure. In both conditions, lethargy, anorexia, and vomiting are common clinical signs; patients are often dehydrated and may be hypotensive and bradycardic; clinical pathologic abnormalities may include azotemia, acidemia, hyperkalemia, hyperphosphatemia, hypercalcemia, and a low sodium-to-potassium ratio. Urine specific gravity will be inappropriately low for a dehydrated patient in renal failure because of an inadequate population of functioning nephrons, and in hypoadrenocorticism because of insufficient levels of aldosterone necessary for sodium reabsorption and maintenance of the medullary concentration gradient. The clinical similarities of these two conditions dictate careful consideration and localization. Misdiagnosis results in incomplete treatment of hypoadrenocorticism and may result in unnecessary euthanasia, as renal failure bears a much worse prognosis.

Key Points

- Azotemia is defined as excess urea, creatinine, or other nonprotein nitrogenous compounds in the blood. It is further classified as prerenal, renal, or postrenal in origin. In evaluating azotemic patients, such classification can facilitate selection of appropriate diagnostic and therapeutic procedures and can inform communications regarding potential causes and prognosis. Failure to properly identify the underlying mechanism of the azotemia can lead to inappropriate or even contraindicated treatment plans. Urine specific gravity is a useful parameter to help distinguish renal azotemia, in which the presence of significant renal dysfunction results in an inability to concentrate and/or dilute urine (isosthenuria), from prerenal and postrenal causes, where renal function and urine concentrating ability are retained (unless significant secondary renal injury has developed). However, a number of extrarenal conditions, including central diabetes insipidus, hepatic insufficiency, aldosterone deficiency, hypercalcemia, hyperadrenocorticism, and *Escherichia coli* endotoxemia, as well as certain drugs, can interfere with the kidneys' ability to concentrate urine in the absence of primary renal disease. Patients with these conditions may become dehydrated more readily because of the inability of the kidneys to conserve water and may not show an appropriately concentrated urine in the face of

(*Continued*)

Key Points (Continued)

dehydration, similar to patients with renal insufficiency. It is therefore important to consider these factors when evaluating a patient with dehydration or azotemia and a lower than expected urine specific gravity. Renal failure and hypoadrenocorticism can be clinically and biochemically very similar.

- Prerenal azotemia is common in patients with hypoadrenocorticism because of fluid losses through vomiting and diarrhea and inability of the kidneys to conserve water.
- The combination of azotemia and failure to concentrate urine is consistent with but not pathognomonic for renal failure; extrarenal as well as renal disease can compromise the kidneys' ability to concentrate urine.
- Multiple differential diagnoses should be considered for each clinical problem (i.e., azotemia).
- Dogs that are clinically ill from renal failure generally have more than just a mild azotemia.
- Tunnel vision regarding a specific diagnosis is always dangerous to the patient.

21

Unlucky Lady

Remember to consider ALL possible differential diagnoses for your patient!

Lady, a 7-year-old Pit Bull Terrier, was seen through the emergency service for an enlarging abdomen. The emergency doctor, Dr. Margeaux, evaluated Lady. Her physical examination documented severe ascites, but all else was okay. Point-of-care testing showed severe hyponatremia (sodium 129 mEq/L), moderate hyperkalemia (5.1 mEq/L), and mild azotemia (blood urea nitrogen 42 mg/dL; 15 mmol/L). Her hematocrit was 38% and her total solids 5.9 gm/dL (59 g/L). Lady's owner commented that she only had a few hundred dollars, and if this was not a good prognosis, she thought that euthanasia might be the best way to go. Dr. Margeaux talked with her, said nothing that was even a little fixable could cause this degree of hyponatremia with ascites, and that it was best to humanely euthanize her. Lady's owners took her home for the night and returned the following morning for euthanasia. They agreed to the necropsy suggested by Dr. Margeaux. Necropsy showed a large volume of pericardial effusion, with no mass or microscopic lesions. The final diagnosis was idiopathic pericardial effusion.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Key Points

- Severe hyponatremia is often caused by decreased effective circulating volume, as seen with pericardial effusion, and is magnified in those dogs with right-sided congestive heart failure.
- Idiopathic pericardial effusion (IPE) carries a good-to-excellent prognosis, if treated initially with pericardiocentesis, then definitive surgery to remove the pericardium (pericardiectomy).

22 But She Has Heart Disease!

All aspects of a patient's history should be carefully considered when presenting for an illness

Raven, a 12-year-old cat, has not been feeling well since a week after the new kitten (Finn) came home from the shelter. Raven, a pure black domestic shorthair cat, was herself found in a dumpster with her brother (Shadow) as a 6-week-old kitten. About 2 years ago, Shadow developed heart failure from hypertrophic cardiomyopathy. After treatment, Shadow has been stable and doing well. Raven herself was found to also have heart disease, although not as bad as Shadow's. Both cats had been prescribed enalapril and furosemide every day and while Raven herself has never been in heart failure, seeing Shadow so sick has made her owners, the Brewsters, very worried about respiratory distress.

Both Finn and Raven had a full-blown upper respiratory infection, and Raven had not eaten or drunk anything in almost 2 days, when Mrs. Brewster decided to bring her to the hospital. Finn has recovered almost completely within 3 days.

On examination, Raven is at least 10% dehydrated and very weak. In-house blood testing documents a creatinine of 14 mg/dL (1238 μmol/L) and a blood urea nitrogen greater than 120 mg/dL (42 mmol/L). A urine specific gravity is low at 1.014. Dr. Sparrow, the emergency doctor, broke the bad news to Mrs. Brewster. It looks like Raven has bad kidney failure, and he is not optimistic that he can turn

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

her around. It is very challenging to treat cats with both heart and renal disease. Mrs. Brewster begs him to try; it is almost Christmas and she can't bear the thought of losing Raven.

Dr. Sparrow starts Raven on "half-maintenance" intravenous fluids and famotidine, and tries to tempt her to eat or drink. Dr. Sparrow advised Mrs. Brewster that an immediate echocardiogram is warranted, but the cardiologists will not be available for several days due to the holidays. The following morning, the day-shift doctor, Dr. McNamara, takes over care of Raven. She finds that Raven is still very dehydrated and her creatinine is unchanged at 13.8 mg/dL (1220 µmol/L). She calls Mrs. Brewster with an update, and Mrs. Brewster reminds her that Raven needs her heart meds this morning! Dr. McNamara confirms that Raven has been receiving her heart medications all along, and realizes this may be part of the azotemia.

Dr. McNamara orders a chest radiograph on Raven and, when that returns clear, increases her fluid rate to 20 mL/hr, which should replace her dehydration and provide for ongoing needs over the next 12 hours. Rather quickly, Raven begins to improve, and within 2 days she is eating; at discharge on day 4, her creatinine is 1.7 mg/dL (124 µmol/L).

Key Points

- Administration of diuretics will cause a dilute urine, even in the face of dehydration. This can make it easy to misdiagnose renal failure, as Dr. Sparrow did. Raven got into problems because she was continuing to receive an angiotensin converting enzyme (ACE) inhibitor and a diuretic, at a time when she was not eating or drinking.
- It is always wise to confirm if a patient is continuing to receive medications.
- This problem was further magnified as Dr. Sparrow was anxious about administering intravenous fluids to a patient with heart disease, even in the presence of severe dehydration and the absence of any signs of heart failure. Certainly, fluid therapy should proceed with caution, in a patient with heart disease, but many tolerate (and NEED) a large amount if they are dehydrated.
- Chest radiographs are helpful in determining if a patient can tolerate fluids.

23

Pennies from Heaven

ALWAYS perform abdominal radiographs in patients presenting with signs of intravascular immune-mediated hemolytic anemia!

Spacey was a 2-year-old, spayed female Cocker Spaniel that presented to a referral emergency clinic with an acute onset of severe lethargy. The owners reported that she had been fine that morning before they went to work; upon returning in the late afternoon, they found her unable to rise. She was alert and responsive, but seemingly very, very weak. She had been previously healthy, was on no medications, and besides her spay procedure had never had any surgical procedures. She was also up to date on her vaccines and took monthly heartworm and flea-and-tick preventative all year round.

On physical examination, the emergency clinician noted that her gums were very icteric, and although responsive, she was weak and unable to rise. In addition, she was tachycardic and tachypneic, with hyperdynamic pulses. She was noted as having a Grade II/VI heart murmur, and her lungs sounded clear. Her abdomen was soft and nonpainful, with no noted organomegaly or other abnormalities. The clinician submitted some stat blood work and diagnosed a severe anemia, with a packed cell volume (PCV) of 11%. Her serum total protein was normal at 7.4 gm/dL (74 gm/L). In the capillary tubes, the serum was noted to be very hemolyzed.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

The clinician went back into the examination room and discussed immune-mediated hemolytic anemia (IMHA) with the owners. She had the more severe form, with noted intravascular hemolysis. This is a common disease diagnosed in Cocker Spaniels, and treatment includes immunosuppressive drug therapy, blood transfusions as needed, and time to allow the medications to start decreasing the immune response, which can take anywhere from 3 to 5 days or more.

The owners quickly agreed to do whatever was necessary for Spacey. She was admitted to the intensive care unit (ICU), and a blood transfusion was administered from a universal donor. Injectable dexamethasone was given intravenously, along with gastric protectants. A full serum chemistry, complete blood cell count, coagulation profile, tick titers, and urinalysis were submitted, and plans were made to perform thoracic radiographs and abdominal ultrasound the following day to rule out underlying neoplasia as a cause for the IMHA.

The following morning, Spacey was transferred to the ICU doctor on the day shift for continued care. The tick titers were normal, and the only abnormality on the chemistry profile was a total bilirubin of 15 mg/dL (256 µmol/L; reference range, less than 2.0 mg/dL; 34.2 µmol/L). The complete blood cell count showed a mildly regenerative, severe anemia, with many nucleated red cells and hemolyzed serum. Significant hemoglobinuria was documented on a urinalysis. The thoracic radiographs were normal, as was the abdominal ultrasound. Spacey was clinically improved after her transfusion, with a PCV of 22%; however, she seemed more icteric and had started vomiting. Treatment and monitoring continued as before, and an antiemetic was added to her intravenous fluid therapy.

On the second day of hospitalization, Spacey began to deteriorate, with her PCV dropping to 13%. She was given a second unit of packed red blood cells, and all other therapies were continued. During cage rounds in the afternoon, another clinician asked the ICU doctor about the results of Spacey's abdominal radiographs. The ICU doctor stated that he had not done abdominal radiographs, only ultrasound, and all looked normal. The clinician then stressed that abdominal radiographs should have been done, to rule out zinc toxicity from ingested US pennies as a cause of the intravascular hemolysis. Radiographs were taken right away, and four coins were noted within the stomach. The coins were removed via endoscopy and were found to be all US pennies. After a few more days of hospitalization, Spacey started to respond to therapy and was discharged normal.

Key Points

- Abdominal radiographs should ALWAYS be performed on patients presenting with intravascular hemolysis. United States pennies minted after 1983 contain zinc, which causes intravascular hemolysis. The pennies should be removed immediately; although many patients do well, some do succumb to zinc toxicity, depending on the severity of signs.

24

Seeing Red!

All ocular abnormalities should be examined promptly and completely, as irreversible disease may be present

Dolly, a 7-year-old spayed female Shiba Inu, was presented to her primary care veterinarian as an urgent-care appointment with an acute history of pawing at her right eye, with associated blepharospasm. There was no known history of ocular trauma nor other significant medical problems. Physical examination revealed blepharospasm, photophobia, and scleral erythema in the right eye. Light-responsive mydriasis was also noted in the right eye. Dolly was diagnosed with conjunctivitis and was discharged home with neomycin/polymixin B/dexamethasone ointment ($\frac{1}{4}$ inch of ointment in the right eye three times a day) as an antimicrobial and anti-inflammatory therapy.

After getting home, Dolly appeared no better, and perhaps worse, so Dolly was re-presented to a referral/emergency hospital later the same evening for persistent right-eye blepharospasm as well as a new-onset lethargy, and anorexia. Physical examination revealed persistent right-eye blepharospasm and photophobia. Furthermore, episcleral injection was noted. Dolly's right-eye mydriasis was still present but was no longer responsive to light stimulation; a dazzle response was not present. Schirmer tear and fluorescein dye testing were within normal limits for both eyes. Intraocular pressure measured with

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

tonometry was within normal limits in her left eye, but measured 62 mmHg in her right eye; fundus examination of the right eye revealed mild optic disc cupping. Systemic blood pressure was 140 mmHg systolic measured via Doppler auditory ultrasound.

Dolly was diagnosed with right-eye acute glaucoma resulting in a blind eye. She was treated with topical latanoprost (1 drop in the right eye every 24 hours) and dorzolamide hydrochloride-timolol maleate (1 drop in the right eye every 8 hours). She was evaluated by an attending ophthalmologist the following day and was subsequently diagnosed with goniodysgenesis in both eyes. The right eye was blind although the intraocular pressure was reduced to 28 mmHg. Surgical therapy (cyclophotocoagulation, gonioimplantation) and salvage procedures (enucleation, evisceration with intrascleral prosthesis, intravitreal gentamicin injection) were discussed, and the owners ultimately elected right-eye enucleation without intraorbital prosthesis. The lethargy and anorexia were attributed to severe ocular pain.

Key Points

- Every animal with a red eye should receive a complete ophthalmic examination, as it is essential to differentiate between conjunctival hyperemia and episcleral congestion/injection. This differentiation is important as congestion of the episcleral vasculature is indicative of intraocular disease (i.e., anterior uveitis, glaucoma). The treatment and prognosis of conjunctivitis and glaucoma are quite different.
- Conjunctivitis results in a diffuse reddening with vessels involved being small diameter; these vessels may be seen to move if the conjunctiva is moved. In contrast, episcleral vessels are straighter, overlie the globe, and the conjunctiva may be moved over them. Evaluation of tear production in any dog presenting with conjunctival hyperemia is recommended unless there is an obvious excessive tear production. Furthermore, an eye with conjunctival hyperemia and evidence of irritation or discomfort should be stained with fluorescein to check the integrity of the corneal epithelium.
- Dolly's initial examination led the primary care veterinarian to diagnosis conjunctivitis. However, complete diagnostic investigation (including Schirmer tear testing, fluorescein dye testing, and intraocular pressure measurement) at the time of initial presentation would likely have provided invaluable results, empowering the veterinarian with information to make an accurate diagnosis of acute glaucoma. Early intervention might have prevented Dolly's blindness.

(*Continued*)

Key Points (Continued)

- Canine goniodysgenesis is a bilateral disease, but it usually affects one eye before the other. Weeks, months, or occasionally years may lapse between time of onset in the first eye and the second eye becoming affected. Goniodysgenesis is characterized by unpredictable, acute, and often dramatic rises in intraocular pressure.
- A complete ophthalmic examination (including fundus examination and slit-lamp biomicroscopy) and appropriate diagnostic testing (Schirmer tear testing, fluorescein dye testing, and intraocular pressure measurement) should be performed in any patient presented with an ophthalmic complaint.
- Veterinarians are occasionally uncomfortable with diagnosis and treatment of ocular disease. In these cases, either a concerted effort on the part of the clinician is required, or prompt referral to either a more experienced practitioner or a specialist is advised.

25

Sepsis the Next Day?

An illustration of the importance of analyzing effusions yourself if the results will not be reported the same day, and to ALWAYS look under the tongue of a vomiting cat!

Janet was very excited to start her new residency in emergency and critical care. She was at a busy university, and she loved the experience of seeing a ton of cases, as she learned much better by "doing" instead of "reading." This was her first overnight shift, and she was going to be the only doctor in the whole hospital. Although it was a little daunting, she was up for the challenge.

Her shift started with five cases waiting: a vomiting cat; two dogs that had fought over a toy, each with minor bite wounds; a dog with diarrhea; and a hotspot on a Golden Retriever. With the help of her very efficient technicians, she ran through all of the cases with ease. She sent the dogs with the bite wounds home on antibiotics after cleaning and flushing the wounds; the dog with diarrhea had some *Clostridium* organisms on a rectal smear and was sent home with metronidazole; the dog with the hotspot was clipped and cleaned and discharged with antihistamines; and she ordered abdominal radiographs on the vomiting cat, named Lilly.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Lilly was a 4-year-old, spayed female calico. She always stayed indoors, was fully vaccinated, was negative for feline leukemia and feline immunodefficiency virus, and was the owner's only pet. Janet asked the owner if Lilly ever ate inappropriate things, and the owner reported that she did not, although she did like to play with the yarn when the owner was knitting. The owner was very concerned, as Lilly had vomited three times today, all that she had eaten, and seemed just not herself.

On a quick physical examination (there were many cases, and Janet was trying to be efficient), Lilly seemed a little dehydrated, and she did tense up when she palpated her abdomen. She was a VERY obese cat, weighing 13 kg, so it was difficult to palpate her intra-abdominal structures well. Her body temperature was a little low at 99°F. Her heart and lungs were normal, and she was bright and friendly.

The radiographs of Lilly's abdomen didn't look right, but Janet couldn't put her finger on what was going on. She DID notice that the abdominal detail was decreased and, knowing how fat Lilly was, she should have been able to see the intra-abdominal organs easily (Figure 25.1a,b). She went to talk to Lilly's owner, and it was decided that Janet would do an abdominocentesis, submit it to the lab, give Lilly some subcutaneous fluids and an injection of metoclopramide, and send her home pending the outcome of the fluid analysis. Lilly's owner was very happy with this plan, as she really didn't want to hospitalize her.

The morning transfers were abundant, and a very critical emergency presented, a dog with massive internal bleeding after being hit by a car. Janet briefly went over her discharged patients from the evening before with her senior clinician, then went home to nap, ready to arrive that evening for her next overnight shift.

Janet arrived about 15 minutes before her shift, allowing time to review the tests that she had submitted on her outpatients from the previous evening. She read over Lilly's abdominal fluid analysis, and started to feel a bit queasy. Lilly had septic abdominal effusion! There were many degenerate neutrophils, and rod bacteria, noted both within the neutrophils and (a few) free in the fluid. Janet rushed to the phone to call Lilly's owner. The owner reported that, although Lilly remained a little lethargic and did not want to eat, she had not vomited at all during the day. Janet explained the situation and asked that she bring Lilly in right away. On subsequent examination, yarn was found wrapped around the base of Lilly's tongue, and at surgery she had a linear foreign body (yarn) that had perforated her proximal jejunum. Thankfully, the yarn only went through the first third of the jejunum, and a resection and anastamosis was performed on the perforated

(a)

(b)

Figure 25.1 A lateral (a) and ventral–dorsal (b) abdominal radiograph of a cat with a septic abdomen secondary to a perforated intestinal tract due to a linear foreign body.

section. After 3 more days in the hospital, Lilly was discharged home. The owner was educated about keeping the yarn away from Lilly, and a weight loss plan was prescribed.

Key Points

- Emergency patient care can be hectic on very busy shifts. However, each patient should be addressed fully, as things can be easily overlooked. ALL cats that present with vomiting should have the base of the tongue inspected for a string foreign body. The string often gets caught under the tongue, and it is easy to look in this area during a physical examination.
- If submitted body fluids cannot be analyzed immediately by a lab, it is important to make your own slide and look at it yourself, in case of septic effusions. One may not be comfortable diagnosing neoplastic cells on cytology, but those cases can wait for a definitive cytologic analysis. Cases that may become critical without intervention, such as septic effusions, can be easily ruled out on a quick cytology. In addition, other tests can be performed on the fluid, such as a glucose level, as a negative difference greater than or equal to 20 mg/dL (1.1 mmol/L) glucose in the abdominal effusion as compared with serum glucose is highly sensitive for the presence of a septic effusion.[1]
- In a busy emergency practice, it is helpful to ask fellow clinicians on the day shift to review submitted tests and radiograph interpretations on outpatients from the night before. If there are critical results that may need to be addressed sooner than later, the day-shift clinician can then follow up with the owners themselves.

Reference

1. Bonczynski JJ, Ludwig LL, Barton LJ, et al. Comparison of peritoneal fluid and peripheral blood pH, bicarbonate, glucose, and lactate concentration as a diagnostic tool for septic peritonitis in dogs and cats. Vet Surg 2004;32(2):161–166.

26

Anxious to Breathe

Care must be taken when performing diagnostics on brachycephalic, apprehensive dogs

Seamus, a 4-year-old Bulldog, was seen for a right hindlimb lameness. Seamus had previously been treated for pyoderma of the skin folds and also severe separation anxiety. On examination, Seamus was obese (body condition score 8/9) and had loud respiratory sounds. While not an active dog, Seamus' owner was still concerned about the lameness and wanted Seamus to be fully evaluated. He expressed concern about putting Seamus in a cage for the day, as he did not like cages and was often prone to overexcitement and difficulty breathing. He asked if it could be performed as an outpatient, or if he could go to radiology with Seamus. The veterinarian told him no, and assured him that Seamus would be fine and that dogs are day patients all the time. So, with trepidation, Seamus's owner agreed to leave him.

Seamus was admitted for the day and placed in a cage until he could be sedated for films. It was a busy clinic day, and the technicians were frustrated as two colleagues had called out sick, and there was a lot of work to do. Seamus was barking and panting endlessly; most members of the veterinary team did not see the appeal of the bulldog. Finally, after barking and whining for about 2 hours, Seamus was quiet! About 1 hour later, one of the technicians came to get Seamus for his radiographs and found him nearly agonal. He was rushed to the intensive care unit, where he was found to be severely hyperthermic (at 108°F;

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

42.2°C) and cyanotic. An intravenous catheter was placed, and he was bolused fluids to cool him and was emergently intubated. Intubation was exceedingly difficult due to severe airway swelling and edema. Following aggressive supportive measures including a soft palate resection and 4 days in the hospital, Seamus recovered enough to go home. The cause of his lameness was not determined, although his owner was no longer interested in pursuing evaluation.

Key Points

- Brachycephalics are prone to overheating and significant respiratory compromise. While some dogs, like beagles, might be able to bark for hours without problems, brachycephalics, such as Pugs and Bulldogs, are particularly prone to overheating and airway obstruction.
- While many owners are nervous about hospitalization and sedation, in some dogs these concerns should be taken seriously. Dogs that are excessively anxious while hospitalized should be discharged as soon as possible, and any potential threat to the airway should be taken seriously.

27

The Lost Acorn

A complicated case gets more perplexing!

A 9-month-old Boxer puppy was presented to the emergency service as a referral from a local affiliated emergency clinic. The puppy had been playing with acorns and then suddenly started choking. A thoracic radiograph showed a foreign body in the trachea. The emergency clinic referred the puppy promptly at 11 P.M. on a Sunday night for endoscopic retrieval of the acorn, as they did not have the appropriate equipment or personnel available until the following morning.

On arrival at the emergency service, the puppy was bright and alert. Loud upper airway sounds were present, with an occasional paroxysm of coughing occurring. The admitting clinician evaluated the puppy and determined him to be stable. The emergency clinician in consultation with an internist at home then decided that because the anesthesia and surgical team was already in-house for a myelogram and hemilaminectomy on a dachshund, and that team had already had a full day, that the bronchoscopic retrieval could be performed first thing in the morning. The owner, who had been advised to proceed directly to the referral hospital, was frustrated, but agreed to that plan of action. The puppy did well overnight, although continuing to cough periodically.

The following morning, the puppy was anesthetized and a bronchoscopic examination was performed through a cuffed 8-mm-inner-diameter endotracheal tube. Surprisingly, no acorn was found in the airways. The endoscopist elected to look in the puppy's stomach, where an acorn was found and removed. The puppy had a rocky

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recovery, with evidence of aspiration pneumonia. After 4 days in the hospital, the puppy was discharged on antibiotics with a moderate cough, but afebrile and with a good appetite.

Two days after discharge, the puppy again developed acute respiratory distress and was taken directly to a different referral hospital. There, the puppy underwent an emergency tracheostomy and retrieval of the acorn tracheal foreign body. The puppy made an uneventful recovery, but the clients, in conjunction with their lawyer, drafted a letter to the State Veterinary Board, as well as a request to have a full refund from the first visit.

Key Points

- This case was challenging both because of communication errors between the first admitting emergency room clinician and the emergency room clinician receiving the transfer and because of the medical judgment used in this case. In the first challenge, the communication between the two veterinarians was inadequate. It is very frustrating for clients when they are told that something will happen at another facility and, once there, their expectations are not met. The transferring clinician should strive to prepare the client for what will happen at the receiving facility, and the receiving facility should make every effort to perform that task. This is often best accomplished by direct veterinarian-to-veterinarian communication (e.g., a phone call). This client was referred as an "emergency" and then was told that the recommended procedure would not occur until the following day. It is almost immaterial whether or not a tracheal foreign body is an emergency, but rather that there was marked discordance between the clinicians and the plan for the patient.
- The second challenge in this case was a misjudgment on the part of the clinician that the acorn was truly aspirated, then coughed up and swallowed, and then retrieved, rather than the one in the stomach being a second acorn. To perform the bronchoscopy, the puppy was anesthetized and intubated with a cuffed endotracheal tube. In order for the acorn to have left the respiratory system, it would have had to move up the endotracheal tube and then the puppy would have had to swallow it while still anesthetized. The scenario seemed preposterous, but given the apparent lack of the acorn in the airways, it was believed at that time. More suitable options at that point would have included getting a second opinion from another clinician, changing the position of the puppy, or repeating thoracic radiographs to evaluate the respiratory tract.

28

The Lost Puppies

How the inexperience of a junior veterinarian caused the demise of two puppies

A 3-year-old intact female Bernese Mountain dog named Geneva is presented to the emergency hospital by her owner Mrs. Bern with dystocia at 2 A.M. Her temperature had dropped to 97.5°F (36.4°C) 28 hours ago, and despite intermittent signs of uterine contractions, no puppies were delivered. It was her first litter. She had finished her American Kennel Club championship 4 months previously and is also certified as a therapy dog. Her owner is very active in the show circuit. There were eight puppies present on abdominal radiographs performed at 51 days of gestation.

On physical examination, the vital signs are normal, with a maternal heart rate of 80 beats per minute. The cervix is open, but a puppy is not palpated. Ultrasound examination documents multiple live puppies with heart rates (as measured by M-mode) of 140–160 beats per minute. The emergency clinician recommends evaluating in-house blood work, with a particular emphasis on calcium and glucose and, if normal, administering oxytocin due to possible uterine inertia. Mrs. Bern agrees, but mentions again how valuable ($2500 each) the puppies are and how important each puppy is to her. She inquires about a C-section.

The emergency clinician advises against a C-section without first trying medical management. Reluctantly, Mrs. Bern agrees. The laboratory tests are normal and 5 units of oxytocin are administered

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

intramuscularly. Repeat vaginal examination in 10 minutes documents that a puppy is approaching the cervix, in a breech position. The puppy cannot be manually delivered. The bitch and Mrs. Bern are instructed to wait in a dark examination room for another 15 minutes. After this point, with the ongoing absence of either puppies or signs of uterine contractions, the oxytocin is repeated and Geneva, with Mrs. Bern, is returned to labor in a quiet examination room. Fifteen minutes later (3:30 A.M.), there is still no puppy, but the puppy has descended a bit further in the birth canal. The oxytocin is repeated, and 60 minutes later, a puppy finally appears. The puppy, despite the efforts of the emergency clinician, cannot be revived and is pronounced dead. Mrs. Bern again asks about a C-section for the remaining seven puppies, the emergency clinician refuses, saying that "Now this first one is out, the rest should come quickly." Over the next 90 minutes, with multiple doses of oxytocin, a second puppy is delivered. This puppy is dead as well. Mrs. Bern is very upset and calls her primary care veterinarian, who agrees to meet her at her clinic. Mrs. Bern and Geneva travel to the other veterinary practice, where a C-section is performed within 15 minutes of arrival, with six healthy surviving puppies. Mrs. Bern drafts a complaint letter to the shareholders of the emergency hospital, demanding her money back for the care during the dystocia, as well as $5000 for the cost of the lost puppies.

Key Points

- This case was challenging because the client and the clinician were not communicating well. With valuable breeding animals, a C-section should *always* be offered and performed at first signs of dystocia, or even scheduled in breeds or dogs at risk. The clinician failed to appreciate the importance of the puppies and failed to hear, or register, the recurrent pleas on the part of the client to perform such surgery. Some veterinarians appear to think that a C-section is a failure and that it should only be performed after medical efforts are exhausted, rather than as a very viable option. Veterinarians additionally are often guilty of thinking the client does not want to spend the money to perform a C-section, so they will persist in medical interventions that may have a high failure rate. This situation could have been avoided by the clinician listening to the client's wishes, as well as recognizing the likelihood that these puppies were particularly valuable. Certainly, in some cases medical management is valuable for dystocia, but not in all.

Key Points (Continued)

- Owner expectations and wishes are very important in treatment of dystocia.
- Purebred puppies are often very large emotional and financial investments and should be treated as such by the attending veterinarian.
- Communication as to the risks and benefits of a specific procedure are mandatory.

29

Don't Be Too Cavalier

A full abdominal exploratory should always be performed during an abdominal surgical procedure

A 3-year-old, recently spayed female Cavalier King Charles Spaniel named Guinevere presented to the emergency service with a recent history of vomiting, lethargy, pale mucous membranes, and a single episode of collapse. The week before presentation, the patient was treated for lethargy and elevated white blood cells at the primary care veterinarian. At that time, the patient was also approximately 20 days from parturition. With the concern for an infected uterus, the primary care veterinarian took abdominal radiographs, then performed an ovariohysterectomy. Postoperative treatment consisted of intravenous fluids and antibiotics. Initially, improvement was seen; however, over the next few days the patient began vomiting. metoclopramide was then added to the treatment regimen. Despite therapeutics, the vomiting persisted, and Guinevere became progressively lethargic and pale. It was at this time that the patient was referred for emergency care.

On presentation, Guinevere was noted to be depressed, but responsive. She was able to stand for short periods, but preferred to lay in sternal recumbency. She had a body condition score of 3/9, tacky and pale mucous membranes with a capillary refill time of 2 seconds, and a normal systolic blood pressure of 120 mmHg. On abdominal palpation, a firm, tubular structure could be felt in the midventral abdomen.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

The patient appeared painful when palpating in this area; however, her abdominal surgery had been only 48 hours earlier. Guinevere was also anemic, with a packed cell volume of 18%. Total solids were normal at 7.4 g/dL (74 gm/L). Venous blood gas and electrolyte analysis revealed a hypochloremic metabolic alkalosis. She had a leukocytosis, with no left shift. Serum biochemistry revealed significant hypokalemia and mild hyperglycemia. Abnormally large, gas-distended small intestine was seen on abdominal radiographs, consistent with an intestinal obstruction. The patient was stabilized with intravenous fluids, a blood transfusion, and antibiotics prior to surgery.

Surgical exploration revealed a duodenal linear foreign body with secondary intestinal perforation and septic peritonitis. The foreign body was removed, along with resection and anastamosis of the section of perforated intestine. Supportive care was continued, and 4 days after surgery the patient was discharged home.

Key Points

- It is very easy to become fixated on a single potential cause for the problems we see in our patients; however, consideration must be given to a wide variety of differential diagnoses for any given problem, with a resultant diagnostic plan to rule in or out possible causes.
- Whenever the abdomen is approached for a nonelective procedure, a thorough abdominal exploratory must be performed, regardless of a possible inciting cause being identified. If no cause is identified, several biopsies should be obtained and submitted for histopathology. With this case specifically, there was no history of known foreign body ingestion or of gastrointestinal signs prior to the original surgery. In addition, because the patient was pregnant, initial radiographic interpretation may have been hampered and palpation of an intestinal foreign body would have been more difficult. However, when surgically exploring the abdomen, all intra-abdominal structures should be assessed.

30

Too Much Sugar

All causes, pulmonary and extrapulmonary, should be investigated in patients with respiratory distress

It was a busy night in the emergency room. Cases were coming in at a high rate, and a technician had called out sick. Lincoln, a 9-year-old neutered male domestic shorthair, arrived with a complaint of difficulty breathing. He had been hiding for a few days, and then today was clearly breathing with a bit more effort. Lincoln's past medical history was unremarkable. Although he was an overweight cat, in recent weeks he had managed to lose about 1 pound. There were seven other cats in the household, so it was difficult to say anything more about appetite or eliminations. Lincoln's brother (Truman) had died of congestive heart failure, so the Washingtons were worried that this is what Lincoln had as well. Dr. Drew took a cursory look at Lincoln and found that he was breathing hard. She felt he was likely in congestive heart failure, so she admitted him to the hospital, gave him a 2 mg/kg dose of furosemide intravenously and some supplemental oxygen. She had planned to take some thoracic radiographs, but the night got away from her!

In the morning, Lincoln was still markedly tachypneic, and the day-shift doctor, Dr. Carter, took a closer look. On physical examination, he could not hear a murmur or gallop, and Lincoln's pulses were strong and regular. A rectal temperature was normal at 101°F (38.3°C). Dr. Carter took Lincoln to radiology himself and performed

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

thoracic radiography. Surprisingly, the radiographs were normal, with no evidence of congestive heart failure or any other pulmonary disease that would explain the signs of tachypnea. Dr. Carter decided to check some blood and urine tests on Lincoln and found that his pH was 7.012 (reference range 7.36–7.44), his bicarbonate (HCO_3^-) was very low at 8 mEq/L (reference range 20–24 mEq/L), and his blood glucose was out of range, high (>500 mg/dL; 28 mmol/L). Ketones were 4+ in the urine.

Lincoln was identified with severe metabolic acidosis due to diabetic ketoacidosis. The tachypnea was a compensatory response to the metabolic acidosis (Kussmaul breathing), not a reflection of pulmonary disease. The Washingtons were happy to hear that Lincoln had a treatable disease, but they did question how it was missed the night before!

Key Points

- Cats with respiratory distress are challenging, but each animal deserves a careful evaluation especially if the pieces are not fitting together well.
- In this case, Dr. Drew leapt to the conclusion that Lincoln was in congestive heart failure. This is not a bad assumption, but either Lincoln should have responded to the furosemide and oxygen or further steps should have been taken to better evaluate him.
- The conversation with the Washingtons could be challenging. Honest discussion of why things were missed and attempts at resolution of the mistake can go a long way toward satisfied clients, and veterinarians.

31

Tyler

Dehiscence of enterotomy sites should always be considered as a cause of illness in the 3–5 days following the operative procedure

Tyler, a 9-year-old Basset Hound, was prone to eating foolish things at times. He had had a prior foreign body surgery when he was 3 and again when he was 6, and last year he had two foreign bodies endoscopically removed from his stomach. His owner was very careful to watch him, but with five other dogs and a new baby in the house, it was impossible to be sure. Tyler presented with severe vomiting, and radiographs showed a convincing linear foreign body.

Tyler was taken to surgery, where six enterotomies were performed. This was the first time that Dr. Freehold had done this type of surgery by herself. She was very pleased when the surgery was complete, and she was hopeful that Tyler would recover uneventfully. He was treated with intravenous fluids and perioperative cefazolin, as the surgery had taken about 6 hours. The following morning, Tyler was doing well. He was wagging his tail and looking for something to eat!

Dr. Freehold elected to wait until that evening to feed him as she wanted to be sure that everything was healing okay. Later that afternoon, Dr. Freehold was called to the intensive care unit to look at Tyler. He was quieter, and the technicians in the intensive care unit were concerned that he was painful. Tyler was given a dose of buprenorphine, yet he didn't seem improved. Dr. Freehold called Dr. Shortz and

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

asked what he thought. Dr. Shortz, an excellent surgeon though sometimes a bit impatient, recommended starting intravenous enrofloxacin and to give an injection of a nonsteroidal anti-inflammatory drug. Dr. Freehold reluctantly agreed and adjusted the orders appropriately. Tyler did look better after a few hours. She was still concerned, but Dr. Shortz is very good and has been at this for a long time. As the night progressed, Tyler looked weaker, and Dr. Angus, the overnight doctor, decided to tap his abdomen after a full evaluation. Abdominocentesis documented intracellular and extracellular bacteria and had a below-range, low glucose reading. Tyler was taken back to the operating room, where all six sites were leaking and there was a severe peritonitis. After a lengthy hospital stay, including development of a multi-drug-resistant infection, Tyler recovered and was discharged home.

Key Points

- Any animal with clinical decompensation 24–72 hours after an enterotomy or resection and anastamosis should be considered to have dehisced until proven otherwise.
- Adding antibiotics is not a good plan unless you know what you are treating.
- Pain medication is vital to good patient outcome, but it should not be used to mask signs of brewing sepsis or cardiovascular instability.

32

Whiskers

Immunosuppression from administered medications can result in the development of secondary infections

A 5.9-kg, 4-year-old male neutered domestic longhair cat, Whiskers, presented to his primary care veterinarian for pulling out fur in the right lateral thigh area. He was an indoor cat, negative for feline leukemia and feline immunodeficiency virus, and up to date on his vaccines. He had no significant medical history. There was no evidence of erythema or excoriations on his right thigh. Skin cytology and a skin scrape were both negative. Even though the skin scrape was negative, a treatment of selamectin (6 mg/kg) topically every other week for three doses was started. A fish oil supplement and 3-week tapering dose of prednisone were started as well.

At the 1-month recheck exam, Whiskers was still pulling his fur out, except now it involved both the right and left lateral thighs and inguinal area. A fungal culture was negative. A novel protein food trial was started, along with cyclosporine 25 mg (4 mg/kg) once a day for 30 days.

Another recheck exam 1 month later revealed fur regrowth on the right and left lateral thighs and inguinal area. The fur pulling had stopped. The dose of cyclosporine was decreased to 25 mg (4 mg/kg) every other day. The owner felt Whiskers was doing very well on the medication and was pleased with the results.

One month later Whiskers presented for lethargy and anorexia. The owner reported Whiskers had not been acting like himself for the past

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

couple of weeks. He was not as playful and was not not eating well. His weight had decreased to 4.7 kg. His physical examination was otherwise within normal limits.

The complete blood cell count and chemistry profile were normal except for a slightly low white blood cell count at 3100/μL. Cyclosporine toxicity was suspected and the cyclosporine level was found to be 2847 ng/mL (therapeutic range 400–600 ng/mL). At the time of the blood collection Whiskers was on every-other-day dosing. A cyclosporine level had not been previously evaluated.

Whiskers was hospitalized for several days for intravenous fluids, antibiotics, antinausea medication, and nutritional support. A recheck complete blood cell count documented an increased white blood cell count (7920/μL) although clinically Whiskers remained lethargic and had developed progressive tachypnea. A pulse oximetry reading on room air was 89%. Thoracic radiographs revealed severe generalized interstitial pneumonia. A lung aspirate was performed and organisms resembling *Toxoplasma gondii* were seen on the cytology sample.

Additional treatments at this time included oxygen therapy and intravenous and oral clindamycin (16 mg/kg) twice a day. Whiskers seemed to initially stabilize within the first 24 hours of treatment. His respiration rate had decreased to 56 breaths per minute and he started eating on his own. Unfortunately, midafternoon on the fourth day of Whiskers' hospitalization, he cried out, collapsed, and went into cardiac arrest from which he could not be revived.

Key Points

- Cyclosporine is an immunosuppressive drug that inhibits T-lymphocyte function. High levels of cyclosporine could put patients at risk for developing opportunistic bacterial, fungal, or protozoal infections.
- If therapeutic monitoring had been done, the elevated cyclosporine levels would have been found and the medication dose either decreased or discontinued.
- Consideration could have been given to evaluation of toxoplasmosis titers prior to initiating a potent immunosuppressant.
- Whiskers' owners were very saddened to lose him; additionally, they were upset that they had not known that opportunistic infection is a possible side effect of cyclosporine. While they were happy that his fur had come back, that did not compare to losing him to pulmonary failure.

33 Would You Like Some Salt?

The importance of monitoring fluid therapy

Annie, an 11-year-old female intact Italian Spinone, was presented to the emergency service for vaginal discharge and severe polydipsia and polyuria. Physical examination revealed purulent vaginal discharge and pale mucous membranes. A lateral abdominal radiograph was consistent with pyometra. Thoracic radiographs were unremarkable. Preanesthesia complete blood cell count and blood chemistry profile revealed a neutrophilic leukocytosis, mild anemia (34%), and hypoalbuminemia. Electrolytes at the time of presentation were normal [sodium 154 mmol/L (reference range 144–160 mmol/L), potassium 4.4 mmol/L (reference range 3.5–5.8 mmol/L), chloride 118 mmol/L (reference range 109–122 mmol/L)]. Annie was admitted to the hospital for surgery. Surgery and anesthesia were uneventful.

Postoperatively, Annie was markedly anemic at 12% and required a transfusion of packed red blood cells. This was attributed to blood loss and chronic disease. Hetastarch 6% at 13.3 mL/kg/day and lactated Ringer's solution (LRS) at 80 mL/kg/day were used postoperatively for fluid support. Drinking was noted as early as 12 hours after surgery and drinking well was noted during the afternoon of the following day, after which, there were no further notations about drinking. Frequent large amounts of urine in the cage were noted during the following 36

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

hours after surgery (++++ at 15 hours, +++ at 23 hours, ++ at 29 hours, +++ at 34 hours). The dog was not weighed at any point during her hospitalization, other than her admission weight.

Thirty hours postoperatively, Annie was mentally dull and laterally recumbent. An electrolyte panel revealed serum sodium out of range (greater than 205 mmol/L). Hetastarch was continued at the same rate. Crystalloid fluids were changed from LRS to 0.45% NaCl, but the infusion rate remained the same. Seven hours later, Annie had two grand mal seizures that responded to intravenous diazepam. The sodium remained above measurable limits. Hetastarch was increased to 18.7 mL/kg/day; one liter of LRS was administered as a bolus. After the bolus was completed, the 0.45% NaCl was restarted at 160 mL/kg/day. The attending clinician believed the dog may have intracranial neoplasia causing diabetes insipidus, despite suggestions during cageside rounds that the rise in sodium was secondary to excessive urination. Desmopressin acetate was administered for the possibility of centrally mediated diabetes insipidus. After another 7 hours, the sodium was 195 mmol/L. Two liters of 0.45% NaCl were administered as a bolus; 0.45% NaCl was then restarted at 250 mL/kg/day. A urinary catheter was placed at that time and urine output averaged 301 mL/hr for 10 hours. The fluid input was 789 mL/hr. The sodium had fallen to 168 mmol/L (2.7 mmol/L/hr decline). The hetastarch and 0.45% NaCl were continued at the same rates for the next 8 hours. The urine output averaged 260 mL/hr and the fluid input was 535 mL/hr (partially due to boluses to restore hydration) with the sodium rising to 171 mmol/L. Over the next 14 hours, the urine output then averaged 410 mL/hr and fluid inputs were only 235 mL/hr. Annie had received a 200-mL bolus of hetastarch and the hetastarch rate had been increased to 24 mL/kg/day, during this 14-hour period; the crystalloids were alternated between Normosol-R and 0.45% NaCl for each new liter. Furosemide was administered at 2.2 mg/kg for diuresis, and desmopressin acetate injections were repeated twice. Sodium bicarbonate was administered in response to a metabolic acidosis (pH 7.238) with respiratory alkalosis appropriate for compensatory response; the dose administered was approximately one-fifth of her calculated bicarbonate deficit. A dose of dexamethasone sodium phosphate was administered under the belief that there was an intracranial malignancy that may have some localized edema.

Annie experienced seven grand mal seizures over the next 12 hours. The attending clinician recommended euthanasia based upon a grave prognosis due to severity of seizures and probable intracranial neoplasia. Postmortem examination did not identify a brain tumor.

Key Points

- Fluid requirements in sick animals are often different from normal maintenance needs. Sometimes, this difference is quite dramatic if there are physiologic factors inducing diuresis or excessive fluid losses. Polyuria in sick animals can stem from an osmotic diuresis (postobstructive diuresis, diabetes mellitus, ethylene glycol poisoning), central diabetes insipidus (idiopathic, traumatic, congenital, hypothalamic neoplasia), nephrogenic diabetes insipidus (endotoxin, adrenocortical disease, hypercalcemia, hypokalemia, diuretic medications), pressure diuresis (hypertension), or medullary washout (chronic polyuria and polydipsia, hepatic failure, hypoadrenocorticism). Excessive fluid losses from other routes are frequently overlooked: abdominal and thoracic drains, exudative wounds (especially burn wounds), and frequent vomiting or diarrhea. Even constant panting from pain and discomfort or hyperthermia can lead to increases in fluid requirements.
- In this case, Annie was likely experiencing significant fluid losses from endotoxin induction of nephrogenic diabetes insipidus. Endotoxin, most commonly from *Escherichia coli*, interferes with the action of antidiuretic hormone at the renal tubule, resulting in polyuria. The excess fluid loss was not identified due to an inability to truly quantitate urine output without a catheter, urinations that occurred but were not recorded, and failure to recognize physical changes in the patient. Frequent weight measurement would have noted weight loss and prevented the dramatic hypernatremia that occurred, by permitting the clinician to intervene earlier.
- The hypernatremia resulted in seizure activity, which improved. The rapid correction of the hypernatremia led to secondary cerebral edema and damage to nervous tissue; the initial decline in the sodium was five times the recommended rate of correction.
- There was another factor involved in Annie's decline. Her doctor was focused on a central diabetes insipidus as the cause of the hypernatremia, despite no evidence of neurologic disease or electrolyte disturbance preoperatively and minimal response to desmopressin. When suggestions were made in rounds that the hypernatremia could be from the underlying disease process (pyometra) and inadequate fluid support, the attending clinician did not listen. In the end, Annie was euthanized for a prognosis related to a brain tumor she did not have. Although the severity of the hypernatremia may have led to permanent neurologic injury, the hypernatremia might have been avoided altogether if the fluid needs had been monitored more closely at the beginning.

Key Points (Continued)

- Fluid losses from various sources in sick patients can be much higher than expected, resulting in significantly higher needs for intravenous fluid administration; this is particularly common in animals with an obligate diuresis (e.g., prior polyuric–polydipsic disease such as Cushings, diabetes, renal failure, or pyometra) or in pets on diuretics such as furosemide.
- Patients suspected of significant polyuria in the critical care setting should be monitored for physical changes associated with fluid loss. Urinary catheterization and central venous pressure monitoring should also be considered essential in any pet where the clinician has any doubts about the clinical ability to assess the patient.
- Patient rounds are designed to allow for collaboration among colleagues, which can bring in a new perspective. Listen, even when you are sure of a diagnosis.
- Severe hypernatremia must be corrected slowly (less than 0.5 mmol/L/hr) to prevent cerebral edema. Calculations on how to estimate the effect a fluid will have on serum sodium can be found in most critical care texts.

34

Bambi?

Things to think about when coming into contact with wild animals

The wildlife clinic associated with the veterinary hospital was a popular addition among the public in the rural New England town. The staff at the veterinary hospital found the wildlife clinicians "unique" but had recently agreed to try harder to facilitate the care of stray and injured wildlife after hours.

One weekend day in May, when the wildlife clinic was closed, two men in a pickup truck came to the veterinary hospital. They had found a fawn, and it looked sick. They had seen a doe dead by the side of the road, and they assumed this was her fawn. The emergency clinician (Dr. Ramona) went to the truck to look at the fawn. It was easy to see the newborn fawn, still covered with white spots, was ill. Dr. Ramona carried the fawn into the back treatment area and began evaluating it. The outdoorsmen were sent home; they were thanked for their time, but their names and contact information were not recorded.

The fawn was depressed and tachypneic. There was mucopurulent discharge around the nostrils and a slight fever was present. Dr. Ramona suspected that the fawn had pneumonia, perhaps similar to that seen in calves. She placed a jugular catheter and started some volume resuscitation and administered broad-spectrum antibiotics. The wildlife clinic was contacted and agreed to send someone over to pick up the fawn in the next few hours.

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Meanwhile, the fawn appeared stable. Two of the receptionists and one volunteer came to visit the fawn; it was very interesting to see a wild animal in the small animal hospital!

Three days later, the veterinary clinic received a phone call from the wildlife clinic. The fawn had died and subsequently was found to be positive for rabies. The two outdoorsmen were ultimately tracked down by a newspaper article, and seven clinic personal had to undergo postexposure prophylaxis.

Key Points

- All wild mammals should be considered potential rabies vectors, even small and cute ones!
- Appropriate precautions should be taken in handling animals with the potential for rabies.
- Unvaccinated personnel should not be allowed to handle wildlife, particularly mammals.

35

The Big C

The dangers of making a pathologic diagnosis without obtaining a biopsy

Kitty, a well-loved 13-year-old domestic shorthair, was seen in the emergency room for recurrent vomiting. She had always vomited once every few weeks, but over the last 3–4 weeks she has been vomiting every day. On physical examination, Kitty was bright, alert, and responsive. She was 5%–7% dehydrated. Laboratory testing was within normal limits with the exception of a mild elevation in the blood urea nitrogen at 37 mg/dL (13.2 mmol/L; reference range 8–28 mg/dL) and a bilirubin at the upper limit of normal.

Dr. Azure talked with Kitty's owner about the next step. She advised a chest radiograph to look for evidence of metastatic disease, and an abdominal ultrasound to look for evidence of hepatobiliary disease and/or neoplasia. Kitty's owner agreed; she had obtained her as a stray right after college graduation, and while she knew she was older, she wanted to try to help her if at all possible.

The chest radiographs were assessed as normal, but the abdominal ultrasound showed mildly enlarged lymph nodes and an irregular pancreas, thought to be either chronic pancreatitis or, more likely, pancreatic neoplasia. Dr. Azure relayed the probable poor prognosis to Kitty's owner and advised a surgical exploration to confirm the diagnosis. Margie agreed to proceed with surgery, but reiterated her concerns about quality of life and that she did not want Kitty to suffer.

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Dr. Azure agreed and noted these concerns in the record. She was delighted that Dr. Klein, who was a very experienced board-certified surgeon, would be performing Kitty's surgery.

The following day, Kitty was anesthetized and surgical exploration verified a very irregular and thickened pancreas. Dr. Klein called Dr. Azure into the operating room and definitively stated "this is bad, it is clearly a cancer." He recommended euthanasia, due to the grave prognosis. Dr. Azure called Margie and gave her the grim news. She very sadly agreed to euthanize Kitty on the table and thanked Dr. Azure for her honesty and compassion.

The biopsy of Kitty's pancreas returned as "chronic active pancreatitis, with no evidence of neoplasia."

Key Points

- Cancer is considered a histopathological diagnosis, not usually a visual one. Dr. Klein was an experienced surgeon and believed that it was cancer he was seeing. However, chronic inflammatory diseases may look like cancer and, without clear evidence of metastatic disease or a lesion that might require advanced surgery, euthanasia based upon appearance of a lesion at surgery is not advised.
- Much discussion in the hospital revolved around whether or not Kitty's owner should be told the result of the biopsy. Ultimately, Dr. Azure elected not to call her with the news, as while her belief was "honesty is the best policy" it was not clear that this news would be helpful to her.

36 To Stent or Not to Stent?

New technology isn't always the answer

Ginger Spice, an 11-year-old Pomeranian, was enjoying a winter in Florida away from the hustle and bustle of New York City, when she developed a severe cough. Ginger had coughed off and on for the last 5 years, but typically responded well to the Temeril-P (trimeprazine with prednisolone) her veterinarian had prescribed in New York. This cough seemed a little worse, and Ginger's owner had not established a relationship with a veterinarian in Florida, so she and Ginger went off to the local emergency clinic and specialty hospital.

Ginger was immediately triaged to the oxygen cage. Mrs. Spice was surprised, because Ginger was breathing comfortably, but the emergency room looked busy, and Mrs. Spice wanted the best for Ginger. After 2 hours of waiting, Ginger was finally evaluated by the emergency doctor. Ginger looked good to her, but the cough Mrs. Spice described was impressive, so the emergency doctor recommended admitting her to the hospital to have the internist take a look at her, and to perform tracheoscopy. Mrs. Spice agreed and went home.

The following morning, Ginger was still in good spirits. An easily inducible tracheal cough was present, but no other abnormalities were detected. Chest radiographs showed intrathoracic tracheal collapse. The internist (Dr. Z) looked at Ginger and called Mrs. Spice and recommended that she have a tracheal stent placed. Dr. Z had just returned from a conference describing the placement and was eager to start placing stents in her practice. In fact, the stents had just arrived last

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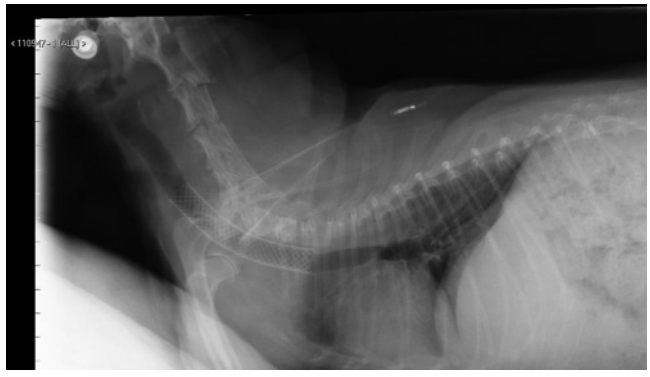

Figure 36.1 A lateral thoracic radiograph showing the stent placed in the trachea.

week. Dr. Z reviewed the possible complications of a tracheal stent, as well as the benefits of the stent. While the stent itself was quite expensive ($1000), the placement was relatively inexpensive, and Dr. Z felt that Ginger was an excellent candidate. Mrs. Spice asked about the Temeril-P that has worked so well in the past. Dr. Z described it as a steroid that could have negative long-term effects such as diabetes or Cushing's syndrome. Mrs. Spice was horrified by this; she had not known the Temeril-P might be dangerous and agreed to have the stent placed.

The tracheal stent was placed uneventfully and Dr. Z discharged Ginger the following day. Ginger did very well at home for the next month, but upon her return to New York she started coughing endlessly. Repeat films showed no evidence of stent migration, although the stent was relatively short (Figure 36.1). Bronchoscopy showed a fine layer of mucus and debris around the stent, and a marked granulomatous response. Therapy was pursued with a variety of antibiotics, anti-inflammatories, and cough suppressants, but Ginger continued to cough.

Key Points

- A tracheal stent may be life-saving for affected dogs but should be considered a palliative procedure, rather than a first line in a dog that may respond to medical therapy. A relatively high percentage of dogs have long-term complications with stent placement and the clients should be well advised of the likelihood of long-term issues.
- As clinicians, it is often exciting to apply a new skill. However, any procedure should be carefully explained to clients.

37

It Isn't Asthma?

Noting when it is important to look past the suspected client situation and focus on the patient

A 14-year-old cat belonging to one of the practice technicians has been seen several times by a roving internist who came by to evaluate internal medicine cases periodically. The cat (Arthur) was a previously healthy domestic shorthair with a 3-month history of coughing and a loss of purr. Dr. Diamond had evaluated Arthur and found increased airway sounds. Chest radiographs were within normal limits for an older cat (Figure 37.1), but Dr. Diamond assured Jen that this was often the case in feline asthma. She asked if Arthur should have a tracheal wash, or any other tests, but Dr. Diamond assured her this was not necessary. He also knew that Jen did not have a lot of money and had seven other cats and four dogs, all of whom, like Arthur had been "rescued" at the clinic over the last 10 years.

Arthur was started on 5 mg of prednisone orally twice a day, and initially started to improve. About 1 week later, he was switched to prednisolone due to concerns about conversion in the liver. However, 1 month later, his signs were just as bad as ever and he was re-presented to the hospital for reexamination. There had been discussion about trying inhaled steroids and Jen was eager to try this if it might help Arthur. Dr. Diamond was not available, so Dr. Bleu examined Arthur.

Auscultation documented loud upper airway sounds. Dr. Bleu advised an oral examination, to which Jen promptly agreed. Oral examination showed a large infiltrative mass, likely a squamous cell carcinoma. Jen elected to euthanize Arthur, due to quality-of-life issues.

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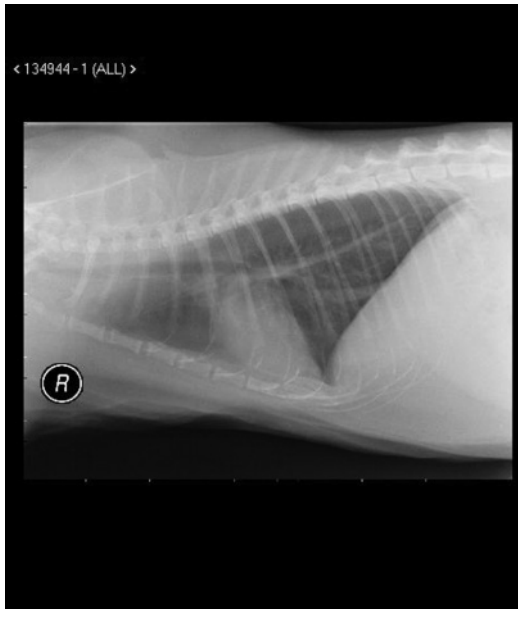

Figure 37.1 Arthur's lateral thoracic radiograph showing the mild interstitial changes.

She was very frustrated with Dr. Diamond and did not understand why he had not identified earlier what the source of Arthur's problems was. Their future interactions were strained, as she continued to blame him for Arthur's misdiagnosis.

Key Points

- Feline lower airway disease is not a condition of elderly cats. Older cats suspected of newly developing "asthma" almost always have some other cardiopulmonary disease. Dr. Diamond knew this, but was also concerned about the cost of further diagnostics and therapy, since he knew that Jen had little disposable income.
- About 10% of cats do better with prednisolone than with prednisone, so it is a reasonable therapeutic plan to change to prednisolone in cats that are not responding to prednisone.
- Inhaled steroids are very useful in feline asthma, but as oral steroid–sparing agents. They would not be expected work *better* than oral prednisolone.
- This situation could have been avoided if Jen and Dr. Diamond had had a good discussion about the options for Arthur and if Dr. Diamond had been less accepting of the diagnosis of feline asthma in an elderly cat.

38 Hoping History Doesn't Repeat

An illustration of the importance of good history taking

Troy, a 2-year-old, male intact Standard Poodle, presented to Dr. West for an acute onset of severe and protracted vomiting. He was not the type of dog that ate foreign material, and he had seemed fine up until about an hour ago. He was previously healthy, with no history of medical or surgical problems. He had no travel history, was up to date on vaccinations, and did not have access to any toxins.

Dr. West was a very seasoned emergency veterinarian. He had worked at this same emergency clinic for the past 15 years and continued to love emergency work. He was very concerned about Troy for a few reasons: he knew that Standard Poodles are a breed at risk for both gastric dilatation-volvulus and hypoadrenocorticism. He immediately did a full physical examination and found that Troy was cardiovascularly stable, with a heart rate of 70 beats per minute and strong pulses, normal mucous membrane color and capillary refill, and normal mentation. When Dr. West palpated the abdomen, Troy vomited yellowish fluid right away. He seemed very sensitive and painful in the cranial abdomen, but his stomach did not seem visibly bloated.

Because of Dr. West's concerns, he ordered blood tests to check electrolytes, and abdominal radiographs because of the severe vomiting and abdominal pain. The blood work was completely normal. However, when evaluating the abdominal radiographs, Dr. West noticed two metallic gastric foreign bodies (Figures 38.1 and 38.2). After discussing

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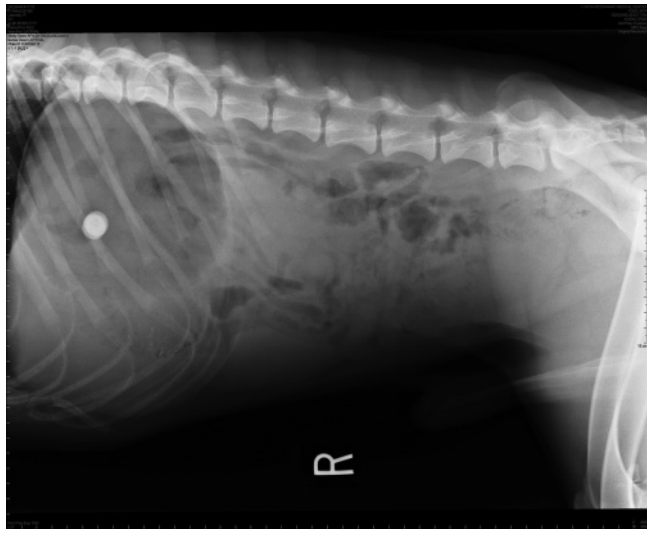

Figure 38.1 Lateral abdominal radiograph showing metallic gastric foreign bodies.

Figure 38.2 Ventral–dorsal abdominal radiograph of the gastric metallic foreign bodies.

the case with the on-call surgeon and the owner, it was decided to perform an emergency exploratory laparotomy to remove the foreign bodies. One concern was zinc or lead toxicity, since the foreign bodies had a metal density.

Troy was placed under general anesthesia and an exploratory laparotomy was performed. A gastrotomy was done to remove the metallic foreign bodies. However, the only objects visualized were two pink tablets. These were removed, and the rest of the abdomen was explored. No other abnormalities were noted.

Upon further questioning of the owner, it was found that she had given two tablets of bismuth subsalicylate (Pepto-Bismol®) about 30 minutes before arriving at the emergency clinic, because of the severity of the vomiting. These tablets have a metallic appearance on radiographs, which prompted Dr. West and the surgeon to recommend an emergency surgical procedure.

Key Points

- A good history can often mean the difference in avoiding unnecessary testing, and it helps guide the clinician for likely differential diagnoses.
- In this case, an unnecessary abdominal surgery was performed in a dog with simple gastroenteritis. This burdens the dog, as surgery is an invasive procedure that induces physiologic stress. In addition, surgical procedures are costly to the owner.
- Even seasoned veterinarians, with years of experience, need to remember the basics of good history taking and physical examination. In addition, when veterinarians assess a patient with likely differential diagnoses based on breed and age disposition, other diagnoses are not as likely to be considered.

Part Three

Lessons in Client Communication

39 Not All Albumins Are Equal

When transfusing nonautologous fluids, possible allergic reactions should always be considered and discussed with the client prior to administration

A 5-year-old, female spayed Rottweiler mix named Jada was presented to an emergency doctor for acute vomiting and lethargy. She had a history of a lameness for which she had been given the nonsteroidal anti-inflammatory medication firocoxib daily for the previous 2 weeks. The lameness had resolved with the firocoxib, and she had no other medical history.

On admission, her body temperature was 103.2°F (39.5°C), heart rate was 210 beats per minute, and she was panting. She had pale pink mucous membranes and a prolonged, 3-second capillary refill time. No murmur or arrhythmia was auscultated, but her peripheral pulse quality was weak. She had significant pain on abdominal palpation. Due to clinical suspicion of intra-abdominal sepsis due to the fever, vomiting, and abdominal pain, an ultrasound examination was performed. This documented free abdominal fluid, and cytological examination confirmed sepsis.

Screening laboratory testing documented low albumin (2.1 g/dL [21 gm/L]; reference range 2.7–3.8 g/dL [27–38 gm/L]) and a degenerative left shift. Surgical exploration was recommended and, after a

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discussion of the costs and perceived benefits for surgery, consent was given by the clients. At surgery, a 3-cm perforation was identified in the pyloric outflow tract. Following repair, closed suction abdominal drains were placed to help control abdominal effusion.

Jada was recovered in the intensive care unit and was treated aggressively with crystalloid and synthetic colloid fluids, analgesics, broad-spectrum antibiotics, and antiemetics. Daily monitoring documented that the serum albumin level dropped to 0.7 g/dL (7 gm/L), 24 hours after surgery, which was considered clinically significant. Because of her size (70 kg), plasma transfusion to increase her albumin was considered imprudent. Jada was given 40 mL of 25% human albumin intravenously, which increased her serum albumin to 0.8 g/dL (8 gm/L). She started to voluntarily eat on the second postoperative day. Her abdominal drains were removed after 3 days, and she was discharged home after 5 days for ongoing supportive care.

Seven days after Jada was discharged she re-presented for periorbital swelling and was treated with an antihistamine. Nine days after discharge she presented with urticaria, vomiting, diarrhea, ventral hyperemia, and peripheral edema. Her serum albumin was 1.7 g/dL (17 gm/L), which dropped to 0.8 g/dL within 24 hours. In addition to being treated with crystalloid and synthetic colloid fluids, she was treated for an immune-mediated reaction using cyclosporine and pentoxyfilline. She was discharged after 5 days. Ten days later her edema had completely resolved; 4 weeks after discharge she had a serum albumin of 2.8 g/dL (28 gm/L), and the cyclosporine was discontinued.

Key Points

- Albumin plays a major role in maintaining colloid osmotic pressure as well as the transport and pharmacokinetics of hormones and medications due to protein binding. Hypoalbuminemia (<2.0 g/dL; 20 gm/L) is associated with increased risk of complications following intestinal surgery and of death, in people and animals. Causes of hypoalbuminemia can be reduced production (hepatic insufficiency) and increased loss (glomerular disease, gastrointestinal disease, and increased capillary permeability). This prompts some clinicians to treat with albumin-containing products when moderate to severe hypoalbuminemia occurs.
- Species-specific plasma transfusions contain canine albumin; however, large volumes are required to increase albumin in dogs. Approximately

Key Points (Continued)

22.5 mL/kg of plasma would be needed to increase the plasma albumin by 0.5 g/dL (5 gm/L). It would be anticipated that at least 3000 mL (~15 plasma units) of plasma would be required to increase the albumin by 1.0 g/dL (10 gm/L) in a 70-kg dog. This is considered cost prohibitive and an inappropriate use of a scarce resource. As an alternative, concentrated (25%) human albumin products have been administered to dogs. Human and canine albumin molecules are not identical, and administration of human albumin to dogs can result in severe, life-threatening type-II hypersensitivity and immune-mediated reactions up to 2 weeks after administration. Therapy may require immunosuppression. In Jada's case, use of corticosteroids to treat a presumed immune reaction to human albumin was considered too risky given her recent history of a perforated gastric ulcer. Cyclosporine was chosen as a safer, rapid-acting alternative.

- Use of human albumin in dogs and cats should occur with the owner's understanding of the risks and with the owner's consent.
- When human albumin is administered, clinical signs of an immune-mediated and hypersensitivity reaction can occur immediately—or after several weeks.
- Signs of hypersensitivity and immune-mediated reactions related to albumin treatment in the dog can include vomiting, diarrhea, urticaria, peripheral edema, flushing of the skin, joint pain, and fever. Owners should be warned of the possible side effects, which can be life threatening.
- The use of human albumin should be recommended in select cases, and only if the true benefits outweigh the possibility of developing a severe immune-mediated syndrome.
- Treatment of immune-mediated reactions associated with human albumin infusion in dogs usually requires immunosuppressive therapy.

40 Believing the Client

Listen to the client! They know their pets the best!

Two 10-year-old cats were presented to an urgent-care veterinary hospital with a complaint of possibly having eaten a toy with string attached. The owner was requesting immediate endoscopy. Further historical questioning documented a missing toy with a piece of yarn, but no discrete evidence that the cats had eaten the toy. However, as the owner was adamant, the cats were referred to a referral center for possible endoscopy.

On arrival, the cats were stable. No further history could be obtained from the client, other than a conviction that one of the cats had eaten the toy. The house was large, and the toy had disappeared. A "house-hunt" had not found the toy. The cats had never before eaten any foreign objects. The admitting intern attempted to send the cats home for observation, at which point the owner became irate and demanded to see "someone in charge."

Based upon the owner's conviction, abdominal radiographs were performed on both cats. One cat's radiographs were completely normal, while the second showed evidence of gastric contents, thought to be food (Figure 40.1a,b). The owner was insistent upon endoscopy for that cat and, despite clinical suspicion of food, the cat was readied for endoscopic evaluation. Due to the possibility of a full stomach, the cat was premedicated with xylazine with the hope of inducing emesis to make visualization of the stomach more straightforward.

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(a)

(b)

Figure 40.1 A lateral (a) and ventral–dorsal (b) radiograph from a cat suspected of having eaten foreign material.

Approximately 3 minutes after administrating the medication, the cat vomited approximately 12 feet of blue yarn with a small toy mouse. The owner immediately identified the missing toy and was very relieved. The cats were discharged home uneventfully.

Key Points

- Clients are often the best judge of their pets. In this specific case, despite a lack of solid evidence of actual ingestion of the toy, the client was correct.
- Client relations are often severely hampered by poor listening and poor communication. Had this specific client not been so forceful, the toy might not have been detected until it was too late to manage nonoperatively.
- Certainly, clients are not correct in their diagnosis in every case, but treating them and their opinions with respect and professionalism is mandatory.

41 But I Thought He Would Be Fine!

The importance of communication about prognosis and risk—junior clinician errors

A 34-kg, 11-year-old neutered male Malamute was presented on emergency at midnight with an acute onset of vomiting, discomfort, lethargy, and abdominal distension. There was no history of foreign-body ingestion or toxin exposure. The patient was not currently on any over-the-counter or prescription medications and was healthy, with no previous or ongoing medical problems. A physical examination was performed at the time of presentation and revealed strong synchronous femoral pulses, pink moist mucous membranes with a normal capillary refill time, and a 7- to 8-cm firm mass in the cranial abdomen. The heart rate was tachycardic at 160 beats per minute. At that time differential diagnoses included an abdominal mass, gastric dilatation-volvulus (GDV), gastrointestinal foreign body or obstruction, pancreatitis, or less likely, mesenteric torsion. The receiving veterinarian (Dr. A) performed a right lateral abdominal radiograph that displayed gastric distension with dorsocranial displacement of the pylorus, consistent with a GDV. The entire small intestine appeared moderately dilated with gas. Blood samples were obtained and an immediate lactate was 4.4 mmol/L.

After confirming a diagnosis of GDV, Dr. A discussed treatment options with the dog's owners while the staff placed a peripheral intravenous (IV) catheter and instrumented the patient with an

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electrocardiograph (ECG) and blood pressure monitors. Normosol-R (1 L) was administered as a fast bolus to treat hypotension. Hydromorphone (0.1 mg/kg IV) was administered to provide analgesia while the clients considered the prognosis and options.

Dr. A explained the process of GDV, the risk of gastric necrosis due to decreased gastric perfusion, as well as the potential for splenic torsion and need for splenectomy. At that time, the veterinarian advised that surgery was the only option for a potential for recovery; otherwise, euthanasia was recommended. The clients explained that they had financial constraints and that,if recovery was not possible, they did not want to proceed with surgery. The veterinarian quoted the hospital's survival rate of more than 90% and advised that since the lactate was less than 6.0 mmol/L, there was a good chance of recovery and survival. The clients then visited with their dog for $1\frac{1}{2}$ hours prior to agreeing, with some reluctance, to proceed with the surgery. At that time, the surgeon (Dr. B) and the on-call anesthesia technician were called in to perform anesthesia and surgery.

At the time of anesthetic induction, it was noted that the patient's blood pressure could not be measured with oscillometric methodology. The patient received a dose of ephedrine and was continued on 10 mL/kg/hr IV Normosol-R, and isoflurane gas anesthesia in oxygen. Intraoperative premature ventricular contractions were observed on the ECG despite a continuous infusion of lidocaine (50 µg/kg/min).

Intraoperatively, 20% of the stomach appeared necrotic and was resected using a thoracoabdominal stapling device. The omentum bruised easily and had numerous petechial hemorrhages. Following surgery, Dr. A spoke with the clients and advised that surgery went well, although there was a need for gastric resection. At that time, the clients left while the patient continued anesthetic recovery. Five hours had passed from the time of initial presentation to the end of surgery.

Postoperatively, the patient was treated with intravenous crystalloids (2.5 mL/kg/hr), famotidine (0.5 mg/kg IV twice a day), hetastarch [300 mL IV bolus, then 20 mL/kg/day IV continuous rate infusion (CRI)], fentanyl (4 µg/kg/hour IV CRI), metoclopramide (2 mg/kg/day IV CRI), and lidocaine (50 µg/kg/min IV CRI). No dysrhythmias were observed on the ECG monitor. He was normotensive, and a coagulation test was within normal reference ranges.

At 10:00 A.M. the following morning, the dog was evaluated, and no abnormalities were noted, including a normally healing incision. By 2:30 P.M., however, the incision was oozing blood-tinged fluid and the patient was passing hemorrhagic diarrhea. Fresh frozen plasma was started, for treatment of potential disseminated intravascular coagula-

tion (DIC). Dr. B called the owners and gave them an update, mentioning that the patient may be in DIC. At that time, the surgeon seemed cautiously optimistic, however, and advised that the clients could come and visit. The clients visited at 7:30 P.M. and thought that their dog seemed to perk up. During the visit, Drs. A and B were not present, and the attending veterinarian (Dr. C) was occupied seeing a number of emergencies so was unable to speak to the clients. Dr. A presented for her shift at 11:00 P.M. and noticed clinical deterioration of the dog, with continued hemorrhagic diarrhea and decreased mentation. Dr. A immediately called the owners to give them an update and, at that time, asked for the dog's CPCR code status. By 12:30 A.M., the patient's condition deteriorated further, developing runs of ventricular tachycardia with pulse deficits. Aggressive therapy with intravenous crystalloid boluses, fresh frozen plasma, and antiarrhythmic drugs was instituted. At 5:00 A.M., the patient lost consciousness and experienced respiratory arrest. Dr. A called the patient's owners as CPCR was initiated.

CPCR was continued until the owners arrived; however, the dog was not responding to CPCR and was taking agonal breaths. The owners visited with their dog and elected to stop resuscitative efforts at that time.

Approximately $1\frac{1}{2}$ weeks after the patient's death, the clients drafted a letter with the primary complaints of miscommunication on the part of the hospital staff. Their primary complaints were as follows:

1. The first miscommunication was an initial misquote of the price of the service. Dr. A quoted a price to the owners before speaking with Dr. B, the on-call surgeon, and did not take into consideration additional fees to call in the surgeon and technicians. After discussing the charges with Dr. B, Dr. A then went back to the clients with another estimate, which was larger than the first that they had been quoted.
2. Another concern was that they had been told that the patient had an excellent chance of recovery, with the potential complication of splenectomy only; DIC was not mentioned until the patient's clinical deterioration.
3. At the time of the client's visits, the ECG monitor was not continuously hooked up. They had been reading on the Internet of the importance of monitoring for potentially fatal cardiac dysrhythmias.
4. Finally, when the clients were with their dog during CPCR efforts, the term "agonal breath" was used, and they heard "agonizing breath" which was very upsetting to them.

In addition, during the $2\frac{1}{2}$ weeks that followed the patient's death, the clients researched GDV and its potential complications. Most of the research was performed on the Internet and in verbal communication with their general practitioner, who advised of a much more guarded prognosis with GDVs in their somewhat limited experience.

Key Points

- *Give the client the opportunity to be heard*. In this case, the hospital administrator and the director of emergency services contacted the clients after reviewing the letter of concern. The meeting did not include Drs. A and B, the veterinarians who had been in charge of the patient's care, as it was felt that this forum would allow the clients to be able to speak freely about their concerns. Although there was not anything that could be done to bring their dog back, listening to the client's concerns and providing empathy and feedback that educated the client with factual, peer-reviewed information, rather than being defensive of the veterinary team, was important. Meeting with the clients allowed the hospital representatives to acknowledge the client's emotional distress and to validate their concerns regarding their dog's care. In the end, the clients were more satisfied and less blameful. This discussion also gave the hospital staff an opportunity to learn from this experience, so that they could serve them, and other clients, better.
- *What could the veterinarians and hospital staff have done better?* At this facility, overnight shifts are staffed by interns, who are less experienced than other, more senior veterinarians. As such, the survival numbers stated to the client were based on this hospital's survival rate of GDV patients, not on reported national averages. Similarly, Dr. A had not seen a GDV case that had required partial gastrectomy, and none of the GDV cases that she had seen had had any severe complications. Because of this limited experience, Dr. A did not mention all of the potential complications and perhaps emphasized only the positive aspects of the condition and postoperative care.
- *Use of lactate as an indicator of prognosis*. Although lactate concentration greater than 6.6 mmol/dL is a positive predictor for gastric necrosis and need for partial resection in 70% of animals, it is not 100% sensitive or specific for gastric necrosis or lack thereof. This patient's lactate was 4.4 mmol/dL; therefore it was assumed that there would be no need for gastric resection and that there was a good prognosis for recovery and survival. Owners often consider complications rare and, in this case, felt that since their dog's lactate was lower than 6.6 mmol/dL, he had a good chance of not requiring gastric resection.

Key Points (Continued)

- The clients' perception of what was happening with their animal was based on communication with the technical staff instead of the veterinarian, and they presented a concern about their dog's care after some investigation on the Internet.
- The clients also had concerns about continued resuscitative efforts on their dog for a prolonged period of time, while they were en route to the hospital. One of their initial concerns about whether to go to surgery was that they did not want him to suffer. The owners felt that the veterinarians had promoted the patient's discomfort during CPCR, which is what they had been trying to avoid. A detailed explanation of cessation of effective circulation and respirations, and lack of perception of pain or suffering on the patient's part during CPCR, likely would not have changed the clients' perceptions that their dog was "alive" as long as the CPCR was being performed and therefore could feel pain and suffering. As a gesture of goodwill, the hospital credited back some of the fees associated with the CPCR efforts. The clients were satisfied with this small reduction in fees and asked if the hospital could institute a payment plan for the remainder of the bill. Although the hospital's policy is to not allow payment plans, under the circumstances, it was better to be flexible, and the hospital agreed to a plan that the owners could better mange. They paid the remainder of the bill over the next 2 months.
- *Using the Internet as a source of information*. The Internet is a powerful source of information, although unedited, and is a source of the general public's experience with this disease, rather than peer-reviewed scientific information. Because of this, the Internet is filled with opinion, anecdote, and possibly erroneous information. To an emotional client without a prior knowledge or experience of specific disease processes, misconceptions can occur; at times, these drive clients' decision making and lead to decreased faith in their veterinarian, especially if certain therapies are not employed.
- *There are no guarantees*. The clients had stated at the time of initial presentation that if there was not a potential for complete recovery, they would not proceed with surgery. GDV often has a very good prognosis, even if there is a need for partial gastrectomy. Based on the information received from Dr. A, the clients chose to proceed with surgery. However, their perception was that their dog would completely recover and that the potential for complications was low. The surgeon or the most experienced individual on the team should ultimately discuss the case and prognosis, and potential for complications, prior to performing emergency surgery.

42

If It's Not in the Medical Record, Did It Happen?

The importance of a medical director addressing any and all client concerns

The following two cases represent different situations in which clients contacted the medical director of a specialty veterinary clinic following care that their pet received at the hospital. After receiving each complaint, the medical director reviewed the medical records for each case, so the concerns or complaints could be addressed.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Complaint 1

Ms. Erickson called to complain about the medical care that her dog, Spike, a 9-year-old spayed female Labrador, had received at the hospital 2 months prior. Specifically she was concerned that she had not received any written recommendations following a visit to the emergency room. Incidentally, she had received written recommendations for Thor, her 7-year-old spayed female Labrador, who was evaluated the same evening. Thor had presented to the emergency clinic for evaluation after ingesting an unknown amount of chocolate. Thor was showing clinical signs of agitation and vomiting. Spike was also brought in for evaluation, just in case, although she was not showing any clinical signs and, historically, she is not the one who gets into things. She stated that Spike was found to have normal vitals and physical examination, so no further treatment or recommendations were made. Ms. Erickson was concerned that Spike was currently having some gastrointestinal issues, so she wanted to make sure she had all her medical records. She also stated that her regular veterinarian had not received any information regarding Spike's visit to the emergency service.

Medical record review

Both Spike's and Thor's medical records were reviewed. Thor's record was complete (history, physical exam, lab work, treatments, and discharge summary) and copies of the record had been sent to the primary care veterinarian. Spike's record did not have any information documented. No history or physical examination was documented, nor were discharge recommendations written in Spike's record. A statement in Thor's record was made that the "the other dog appeared normal" and if "clinical signs developed, she should be brought in for evaluations and/or treatment." The client was charged for Spike's full evaluation and additional blood tests, including a packed cell volume, total protein, blood glucose, and blood urea nitrogen (via Azostix®), although none of the results were recorded.

Key Points—Complaint 1

- The importance of documentation in the medical record cannot be overstated. In this case there was absolutely no documentation in the record that the patient had been evaluated. In addition, even though minimal lab work had been performed, these results were not documented. The client had been charged for these services, which was the only way it was determined that the minimal lab work had been performed. There is a vague statement in Thor's record referring to "the other dog"; however, no in-depth detail was provided. This information, even though it was incomplete, should have been documented in the appropriate medical record.
- This client was contacted to inform her of the absence of documentation. All charges for Spike's visit were credited, as there was no documentation. The owner was informed that the hospital was addressing this issue with the veterinarian involved and that her concerns were being tracked by the hospital for routine evaluation of hospital complaints, so processes can be improved. The owner was very surprised that this occurred, and very thankful that the issues were being addressed.
- Emergency veterinarians are occasionally faced with a second pet, where the known offender is presented along with a housemate who is "likely not guilty." Sometimes veterinarians are reluctant to "overcharge" for a relatively brief examination, but a medical record should be maintained for each pet. It may be that, with hospital administrator approval, a small (20%) discount might be provided, but free, unrecorded examinations should not be permitted at any time.

Complaint 2

Mr. Bowman contacted the hospital to complain about the follow-up recommendations that were given for his dog Vinnie, who was being managed for chronic renal disease by one of the hospital internal medicine residents. He was specifically concerned that the resident was recommending evaluation of the dog's albumin levels, rather than kidney values. Mr. Bowman had been following all recommendations and having lab work performed by the primary care veterinarian and copies sent to the resident for additional recommendations.

Although Vinnie did well for many months, he eventually developed an acute episode of renal failure, which ultimately resulted in his death. His owner's complaint was that if recommendations had been made to evaluate Vinnie's renal values (rather than just albumin), the ensuing renal failure might have been caught earlier, and therefore his life saved. He wanted all final charges to the emergency service credited back.

Medical record review

Vinnie's record was evaluated by the medical director and by one of the internal medicine faculty who specialized in urology. Vinnie had been seen initially at the hospital for renal failure, for which his values had normalized after the initial medical management. Vinnie was also diagnosed with a low albumin level, which had not been fully worked up at that time. The discharge instructions that were sent to the owner and primary care veterinarian following the initial renal-failure management were thorough, indicating that Vinnie should have his albumin checked in 2 months (via a chemistry profile) and that his kidney disease be checked in 6 months (via a complete blood cell count, chemistry profile, blood pressure, urinalysis, and urine culture). It was also recommended that, once the renal disease was stabilized, the cause of the low albumin would need to be further evaluated.

The communication logs in Vinnie's record indicated that referring blood work had been faxed and the medicine resident had contacted both the primary care veterinarian and one of the owners (Ms. Bowman) with follow-up recommendations. Vinnie's albumin continued to be low at the 2-month recheck, and the renal values remained stable (within normal range). In addition, there were numerous entries in the communication log of referring follow-up lab work and of discussions between the medicine resident and Ms. Bowman, all discussing

appropriate follow-up recommendations, including a reminder that Vinnie needed a full renal evaluation in 1 month. Based on the communication log, at 7 months following the initial discharge, Ms. Bowman had questioned the resident about performing a dental prophylaxis on Vinnie and was informed about the need for full renal evaluation prior to this procedure, including full blood work, urinalysis, and urine culture, which still needed to be performed as a follow-up to the initial evaluation. The final communication entered in the medical record was 3 months later, when Mr. Bowman contacting the medicine resident with the information that Vinnie had come in to the emergency service at the referral hospital with an acute episode of renal failure and was subsequently euthanized.

The urology specialist evaluating the medial record found that all recommendations were appropriate. Although it was likely that Vinnie developed an acute exacerbation of his renal failure (unlikely to be predicted with the lab work), he could also have had a slowly progressive kidney failure that could have been detected by earlier monitoring. The medical director discussed the case with Mr. Bowman via a telephone conversation and then again, in person. Interestingly, in the discussions, Mr. Bowman produced notes kept by Ms. Bowman in which she had indicated that the lab work to check the renal values needed to be performed, and agreed that they had not followed up on it. Despite this evidence, Mr. Bowman still insisted that the case had been mismanaged by the resident and that the resident should have been more diligent in following up what they were doing.

Key Points—Complaint 2

- In this case, much of the care that was provided to the patient was conducted by the primary care veterinarian, under the guidance of the internal medicine resident. All recommendations and follow-up communications were clearly documented in the medical record, leaving a clear trail of what had transpired following the care provided at the referral hospital. The owners were following all recommendations diligently; however, they failed to perform the final diagnostic work-up within the time-frame recommended. Unfortunately, it is always challenging to follow up on a case that is being managed by another veterinarian. In this case the detailed communication logs (which were substantiated by the owners' own notes) provided a very clear trail of the medical care that was being recommended.

Key Points (Continued)

- This case was also discussed with the hospital social worker, as there appeared to be more going on. Despite all the evidence provided and Mr. Bowman's acknowledgment that they did not follow up appropriately, he still insisted that the hospital was at fault. In this case, there are likely additional guilt issues that are preventing the owner from accepting what has occurred. The owners' need to "blame someone" can be a coping mechanism to avoid accepting blame for their own actions (or lack thereof). Certainly we often encounter situations similar to this one, where due to stress, grief, or guilt owners may not "hear" what they are being told. It is critical in such cases that the medical record, including summaries of communications, be complete.

Final Medical Record Summary

The medical record serves as a legal document that should provide detailed information regarding pertinent facts, findings, and observations about an individual animal's health history, including past and present illnesses, examinations, tests, treatments, and outcomes. The medical record should document, chronologically, the care of the patient. In addition, the medical record facilitates the ability of the veterinarian and technicians to evaluate and plan the patient's immediate treatment and to monitor his or her health care over time. Especially when multiple care providers are involved, the medical record helps with communication and continuity of care among the veterinarians and technicians. The medical record can also provide information for use in review and quality-of-care evaluations and can provide data that are useful for research and educational purposes. Finally, in the event that a case goes to court, the medical record provides critical information regarding the care the patient has or has not received.

43 Hemangiosarcoma Is Bad

Failure to completely evaluate patients can result in a misdiagnosis

An 8-year-old spayed female mixed-breed dog presented to the veterinary clinic with a 2-day history of anorexia, lethargy, reluctance to rise, and urinary incontinence. Physical examination revealed tachycardia (heart rate 200 beats per minute), slightly pale mucous membranes, and a large, readily palpable midabdominal mass. The packed cell volume was 28%, and abdominal radiographs revealed a moderate amount of abdominal effusion, which abdominocentesis revealed to be hemorrhagic. Radiographs showed a mass larger than a softball in the splenic region of the abdomen (Figure 43.1). Thoracic radiographs revealed elevation of the trachea at the level of the heart base and no other abnormalities.

Based on the signalment and radiographic findings, a presumptive diagnosis of hemangiosarcoma of the spleen was made, with a possible concurrent heart-based tumor. The clients were advised of the poor prognosis, and euthanasia was recommended. The owners declined and instead decided to take their pet home. They wanted their children to have the opportunity to say goodbye to their pet, and they were not prepared to make such a decision at that time. The veterinarian advised against this and, in an effort to make the owners aware of the potential ramification of their decision, described possible scenarios of the pet's death, any of which would likely occur in a very short period of time

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

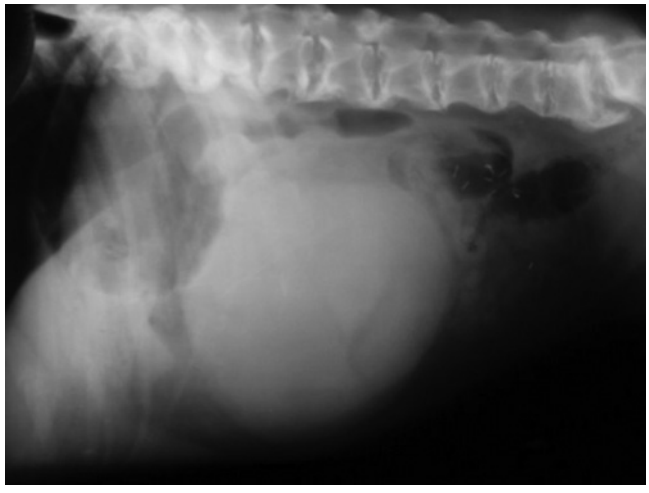

Figure 43.1 A lateral radiograph showing a splenic mass.

and be unpleasant for the family to witness. With great trepidation, the owners took their pet home and waited for her impending demise. They waited, and they waited, until, after a year's time, the urinary incontinence was profound, and the pet was no longer able to eat anything but very small meals without vomiting. The mass had now grown so large that it filled the entire abdominal cavity, displacing the viscera. While away on vacation, the situation became dire, so the owners took the pet to a local veterinary hospital, presumably for euthanasia, assuming the end had finally come. After an abdominal radiograph showed an enlarging mass, further sonography was recommended (Figure 43.2). The ultrasonographer was unable to ascertain the origin of the mass because of its extreme size and because all of the other organs were adhered in and around it. Thoracic radiographs were done to check for pulmonary metastasis, and none were seen. An echocardiogram was within normal limits. The tracheal elevation noted 1 year prior was found to be a "normal abnormality" in this dog. The clients were understandably distraught that this workup had not been performed a year ago and were upset about the emotional toll the situation had taken on the family and about the quality of life the pet had been subjected to, unnecessarily, over the last 12 months. They immediately consented to surgery. An abdominal exploration was performed, and a 14-pound splenic hematoma was removed. The dog went on to live for an additional 6 happy, healthy years.

Figure 43.2 A lateral radiograph showing progression of the size of the mass. The dog also has severe spondylosis.

Key Points

- Most frequently, splenic masses with associated hemoperitoneau are due to malignant, neoplastic processes; however, this is not true in all cases. It is therefore imperative to perform appropriate diagnostics to evaluate the nature of the disease. Exploratory laparotomy is potentially life-saving as well as diagnostic. Because cytologic differentiation between various types of splenic disease is challenging, multiple representative sections must be evaluated. The prognoses for hematoma versus hemangiosarcoma or other splenic malignancies vary drastically; therefore it is vital that they be appropriately identified. Between 24% and 45% of dogs with splenic hemangiosarcoma have concurrent right atrial hemangiosarcoma, not a heart-based tumor as was suspected in this case.
- Managing and communicating with the pet owners is quite possibly the most challenging aspect of veterinary practice. It is also perhaps the greatest investment in time and energy that a clinician can make. When this investment is made, it is possible to virtually eliminate the disappointed, angry, or litigious client. When the clinician editorializes, makes judgments or decisions for a client, it is invariably a recipe for disaster. The veterinarian's role is to present all options to the client in a clear, concise way, and not to interject any personal bias or philosophical or financial judgments. After

Key Points (Continued)

empowering the client with information regarding the pet's condition, workup, and treatment options, as well as potential complications and implications of same, the client must always be responsible for decisions regarding the pet's care. Coupling this practice with obtaining informed consent and meticulous record keeping, the clinician avoids the stress of repercussion from a dissatisfied client, a guilty conscience, and a damaged reputation.

- Signs of hemangiosarcoma can be similar to those of hematoma or other splenic neoplasia. After appropriate staging and stabilization, exploratory surgery is indicated, and multiple histological sections must be examined.
- Never allow assumptions to replace sound diagnostics.
- Never presume to make decisions for the clients as to the care of their pet. Always be objective and complete when presenting rule-outs, workup, and treatment options. The decision as to how to proceed should always be left to the discretion of the owners, after a full and educated discussion with their veterinarian.

44 The Internet Can Be a Dangerous Thing

One must take into consideration the availability of information on the Internet, whether it be true or not, when discussing disease diagnosis and treatment

A 4-year-old, female spayed Cavalier King Charles Spaniel named Eliza presented to an emergency clinic with the chief complaint of lethargy and decreased appetite for 1 week. The owner also noted that she cried out in pain when picked up to be put on the bed. She had no other prior medical problems.

On physical examination, she was found to have pain upon ventroflexion of the neck. She was ambulatory, with an otherwise normal neurologic exam. Diagnostics were discussed with the owner, including spinal radiographs and advanced imaging; however, due to the subtle clinical signs, the owner elected conservative outpatient therapy. Eliza was discharged with carprofen at 2 mg/kg orally every 12 hours, tramadol at 2 mg/kg every 8–12 hours as needed for pain, and misoprostol at 4 μg/kg every 12 hours. All medications were prescribed for 10 days. Eliza improved rapidly at home, and after 3 days she did not seem to exhibit any further pain.

Twenty-seven days later Eliza re-presented to the emergency clinic for acute onset of circling, collapse, and seizure activity. She had been

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

seizuring for the past 1½ hours. Her body temperature was 105°F (40.5°C), heart rate 60 beats per minute, and respiratory rate 20 breaths per minute. She was treated with two doses of intravenous diazepam, which stopped her status epilepticus; however, she continued to paddle her legs intermittently and had inappropriate mentation.

Diagnostics included a chemistry profile, complete blood cell count, computed tomography (CT) of the brain, and cerebral spinal fluid (CSF) collection. The blood work and CT were normal. Cytology of the CSF was inconclusive for any specific disease process. While under anesthesia for the CT and CSF collection, Eliza was maintained on a ventilator and had a normal anesthetic episode. About 40 minutes following extubation, Eliza became apneic, requiring reintubation and positive pressure ventilation. Her heart rate decreased to 30 beats per minute with an irregular rhythm. Once reintubated, 1 g/kg of mannitol was administered intravenously, along with 0.25 mg/kg of dexamethasone-SP. At this point, it was noted that Eliza's pupils were dilated and nonresponsive. The owners were contacted and, due to her clinical state, it was recommended to begin prolonged assisted ventilation with a mechanical ventilator. Due to the poor prognosis for a positive outcome, the owners elected humane euthanasia. A necropsy was performed and Eliza was found to have granulomatous meningoencephalomyelitis (GME), an inflammatory disease of the central nervous system; GME is thought to be a progressive immune-mediated disease of the white matter of the brain and carries a poor prognosis.

Following Eliza's euthanasia, the owner started researching the possible cause of Eliza's seizures, despite the diagnosis of GME obtained on necropsy. The owner believed that the carprofen that she received 17 days prior to the onset of seizures was the source of the neurologic abnormalities. In addition, the owner spent an exorbitant amount of time on the phone with veterinarians and researchers from the drug company[1] discussing the case. She contacted multiple other veterinarians (a toxicologist, internists, pathologists, and a DVM running for political office) across the country that in her mind were "specialists" and "experienced" to discuss Eliza's case and the possible impact of the carprofen on her subsequent clinical course and outcome. The owner communicated to multiple veterinarians that, in her opinion, veterinarians, in general, do not spend an appropriate amount of time discussing *all* the "side effects" associated with dispensed medications. However, when the owner was initially discharged with the carprofen, client drug information handouts (listing indications, how it should be given, interactions with other medications, and *known* side effects) were included.[2]

Key Points

- It is important for a veterinarian to be aware of the wide range of potential symptoms that can be seen with certain pharmaceutical agents. Drug companies are required to report to the U.S. Food and Drug Administration Center for Veterinary Medicine a quarterly report of "adverse reactions" that develop in a patient while on any of their medications.[3] These reports come from a voluntary reporting system by veterinarians or owners who have experienced a clinical symptom while on a specific drug that cannot be accounted for by another underlying disease process. However, there is no absolute certainty that the suspected drug actually caused the experienced symptom. The carprofen drug insert describes *Post-Approval Experience*, where multiple body systems (gastrointestinal, hepatic, neurologic, urinary, behavioral, hematologic, dermatologic, and immunologic) are listed with their reported reactions. Under the neurologic heading in this section, the following symptoms are listed: ataxia, paresis, paralysis, seizures, vestibular signs, and disorientation. In Eliza's case there was evidence of another underlying disease causing the seizures; however, carprofen could not be ruled out as a cause for the seizure.
- When discussing diseases, diagnostics, and therapies with a client, veterinarians need to be as accurate as possible. With the advent of the Internet, people have access to a large amount of information, both scientific and nonscientific, allowing for clients who are much more educated about their pet's health. Veterinarians may need to discuss a variety of information brought forward by a client to allow for the most accurate information to be integrated into the course of recommended diagnostics and therapies.
- Grieving the death of a pet can take many forms, including blame, legal threats, and publicizing the care of their pet. It is important to recognize this and to find the appropriate support system for the person, such as other family members, social services, or pet-loss groups.
- The Internet is a powerful source of information. Direct clients to the proper scientific sources of information, rather than anecdotes or lay reports.
- Due to the limited number of animals and the controlled nature of premarketing clinical trials, only the most common adverse effects of a medication may be observed. Keeping up to date with the veterinary scientific literature and reports of adverse events from drug companies will illustrate any emerging side effects of a specific medication.
- Uncommon effects or problems associated with a drug may not be discovered until it has been widely used. Do not discount a possible effect or clinical sign that a patient is showing without thoroughly investigating all possible postapproval reactions. Also, if no other clinical diagnosis can be made to explain a specific symptom, consider administration of a medication as a potential cause for the problem.

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45 Is There Some "Wiggle" Room?

An illustration of how essential it is to offer a variety of options to clients

Wiggles loved to chase rabbits; one sunny afternoon, she screamed and was acutely lame after falling in a hole. Her owners brought her immediately to the veterinary hospital.

On presentation, Dr. Catone found that Wiggles, a 6-month-old Pug–Labrador cross, was three-legged lame, and the radius and ulna were unstable and at an unusual angle. Overall Wiggles seemed very stable, and the quick blood tests done in the emergency room were normal. Mr. and Mrs. Piersol gave permission for a radiograph of the front leg, but they asked how much the radiograph would cost and how much money they had spent so far with the emergency visit (Figure 45.1).

After evaluating the radiograph, Dr. Catone started to wonder how many more bad stories she would have to deliver to owners during her internship. It seemed like almost everyone wanted to euthanize their pets—nobody had the money needed to fix the problem using the high standard of care that she was taught at her university. Although this case seemed to have a simple solution, she was concerned that the Piersols would not have the $3500 needed to repair the fracture.

As Dr. Catone predicted, the Piersol family did not have money for the needed surgery. She began discussing euthanasia with the family, and the conclusion of that discussion was that this would be the best

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Figure 45.1 An anterior–posterior film showing a displaced radius–ulna fracture.

approach. As Dr. Catone started to draw up the euthanasia solution, Dr. Morris wandered through the emergency room. She stopped and started to ask questions about the cute dog on the table with the broken leg. Dr. Morris suggested to Dr. Catone to try casting the leg, as this may be an effective option in a young, otherwise healthy puppy.

Dr. Catone tearfully admitted to Dr. Morris that she had not thought of this option and wondered what to do, as the Piersols were prepared to euthanize Wiggles. Dr. Morris explained that while "The Cadillac Plan" should always be recommended as the ideal approach, there are often other less-expensive options that might be pursued, and this is an example where talking with the senior clinicians might uncover other options that have a reasonable chance for a successful outcome. Dr. Catone, somewhat reluctantly, returned to talk to Wiggles' owners. The Piersols excitedly agreed to cast the leg. They promised to keep Wiggles quiet for 10 weeks, to return as needed for recheck evaluations, and NO rabbit chasing until the leg was fully healed. Following casting and exercise restriction, a radiograph showed progressive healing of the fracture (Figure 45.2).

Figure 45.2 An anterior–posterior film showing progressive healing of the radius–ulna fracture after conservative management.

Key Points

- While some diseases clearly require one specific treatment, in other cases there are a variety of options that could also result in successful outcomes. Remember that many diseases can get better on their own and that some other disease, like a young dog with a fracture, might only need a modest amount of veterinary help for a successful outcome. Consideration of conservative therapies is warranted in many disease processes, and carefully selecting treatment options with a REASONABLE chance of success might be better than euthanasia in some circumstances. This must be weighed against the recognition that, in other situations, euthanasia is the best course of action for all involved.
- This case shows how two people working in the same hospital can have very different perspectives on a situation. Dr. Catone has not found "solid ground" to stand on and the internship is eroding her confidence, rather than augmenting it. She has started to look for the logistically easiest approach to care, especially when it comes to interactions with senior clinicians, rather than feeling comfortable in advocating for the best care for the animals under her care. In many cases, this sense of frustration has

Key Points (Continued)

developed from working in an environment where the positive feedback that Dr. Catone grew up and thrived on is nowhere to be found. Crying and transient emotional outbursts are not uncommon in the stressful environment of the emergency room, where life-and-death decisions about animals are made, and small mistakes can have huge consequences. An environment where acceptance, understanding, and guidance exist (rather then criticism) can go a long way in enhancing the confidence of junior veterinarians. Maturity and an understanding of when to offer something other than the best possible plan will come with time, and an even give-and-take situation among colleagues is essential for learning and teaching.

46

But CPCR Was Successful!

Clear, timely communication about changes in patient status

Buddy, an 11-year-old Labrador cross, was rushed into the hospital. He had been previously healthy, and weighed about 90 pounds (41 kg). He had collapsed at home and upon arrival was immediately brought by the receptionists and technicians to the treatment area. The technician who met Buddy's owners reported they were very worried about Buddy and wanted to try to help him.

On physical examination, Buddy was very weak. His mucous membranes were white, and his heart rate was evaluated at 180 beats per minute. The veterinarian immediately directed the placement of two large-bore intravenous catheters for resuscitation. Initial screening tests showed a hematocrit of 25%, a total solids of 4.8 g/dL (48 gm/L), and a lactate value of 11 mmol/L. Two liters of crystalloids were immediately infused, and an in-house ultrasound showed a large cavitated splenic mass with free fluid in the abdomen. Abdominocentesis confirmed free unclotting blood. Despite the fluids, Buddy continued to deteriorate and he suffered a cardiopulmonary arrest. Due to a well-orchestrated cardiopulmonary resuscitation effort, including the rapid infusion of 4 units of packed red blood cells, Buddy was revived.

The clinician went to discuss the progression over the preceding 45 minutes, to gain permission for surgery, and to discuss the likelihood of hemangiosarcoma. However, to his surprise, Buddy's owners were

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

upset at the events and, given the potentially grim prognosis, elected to euthanize Buddy. The costs for the veterinary care to stabilize Buddy, including the blood products, were in excess of $1000, which Buddy's owners refused to pay, as they had not authorized such care.

Key Points

- This case represents a scenario in which, despite good medical decisions and initial treatment, the ultimate outcome was not what the clients or the clinician might have hoped for.
- Early discussion of costs and likely outcome is vital in all cases of critically ill or injured pets in order to prevent later misunderstanding. In this case, the medical resuscitation was flawless, but both the client and the veterinarian were left disappointed at the outcome.

47

Rosie and the Platelets

Novel therapies require a firm discussion of risk and benefit

Rosie Brown, a 9-year-old spayed female Cocker Spaniel weighing 10 kg, was on vacation at the family cottage when she started to have gingival bleeding. She had been previously healthy, with no medical problems other than some chronic ear infections. She was presented to her primary care veterinarian, who detected the presence of petechiae and referred her to the specialty hospital for care and treatment. On examination, Rosie was quiet but alert and responsive. There were no significant findings other than the bruising and slightly pale mucous membranes. Melena was present on rectal examination. In-house blood tests showed that her platelet count was less than 1000/μL (reference range 200,000–500,000/μL). Her white cell count was slightly low at 4500/μL, and her hematocrit was 26%. Dr. Allen talked to the Browns about admitting Rosie and conveyed that it was most likely immune-mediated thrombocytopenia (IMT) and that, with supportive care, dogs are usually better within 4–7 days. The treatment would include prednisone, a single dose of vincristine, and blood transfusions as needed to maintain her hematocrit. Blood loss through the gastrointestinal tract was a big concern as large volumes of blood could be required but he suspected that, as long as bleeding into "important" places such as the lungs or brain did not occur, Rosie would be fine. The Browns agreed to admit Rosie and confided that they had some financial

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

constraints; however, they were eager to do whatever was needed for Rosie. It sounded like she could be home in a few days.

The next 3 days passed uneventfully. Diagnostic testing did not identify an underlying cause of the IMT, with no evidence of neoplasia or infection. However, Rosie had significant gastrointestinal bleeding and was receiving about 180 mL of packed red cells a day to keep up with her blood loss. The Browns were becoming concerned about the number of transfusions, and Rosie's platelet count had still not budged. On day 4, with a platelet count of less than 1000/μL, a bone marrow aspirate was performed to evaluate the ability of her bone marrow to make more platelets, by assessing the presence of megakaryocytes. Interpretation of the aspirate showed that there was evidence of megakaryocytic hyperplasia, as well as erythroid hyperplasia. The Browns were encouraged by this news; Dr. Allen reiterated the relatively good prognosis for IMT as long as the immunosuppressive therapy was continued.

On days 5–10 of hospitalization, Rosie again received 180 mL of packed red blood cells per day, with no apparent increase in her platelet numbers, with counts always less than 5000/μL. Dr. Allen rotated off service and was replaced by Dr. Li. She was happy to treat IMT and was eager to take care of Rosie. The Browns asked to meet with Dr. Li, as they were frustrated with the ongoing transfusions, the duration of hospitalization, and the relative failure of the veterinarians to resolve Rosie's bleeding. Dr. Li was kind and patient with the owners, and in fact she had a new suggestion! Human IVIG, an immunomodulating agent, had been used in some dogs with IMT, and the reports were unbelievably good, with many of the dogs' platelet counts increasing dramatically within 6 hours. The only problem was that it was expensive—probably $1000 for a dog of Rosie's size! After lengthy discussion, the Browns agreed to try the IVIG; they were already close to the upper limit of their financial reserves, but to them this sounded almost too good to be true! They had already spent a lot of money and, although they were reluctant to spend more, they also wanted Rosie home and didn't want to euthanize her. The IVIG was administered uneventfully. However, the following morning, the platelet count was still 4000/μL. Around midafternoon, Rosie collapsed, with a bout of severe melena. Another transfusion was provided, and Rosie rallied quickly. That day, Dr. Allen was back on duty, and the Browns read him the riot act. Dr. Li had promised them that the IVIG drug would work and that Rosie would be immediately back to normal. In checking the client communication log, Dr. Allen saw the notation "Okay for IVIG" signed by Dr. Li, but no mention of any of the other specifics.

Dr. Allen spent an uncomfortable 15 minutes in discussion with the Browns, but finally left with the plan to add another immunosuppressive agent (cyclophosphamide) and to carry on for another few days. Two more days, and two more transfusions, later Rosie's platelet count was 78,000/μL and she was discharged. Her final bill was about twice what the Browns had planned to spend, and Rosie had received 12 half-units of blood.

Key Points

- Immune-mediated thrombocytopenia is a common hematological disorder, typically with a good prognosis, when supportive care and immunosuppressive medications are provided.
- The clinical course can be variable and, although most dogs are better in 4–7 days, not all respond. Good communication about the possible ranges of the duration of therapy is important so that clients understand the challenges of therapy.
- The human IVIG is an exciting possibility for treatment of IMT; however, Dr. Li's discussion with the owners provided, in their mind, false hope of an immediate response to treatment, and they were very surprised when Rosie did not respond as promised. All conversations should be carefully documented, particularly when newer or less commonly used drugs are involved. Despite the Browns' happiness at getting Rosie home, they were still frustrated by Dr. Li's recommendation for IVIG and by Rosie's lack of the immediate response they were "promised."

48 The Receptionist's Dog

Family and friends' pets can be particularly stressful for clinicians

Major, a 10-year-old mixed-breed Terrier, belongs to the receptionist (Mrs. J) of a local veterinary hospital. Major has been polyuric and polydipsic lately, and diagnostic testing has confirmed Cushing's syndrome. Mrs. J loves Major and is very willing to treat him for Cushing's disease. Despite having worked at the practice for 25 years, she is not entirely sure what Cushing's disease is, but she knows that dogs that with that condition do well, although they seem to come in a lot. Mrs. J and her husband are going on vacation for 2 weeks to see the grandchildren, and after that Mr. J is having a knee replacement. Since she wants to focus on her husband's surgery, and Major seems okay, she asks if she can wait to start treatment for about 1 month. The primary care veterinarian (Dr. K) agrees. Mrs. J is very special to him; she has known him since he first started as a kennel attendant, and in fact she drove to the university to watch him graduate from veterinary school 17 years ago.

Thirteen days later, the primary care veterinarian receives a frantic call from Mrs. J. Major has collapsed while on vacation. She has taken him to a local emergency clinic; they have diagnosed diabetic ketoacidosis (DKA) as a complication of his untreated Cushing's syndrome. They have stabilized Major but are recommending that he go to a local referral hospital rather than back to his primary care practice. Mrs. J is too upset to think and just wants to do what is right for Major. Dr. K agrees that Major should go to a hospital with 24-hour care and promises to call ahead to facilitate Major's care. However, the internist is too busy to talk to him because she is behind in appointments.

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Major arrives at the 24-hour hospital; despite assurance that he is better, he looks very weak. He is vomiting almost continuously and is slightly icteric. The internist (Dr. I) assures Mrs. J that, despite Major's condition, he should recover uneventfully but that, in addition to the Cushings and DKA, he also has pancreatitis. She does chastise Mrs. J for delaying treatment of the Cushing's syndrome, as laboratory testing showed he was "prediabetic" with a blood glucose of 157 mg/dL (8.7 mmol/L). Mrs. J called Dr. K again, very upset at how homesick Major is, and concerned that she is responsible. After much cajoling, Mrs. J feels better and decides to get some rest. Dr. K, who has intermittently done relief work at the 24-hour hospital, goes over to check on Major. He is greeted collegially and proceeds to explain to the overnight intern how he manages DKA and to make some changes to the orders. Dr. K liked the old internist at the practice, but she is on maternity leave. He has only met Dr. I once, and he didn't think she was very friendly and thought she looked very young. Dr. K also asks the overnight intern to call him with questions.

The following morning, Major is still very weak. Dr. I arrives and is livid that her treatment plan was not followed. She screams at the overnight intern and then calls Mrs. J to say "if she doesn't trust her, she should take Major elsewhere." Mrs. J again begins to cry and doesn't know what to do.

Key Points

- Open communication is essential. All veterinarians have clients that they are particularly close to, especially if they are long-standing colleagues. Dr. K wanted to do what was best for Major, and he probably had some guilt that Major had not started treatment, even though the outcome would have been impossible to predict.
- Dr. K had very good intentions, but he should have assumed the role of either primary clinician or a friend of Mrs. J. Changing a treatment plan without discussion and instructing an intern on whom to call overstepped the bounds of professional behavior.
- Dr. I should have taken the time to talk to Dr. K. Had she done this originally, more of a team spirit could have been reached. If she had recognized the extent of the relationship between Dr. K and Mrs. J, she could have used him as an ally in treating Major, rather than helping to foster an adversial relationship. Additionally, while it might ultimately be important for Mrs. J to understand the relationship between Cushings and diabetes and pancreatitis, it may be wise to leave that until Major is more stable.

49 We'll Take Good Care of Maxwell!

Unexpected deterioration of a pet after admission

Maxwell, a 4-year-old cat with vomiting, was admitted to the hospital by the receiving emergency intern (Dr. Y). Maxwell had been previously healthy although he has been vomiting for about 3 days. On examination, he was assessed as stable, although he appeared to be painful in his abdomen. The client (Mrs. Honeywell) left Maxwell for intravenous fluids, laboratory testing, and diagnostic imaging. Dr. Y promised to call if there is any change and to "take good care of Maxwell."

Maxwell was admitted to a fluid ward, and routine laboratory samples were collected. An intravenous catheter was placed and crystalloid fluid therapy was started at a rate designed to counteract his dehydration and provide for maintenance needs. Buprenophrine was administered at 0.02 mg/kg intravenously for pain relief. Point-of-care testing, including a complete blood cell count and chemistry profile, was unremarkable except for an elevated white blood cell count of 22,000/μL (reference range to 16,000/μL) with a mature neutrophilia, and mild hypoglycemia at 69 mg/dL (3.8 mmol/L; reference range 75–120 mg/dL, 4.2–6.7 mmol/L). Diagnostic imaging was delayed due to multiple postoperative cases and additional outpatients.

The receiving intern had a busy day as well; when she returned to check on Maxwell in 2 hours, Maxwell looked to be resting comfortably. Mrs. Honeywell called for an update and was told by the receptionist that no news is good news and that Dr. Y will call when she has a chance, but the day was really busy. However, later in the day,

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

toward the end of Dr. Y's 14-hour shift, Maxwell was found collapsed in his kennel. He was hypothermic, bradycardic, and minimally responsive. The emergency intern advised the nurses to move Maxwell to the intensive care unit and to place him on a heating pad. A 50-mL bolus of crystalloid was given intravenously and Maxwell seemed a bit brighter. Dr. Y returned to her other cases, including a laceration repair and an assortment of other outpatients.

Mrs. Honeywell returned at 6 P.M. to visit with Maxwell and was horrified by his current condition. She demanded to talk to whoever was in charge. The senior emergency room clinician came to talk with her and agreed Maxwell looked unwell. He immediately evaluated the abdominal radiographs, which documented free abdominal air and a pattern consistent with a gastrointestinal foreign body. Maxwell was aggressively treated for shock and was taken urgently to the operating room. Surgical exploration confirmed a jejunal foreign body and a gastric perforation. The stomach and intestines were repaired, and Maxwell was returned to the intensive care unit. Following a week of hospitalization with his care supervised by the senior clinician, Maxwell ultimately recovered and was discharged home. Mrs. Honeywell was delighted with Maxwell's recovery, but every day she asked if he would have been so sick if "this was caught earlier" and "why was she told that she would be called if there was a problem, when she was not?"

Key Points

- Maxwell's initial presentation was vague and might have represented any of a number of conditions. However, when he was found collapsed, two major errors occurred. The first was a failure to act immediately to determine the cause of his collapse. Self-limiting vomiting does not result in collapse, so finding Maxwell in this condition should have immediately directed the focus to identifying the source of the decline. Dr. Y should have consulted a senior clinician and followed up on the diagnostic imaging results. Second, and equally important, was the failure to call Mrs. Honeywell. Moving a pet into the intensive care unit or administering a fluid bolus to a previously stable pet suggests that their condition is deteriorating. It is much preferred to call and discuss the decline and intervening steps, rather than to just *hope* the patient responds to therapy.
- Additionally, while by all accounts Dr. Y was having a busy day and could not have necessarily predicted that Maxwell would take a turn for the worse, clients don't care that you are "having a busy day"; they simply want their pet looked after appropriately.

50 A Diagnosis to Stand By

A case highlighting why things are not always as they seem

Sheila, a 3-year-old spayed female Australian Terrier, had been diagnosed with Addison's disease 6 weeks ago. She had been hospitalized for 4 days and improved dramatically on her medication [desoxycorticosterone pivalate (DOCP) and prednisone]. She presented to the emergency room because she had acutely collapsed after running in the backyard.

Sheila's owner, Mary Francis, had been told that Addison's disease promised a good prognosis, both by her veterinarian and through extensive research on the Internet. However, the last veterinary visit took a lot out of the family, what with Sheila's hospitalization, the blood tests, and the recheck exams and injections to keep Sheila healthy. Mary Francis was watching Sheila run in the backyard when she had her back legs go out from under her. Sheila immediately cried out and was reluctant to stand. Was this all part of the disease? Mary Francis picked up Sheila and rushed her to Dr. Thompson.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Dr. Thompson learned from the receptionist that Sheila was returning, collapsed and unable to stand. Dr. Thompson started to do the math and consider the options. How long had it been since the last DOCP injection? Could the bottle have been outdated? Sheila had looked so good at the last exam.

On physical examination, Sheila's mucous membrane color and capillary refill time looked normal and her pulses seemed strong, but this still must be a recurrence of the Addison's disease. There was no spinal pain, the patellar reflex seemed fine, and Sheila had normal conscious proprioceptive responses. Maybe she should have used a higher dose of prednisone with the DOCP? She placed an intravenous catheter, handed a blood sample to her technician to get the electrolytes, and started some intravenous fluids. She also administered another dose of DOCP and some intravenous cortisone. Dr. Thompson then went to talk to Mary Francis about hospitalizing Sheila overnight.

Mary Francis left reluctantly—she did not want to leave Sheila in the hospital again, but this seemed to be the only option. When Dr. Thompson called at 5:30 P.M. to let her know that Sheila seemed stable, but was not yet standing, she started to wonder whether she had made the right decision 6 weeks ago. She loved Sheila, but she really did not have all this extra money to cover the veterinary bills.

The next morning, Sheila was not much improved. She was eating some, but still not standing. The electrolytes had been normal; Dr. Thompson felt she must be missing something. She asked Dr. Porter, her boss, what he knew about refractory Addison's disease and described the case to him. Dr. Porter had been practicing for 20-plus years, and he was stumped as well. He offered to examine Sheila. Dr. Porter first found some sensitivity on manipulation of her hind limbs and subsequently localized the pain to her stifle joints. He also found cranial drawer, cranial tibial thrust, and mild joint effusion evident in both stifles. Sheila was diagnosed with bilateral cruciate ligament rupture, which had caused her inability to stand. Mary Francis was going to be disappointed. The Addison's disease was stable, but surgical repair would be required for the cruciate ligament injury, and it would run to thousands of dollars.

Dr. Thompson wasn't prepared for Mary Francis' reply. She had brought Sheila in for recurrence of Addison's disease, and Dr. Thompson had confirmed this diagnosis and started treatment. Now she had cruciate ligament injury—if this was the case, Mary Francis was convinced that it must have happened at the veterinarian's office, and it would be up to the clinic to pay for Sheila's surgery.

Key Points

- Due to Sheila's recent diagnosis of Addison's disease, it was initially hard to consider that another diagnosis might be responsible for her new signs. Diagnostic evaluation typically tries to link all signs together, and it is appealing to attribute any new clinical sign to an ongoing problem. However, in this case, Shelia's collapse and hindlimb weakness was actually due to a new and completely separate problem. Addison's disease is often characterized by an excellent response to treatment. The dog was well managed by Dr. Thompson and, given the absence of electrolyte abnormalities, a new diagnosis, such as musculoskeletal pathology, should have been considered.
- Dr. Thompson was wise to consult a colleague when the response to therapy was different than what was expected. Colleagues can often bring a different perspective to the situation, and they might not be as biased by recent events.
- The response from the owner was not expected by Dr. Thompson. Was this because she failed to deliver the changing clinical picture in a cohesive fashion? Was the financial limitation of the client part of the motivation to assign blame elsewhere? Discussion with clients when a new diagnosis becomes apparent is often fraught with challenges. Honest discussion of how and why the diagnosis is different than initially thought is usually associated with a better response.

51

The Confused Setter

Making sure that all presenting clinical complaints are addressed

An 8-year-old intact female English Setter was presented to her family veterinarian for lethargy, confusion, and weight loss. Physical examination at that time was unremarkable except for several 1- to 2-cm masses in the caudal mammary glands. A complete blood cell count and chemistry profile were unremarkable. Mastectomy was recommended as treatment for the mammary masses.

Two weeks later, the dog was presented for a surgical evaluation at a local referral hospital. The dog's clinical signs had not changed, and perhaps had worsened. She was quiet and still appeared to the client as if she was disoriented. The remainder of the physical examination was unchanged although two smaller masses were identified in the more cranial mammary glands. The attending surgeon elected to perform an abdominal ultrasound to exclude pyometra or other intra-abdominal problems and also to perform three-view thoracic radiographs to evaluate for metastasis. The abdominal ultrasound was normal and the thoracic radiographs were clear of any evidence of metastatic disease.

Unilateral complete right mastectomy was performed, in conjuction with a lumpectomy on the left caudal mammary gland. A routine ovariohysterectomy was performed at the same time. The dog made a

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

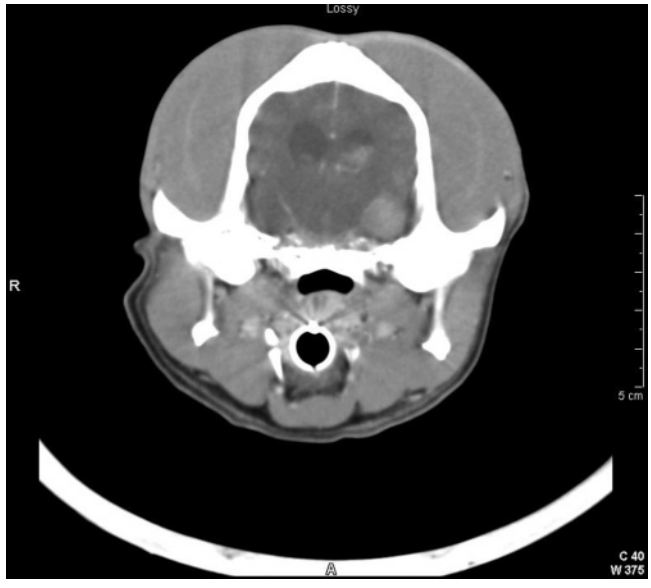

Figure 51.1 A CT slice documenting a mass on the left side of the brain, seen as a white round focal lesion.

slow but uneventful recovery from anesthesia and was discharged home 2 days postoperatively.

Seven days later, the dog re-presented to the emergency service. The dog had been progressively mentally dull and had a seizure in the car on the way to the hospital. On examination, the dog was stuporous and weak. The incisions were healing well. Following discussion, a computed tomography (CT) of the brain was performed.

The CT scan documented several masses in the brain, which were thought to be responsible for the clinical signs (Figure 51.1). The histopathology of the mammary masses returned benign.

Key Points

- This case was challenging primarily due to poor communication between the attending veterinarian(s) and the client. The presenting complaint, dullness, was not adequately explained by mammary masses. Certainly, surgical removal of mammary masses is advisable, but not given the other conditions in this dog. In the case of the first two veterinarians, they were

(*Continued*)

Key Points (Continued)

likely distracted by a tangible problem (e.g., the mammary masses). It was not until the dog demonstrated more outward signs of intracranial disease that the correct diagnosis was reached.

- The presenting complaint should be adequately addressed in all patients.
- Elective surgical procedures, such as ovariohysterectomy, should not be performed on a patient with an unexplained disorder that will not be helped by surgery.

52

Tasty Fungi

Working within financial constraints when the disease and prognosis are unknown

Rudolph, a 6-month-old yellow Labrador puppy, was brought to the emergency clinic with acute neurologic signs. He had just been neutered that day at the primary veterinarian's office and had seemed to be fine when the owner picked him up about 4 hours earlier. He was not sent home with any medications and had eaten his dinner well. The owner had taken him out for a walk about 2 hours prior to the onset of clinical signs. The owner did mention that she had noticed some mushrooms in a field in which he had been running, but she was unsure if he had eaten any as both of her dogs were in the field playing for about 15 minutes.

On physical examination, Rudolph was found to be very ataxic, with muscle tremors and facial twitching. He was febrile at 104°F (40°C). He proceeded to have a full grand mal seizure, which responded to an intravenous dose of diazepam. Other than the neurologic signs, no other physical examination abnormalities were noted.

The emergency doctor discussed the differential diagnoses with the owner, including possible toxic effects from the ingestion of mushrooms. Some types of mushrooms (*Amanita* spp.) can cause acute liver failure and can lead to neurologic signs as well. The owner confided that she had some significant financial constraints and would not be able to pay for a large number of diagnostic tests and treatment. Other differ-

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

entials included a reaction to the sedation given earlier for his neuter, underlying congenital liver or central nervous system disease, or other types of toxins. The emergency room doctor recommended blood electrolyte and glucose analysis, and abdominal radiographs to assess the size of the liver and to evaluate the other intra-abdominal organs.

The blood glucose and serum electrolytes were within normal limits. Gastric distension with a large amount of material was seen on abdominal radiographs. Because of the history of possibly eating mushrooms and the severity of the clinical signs, Rudolph was sedated, intubated, and gastric lavage was performed. A large amount of mushrooms were lavaged from the stomach! After fully flushing the stomach with warm water, Rudolph was recovered from sedation. However, once extubated, he started seizuring and began to breathe very slowly, and pulse oximetry showed an oxygen saturation of only 85%. He was reintubated and given another dose of intravenous diazepam, which stopped the seizure activity. He required manual ventilation, as he was not taking effective breaths on his own.

At this point, the owner was unsure if she could continue to treat Rudolph, as his clinical progression was deteriorating and he was still at risk for developing liver failure from the ingestion of the mushrooms. The added complication of potential assisted ventilation also negatively impacted his prognosis. The emergency doctor convinced them to give him a few hours, to see if he would respond to supportive care. He was extubated after another 20 minutes, although he continued to breathe very slowly and shallowly. His sedatives were reversed, he was managed in an oxygen cage, and he was monitored carefully for clinical deterioration.

By the next morning, Rudolph started breathing more effectively; by the afternoon, he was jumping and barking at the front of the cage like a normal puppy! He was discharged normal and did not have any further complications from the mushroom ingestion.

Key Points

- As veterinarians, it is very difficult to be restrained by finances when trying to save patients, especially young dogs and cats that may have a reversible disease. In this case, a toxin was highly suspected, and the emergency doctor did minimal tests and treatments to give the puppy a chance to live. Although the prognosis was unknown, the doctor wanted to give the puppy

Key Points (Continued)

a chance and worked with the owner to stay within financial limits while giving Rudolph time to recover.

- Sometimes, as veterinarians, we are not able to perform as many diagnostics and treatments as we would like, due to availability of resources and the owners' financial commitment. However, many patients respond to supportive care, and as long as the veterinarian follows the adage "first, do no harm," many pets can recover and do well.

53 Watch What You Write!

A lesson on how to always be professional

A 2-year-old female Pomeranian presented to a multidoctor specialty and emergency practice for vomiting and diarrhea on a Sunday afternoon. The dog was seen and admitted by an intern who had only a few months' experience under her belt. Lab work was submitted, the dog was treated with intravenous fluids and supportive care overnight, and she appeared to be improving. The owner, however, was very intense and worried, calling multiple times during the first 24 hours of the dog's hospitalization. She also questioned the diagnostic and treatment choices made by the intern and was very vocal while at the hospital.

Because the intern was scheduled for a different rotation the next day, the case was transferred to a new clinician. As was the standard at this practice, the intern wrote up a case summary and placed it in an outside pocket of a folder that contained the pet's record. This transfer summary was not part of the dog's permanent record and would be discarded after the new clinician read it.

Because of the problems the intern had had with the client, she did write some things about the client as a warning to the new doctor. One of the phrases was "The client is crazy and will badger you all day."

However, on this occasion, the owner arrived unannounced early in the morning to discuss her pet's condition. Since the intern was in the hospital and the new clinician hadn't yet looked at the dog, it was

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decided that the intern should go into an exam room to talk to the client. She brought the folder that contained the dog's chart into the room with her and had a good discussion with the client about her pet's condition (which was stable) and care.

The intern left the room momentarily to retrieve the pet's radiographs, leaving the dog's chart in the room with the owner. When she returned, the owner was holding the chart in her hand, and the first words out of her mouth were, "So you think I'm crazy?" As one can imagine, the situation was very awkward. The intern tried unsuccessfully to explain the words that she had written and it was obvious that the owner was not pleased.

The owner contacted one of the three partners who owned the veterinary hospital to voice her displeasure. He was able to smooth things over, but he requested that the intern write a note of apology.

Key Points

- People have many different types of personalities, and it is important that a veterinarian be able to work with them all. Additionally, the stress of having a sick pet will usually amplify many personality traits. This client was likely a little pushy and demanding, but she became even more so when her pet was hospitalized. Being able to understand and empathize with a client during these situations is key to developing a good bedside manner.
- While it is important to communicate all aspects of a case with other veterinarians who may be working with the pet, this communication must be done in a professional manner. Anything written down and attached to the medical record may be accessed by other veterinarians and the owner, so it is important to be tactful when describing the client's behavior. As discovered here, even a note that was not intended to be part of the patient's chart ended up in the wrong hands.
- It is good practice NEVER to leave the patient's record in the room with the owner, even for a few moments. In many cases, the owner's curiosity will cause them to read the chart, which may lead to an uncomfortable situation.
- Admittedly, this intern was new in her career and had much to learn about client communication as well as the practice of veterinary medicine.
- Veterinarians and veterinary staff must understand that many clients may exhibit undesirable behaviors as a stress response when their pet is ill.
- Do not write anything about a case or client in the medical record, or associated with the record, that you would not want the client to see.

54 But She Was Just Vomiting!

The importance of organization in the midst of chaos

It was a busy Sunday afternoon in the emergency room, with cases piling up left and right. At 4 P.M., in prompt succession, a blocked cat (Finn), a vomiting Labrador (Sammy), a Labrador mix that was hit by a car (Sam), and a heart-failure cat (Stripes) arrived over a 10-minute span. The most seriously injured was the Labrador mix, Sam, with a severe hemoabdomen and a femoral fracture. The emergency team worked quickly to try to stabilize the traumatized dog, but over the next 10 minutes Sam continued to decline and suffered a cardiopulmonary arrest. Cardiopulmonary resuscitation was initiated, and Dr. Mike Archibeaux was elected to go talk to the family in the lobby. Dr. Archibeaux went to the lobby and asked for Sam's owners. A young couple got up, and the doctor walked them back to the consultation room. He confirmed, "Are you the Lab's owners?" They stated they were, and the doctor broke the bad news: "I am afraid he has died; the injuries we just too severe." The young couple started crying, and the man stated, "But Samantha was just here for vomiting!" At that point, with horror, Dr. A realized that he had made a mistake and confused the Labradors. Samantha was just suffering from a severe gastroenteritis, while Sam, the Lab mix, had been killed in the car accident. Dr. A apologized profusely and returned to evaluate Samantha. The other dog's owners were found outside (where they had gone to smoke) and were given the bad news.

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Key Points

- Patient identification is essential to patient care.
- Patients in the hospital should be clearly identified; in emergency situations, the patient-and-owner relationship should be confirmed prior to any treatment decisions or consultations.

55

Peroxide Puppy

A case discussing the potential concerns of phone advice

A 3-month-old, male black Labrador puppy named Ben was presented for evaluation of profound ongoing ptyalism and lethargy that had occurred following the administration of oral hydrogen peroxide.

Earlier that day, Ben had eaten one-fourth to one-half a bag of milk chocolate Hershey's kisses. His owner had called their primary care veterinarian for advice, and it was recommended that she attempt to induce emesis at home with hydrogen peroxide. The receptionist with whom she spoke advised that, while we generally don't worry about milk chocolate unless a patient has eaten close to 1 ounce of chocolate per pound of body weight, Ben had eaten quite a lot so it was better to be safe than sorry. Not having any peroxide at home, Ben's owner made a trip to the drugstore where she purchased a 500-mL bottle.

When asked how much peroxide she had given Ben, the owner said that she gave about a tablespoon at a time, but given that he wouldn't vomit she just kept giving it until he had received almost the entire bottle. The person with whom she spoke on the phone had not told her how much to give, so she continued giving it, becoming progressively worried that he would not vomit.

On examination at the time of presentation Ben was markedly depressed. He was considered tachycardic with a heart rate of 180 beats per minute. He was also mildly febrile with a temperature of 102.5°F

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

(39.2°C). Ben resented oral examination, but when his mouth was finally opened it was evident that his oral cavity contained many ulcerative lesions and associated severe pytalism.

It appeared that the large volumes of hydrogen peroxide administered had resulted in severe mucosal damage. Politely, the emergency veterinarian had to inform Ben's owner that by giving hydrogen peroxide she had inadvertently created this problem.

Ben was admitted to the hospital, where an intravenous cephalic catheter was placed and intravenous fluids and opioid analgesia were administered. Famotidine and pantoprazole were administered intravenously for their antacid effects, and a sucralfate slurry was administered orally to help coat the ulcers. Oral green tea rinses, with occasional dilute chlorhexidine rinses, were also provided in order to be soothing and to minimize bacterial growth in the oral cavity.

Once Ben was feeling a little better he was offered a slurry of canned food. Although he was interested in eating and drinking and would start to lap at the slurry, he was too painful to consume much at all. As such, Ben was anesthetized the following day and a percutaneous endoscopic gastrostomy (PEG) tube was placed. Prior to this he had a thorough diagnostic upper gastrointestinal endoscopy, which revealed that the ulcerative lesions extended all the way down his esophagus and were also present in the gastric walls.

Ben's ulcerative lesions slowly healed, such that by day 6 he was able to eat larger quantities of food (still as a slurry). By day 14 he was back to normal and his PEG tube could be removed; he did not suffer any permanent damage to his mucous membranes or esophagus.

Key Points

- Although we are frequently in the position of having to give advice over the phone, it is vital to remember that we are generally advising a member of the lay public who has no knowledge regarding veterinary medical matters. It may have been obvious to the person giving advice in this case that you would try a tablespoon of hydrogen peroxide maybe twice, then stop if it is not successful; however, this is not necessarily obvious to a lay person. As such, it is imperative that any advice given over the phone be completely clear and that clients are always offered the option of being seen by a veterinarian. Potential side effects of any recommendations given over the phone must also be discussed, such as the potential of hydrogen peroxide to cause mucosal damage.

(*Continued*)

Key Points (Continued)

- While veterinarians are not necessarily liable for advice given over the phone, caution must be exercised. Veterinarians or their staff cannot diagnose a patient's ailment over the phone, nor can they prescribe treatments without a client–doctor–patient relationship. Giving inappropriate advice can potentially result in worsening of the patient status, as is illustrated in this case.
- It is also important to remember that many compounds that we use regularly in veterinary medicine have the potential to cause serious side effects, particularly when used inappropriately.

56

Too Tight!

An illustration of possible complications associated with bandage placement

Roo, a 6-year-old Australian Shepherd, was presented to the emergency service after being hit by a car. Luckily, his injuries were confined to a dislocated hip. The radiographs showed a cranial dorsal luxation, with evidence of a normal coxofemoral joint. Dr. Melbourne recommended closed reduction, with placement of an Ehmer sling. The owners agreed, and Roo was anesthetized and the hip uneventfully repositioned. Roo was discharged the following day, with instructions on home bandage care. Two days later, Roo returned to the emergency service because the bandage had slipped and was wet. Dr. Sydney had never placed an Ehmer sling, but, after reading a surgical textbook describing the procedure, sedated Roo and replaced the bandage. Roo was again discharged home, and the owners promised to return if the bandage slipped again. Since the emergency room was busy, Dr. Sydney did not write discharge instructions but rather verbally conveyed the recommendations.

Fourteen days later, Roo was back in the emergency room with a wet bandage and a swollen foot. The bandage appeared to be too tight on his skin. Underneath the bandage, there was a circumferential necrotic lesion, with the metatarsals exposed. Following multiple bandage changes, and ultimately, a skin graft, the wound healed.

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The owner disputed the final bill, stating that they were not aware of the complications of a long-term bandage, and they requested full reimbursement for the costs associated with the wound. A review of the medical record by the hospital director found that there was inadequate reporting of communication with the client, and that the second veterinarian had not been comfortable with the placement of the Ehmer sling. Clearly, part of the blame rested with the client for not returning the dog more quickly when complications became apparent. However, in the interest of client relations, the director provided a 75% discount on the services, so that the final bill was only US$612.

Key Points

- Bandage complications are common; however, they can be prevented with good client education and explicit discharge instructions.
- It is sometimes difficult to assess if a bandage is too tight or uncomfortable—often, dogs and cats do not show adverse signs right away.
- If a veterinarian does not feel comfortable placing a long-term bandage, it should be suggested that the patient recheck with someone more experienced the following day. This helps to assure that the bandage was placed properly, and any other problems can be addressed.
- Good, clear communication would have saved Roo from a lengthy recovery. In addition, medical record documentation is vital to prevent future problems with clients, to allow other staff to know what the client was told, and to allow review of case management when problems with patient care arise.

57 What Was That Popping Sound?

What to do when a routine procedure goes wrong

Dr. Travis was a new intern in a very busy small-animal specialty practice. She was on her first week of overnight emergency shifts and was very excited. She loved emergency cases and was happy when the shift was busy and interesting. A call came in at 2 A.M. about a male cat that was having trouble urinating. The cat had a history of two prior urinary obstruction episodes and had been diagnosed with chronic cystitis and struvite crystalluria. He had been on a special diet and had not obstructed in over a year.

On presentation, the cat, named Gibran, had a very enlarged, firm, nonexpressible bladder. A urinary obstruction was diagnosed, and the owner consented to further diagnostics and treatment. Abdominal radiographs were performed, and no radio-opaque cystic or urethral calculi were noted. Serum electrolytes were within normal limits, and he was found to be mildly azotemic. Dr. Travis prepared to perform a decompressive cystocentesis, as was routine when treating a cat with urinary obstruction at this hospital. During her internship orientation, the internal medicine specialist had described how to perform the

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procedure; although she had never done it herself, she felt confident that she could do it.

Gibran was sedated with a combination of torbugesic, ketamine, and valium, administered intravenously. Once he was sedated, Dr. Travis placed a 22-gauge, 1.5-inch needle connected to extension tubing and a 35-cc syringe into the bladder. She began to aspirate urine and expected to remove approximately 40–60 mL of urine. All of a sudden, however, she heard a subtle popping noise, and a small amount of blood was aspirated into the syringe. At the same time, urine ceased to flow into the tubing. Concerned, Dr. Travis pulled out the needle and palpated the abdomen. To her dismay, she could not palpate the very large bladder that had been present a few minutes before, even though she had removed very little urine. She immediately suspected an iatrogenic bladder rupture and decided to ultrasound the abdomen to check for free abdominal fluid. As she had feared, there was free fluid in the abdomen, and Dr. Travis subsequently diagnosed Gibran with a uroabdomen based on creatinine measurement of the fluid.

Dr. Travis called Gibran's owner to discuss the complications of the procedure, and to recommend emergency surgery to repair the bladder. The owner was very upset and complained that Dr. Travis did not discuss this potential complication with her. Gibran had been blocked twice before and had been relieved of his obstruction without a problem. In addition, the owner stated that, for the two prior episodes, no one had ever discussed the potential of a bladder rupture from this procedure. She questioned Dr. Travis' experience and technique and asked to speak to the medical director at the first possible opportunity.

The medical director called the owner in the morning to discuss Gibran's case. He mentioned that when a bladder is unhealthy, as in Gibran's case, there is a higher chance of complications from any procedure involved with the urinary tract. Performing a decompressive cystocentesis prior to relieving a urethral obstruction is the standard of care in that hospital, and it had been found to improve the success of relieving the obstruction. Complications can occur with any invasive procedure, most of which are unlikely, but still a possibility. However, since Dr. Travis did not discuss the potential complications of the procedure with the client, the cost of the surgery was credited to the owner's account.

The surgery to repair Gibran's bladder was a success, and Dr. Travis learned an important lesson about discussing all possible complications of any procedure with owners when getting signed consent, including the risks of sedation, bladder rupture, and urethral tear.

Key Points

- Any invasive medical or surgical procedure carries with it a certain amount of risk to the patient, and although these risks may be rare, a frank discussion with the owner should take place when obtaining signed consent. If a complication then occurs, the owner will be better prepared, and less likely to pursue litigious action. Open lines of honest communication between the veterinarian and pet owner should always be maintained.
- While it is important that junior veterinarians feel confident in their skill level, especially during emergency procedures, it is important that techniques be demonstrated to them (potentially on cadavers first). Second, junior veterinarians should be taught to communicate appropriately with pet owners about rare but associated complications of each diagnostic or therapeutic procedure they perform. If possible, junior veterinarians should ask for guidance when performing an invasive procedure for the first time. In this case, Dr. Travis was the only one in the hospital on an overnight shift, making it unlikely that she could ask for hands-on instruction.
- Although mistakes do happen and the hospital should not have been held fiscally responsible for the surgery, the goodwill gesture of performing the surgery gratis to the owner helped to maintain a strong and continued client–hospital relationship and prevented a litigious result.

Part Four

Communication Issues between Colleagues and Hospital Staff

58

Bandit

A case documenting stresses around the holidays, and illustrating different clinical approaches

Bandit, a 6-year-old neutered male mixed-breed dog from a rural part of the state, had been losing weight for the last 5 weeks and vomiting for 3 days. Dr. Gibbons identified a possible abdominal mass and, after additional testing, performed an exploratory laparotomy. At surgery, a large mass was found in the cranial abdomen, adhered to the small intestines. The mass had a complex blood supply, and Dr. Gibbons did not feel comfortable resecting the mass. Dr. Gibbons called the McLarty family in the middle of the procedure and recommended either euthanasia or referral to the University Teaching Hospital. Mr. McLarty requested referral to the teaching hospital as the family was happy to undertake the 4-hour drive. Dr. Gibbons closed the abdomen but did not biopsy the mass as he assumed the surgeon at the university would be back into the abdomen in the near future.

Bandit and the McLartys arrived at the university emergency service on the Tuesday night before Thanksgiving. Bandit appeared stable but a bit uncomfortable on abdominal palpation. The emergency service was busy and Bandit was admitted and placed on intravenous fluids and analgesics with the plan of reexploring his abdomen in the morning. The plan established with the McLarty family was that Bandit would be transferred to the surgical service the next morning for ongoing treatment and that the emergency room doctor was sure that Bandit would go to surgery the next day.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

In the morning, the faculty surgeon on duty, Dr. Clarice Winchell, evaluated Bandit and recommended further evaluation preoperatively, specifically an abdominal ultrasound. Due to the upcoming holiday and an already full day of surgery, she advised that it was likely Bandit could wait until Monday for the reoperation. Dr. Winchell was not available over the holiday and transferred Bandit's care to a small-animal intern, Dr. Susan Korde. Dr. Korde continued to carefully monitor Bandit and, as requested, had an abdominal ultrasound performed. The ultrasound documented a large intestinal mass, near the root of the mesentery, but further evaluation was challenging due to the presence of the free abdominal air associated with the abdominal exploratory surgery the previous day. The radiologist felt that they could biopsy the intestinal mass, and Dr. Korde elected to perform an ultrasound-guided, Tru-Cut biopsy of the mass to try to better define the nature of the malignancy in advance of surgery.

Throughout the day and evening, Bandit appeared stable. At approximately 4 A.M., he began vomiting and developed a fever of 104°F. Dr. Korde was paged and a subcutaneous injection of metoclopramide was administered, antibiotics were added, and the analgesic dose was increased. However, through the early morning hours, vomiting continued and Bandit became very weak. The intern added another antibiotic and gave a small intravenous fluid bolus. By 10 A.M., Bandit was very weak. The critical care service was consulted, and a septic abdomen was diagnosed by abdominocentesis. Bandit was taken urgently to the operating room, where the intestinal mass was found to have perforated. Extensive abdominal contamination was present, and despite aggressive postoperative care, Bandit developed refractory hypotension and died 48 hours postoperatively. The biopsy ultimately confirmed a leiomyosarcoma.

Key Points

This case had at least four possible decision points where other choices would have been preferred:

- Dr. Gibbons correctly diagnosed the mass, but then at surgery he lacked the surgical skill set to address the mass adequately and closed the abdomen without a biopsy. While by no means should surgery be done only by surgeons, a complete discussion of the anticipated outcomes of surgery should be reviewed with the owner. For uncommon or potentially difficult surger-

Key Points (Continued)

ies, the pros and cons of referral should be discussed. Some clients would have been likely to euthanize when the mass was initially assessed as unresectable by Dr. Gibbons; if this discussion had been undertaken prior to surgery, then it would have been known whether referral was a realistic option. Given that Bandit's owners ultimately wanted to proceed with aggressive therapy, discussing this prior to the original surgery might have been prudent.

- Dr. Winchell did not want to reexplore Bandit when he was stable. The rationale for further imaging at this point was vague and may have reflected the busy day and the fact that Thanksgiving was the next day. Further imaging is occasionally helpful, but due to the initial severity of Bandit's signs, and the presence of a surgical report from a colleague, it was perhaps not appropriate to plan to delay surgery for 5 days on a dog with a probable intestinal obstruction and surgical confirmation of a complex abdominal tumor.
- Dr. Korde elected to perform a Tru-Cut biopsy of an intestinal mass. This decision could be questioned in light of the prior surgical report of a vascular mass associated with the intestines. There was some chance that the tissue could become devitalized and that an intestinal perforation could result in leakage of intestinal contents from the devitalized bowel loop. In addition, biopsy results take a minimum of 3 days; because this biopsy was performed during a prolonged holiday, time to results would have been even longer.
- When Bandit began vomiting overnight, the intern had not seen enough cases of bacterial peritonitis to have this clinical picture etched in her mind. Since Bandit did have septic peritonitis, medical management would never have fixed the problem: surgery is always required. The additional 6 hours of sepsis prior to establishing the diagnosis of septic peritonitis could easily have been a contributor to the dog's ultimate death.

59

Check the Medicines

A case describing a very busy day, with an inadvertent distribution of the wrong medications

Rowdy, a young Parson Russell Terrier, presented to the emergency service after a few days of lethargy and a day of difficulty breathing. Pleural effusion had been identified and, thankfully prior to thoracocentesis, his clotting times were checked. His prothrombin time and partial thromboplastin time were both off-scale; on closer questioning, it appeared that Rowdy had been "playing with" a box of rat poison 5 days before his signs developed.

Rowdy was admitted to the hospital and given plasma and vitamin K to treat the anticoagulant rodenticide intoxication. He was given a good prognosis, as long as he adhered to the medication schedule and stayed away from more rat poison!

Later that same day, Fred, an older domestic shorthair cat, returned for a recheck examination. Fred had been diagnosed with hypertrophic cardiomyopathy several years ago, and last summer he had suffered from a thrombus to the front leg. His heart disease was getting worse, and he was here to have his chest drained and for a refill of his dalteparin (low-molecular-weight heparin) and enalapril.

Dr. Park enjoyed these types of cases. They were great teaching cases for the students on the emergency rotation: heart disease is not a death sentence, and anticoagulant rodenticide intoxication often has a good outcome. She completed the discharges for Rowdy and Fred; she was

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planning to talk with Fred's family at discharge and had already talked at length with Rowdy's owners.

An hour later, Dr. Park was paged that Rowdy's owners were at the front desk with more questions. Dr. Park brought Rowdy out to see what other questions they had. She was astonished to hear their question: "What is the dalteparin for? And how do we give Rowdy shots?" Looking in their bag of medicines, Dr. Park immediately saw that Rowdy had received Fred's medications. She ran to the front desk and found Rowdy's medicines all packaged to go home with Fred. A quick trip to the pharmacy clarified everything. The discharges had been confused because both were turned in at the same moment, and the medications were mistakenly placed with the wrong patient's discharge notes.

Key Points

- All medications should be verified prior to discharging patients.
- In this case, the discharge template was changed so that the patient's name appears on each sheet, not just the first one.
- Client questions should always be answered by someone knowledgeable.

60 Cricket and the Insidious Radiograph

Understanding the right and wrong ways to teach and learn

Cricket, a 5-year-old Chocolate Labrador, was a favorite patient of Dr. Hershey, who had identified her with an immune-mediated polyarthropathy about 3 weeks before, after Cricket presented with lameness and fever. Cricket had been doing very well on prednisone therapy, although she was polyuric and polydipsic and had been panting more over the previous few days. These problems were attributed to the prednisone therapy, and her owner was assured that they would improve as soon as the dose was lower.

However, one Saturday afternoon, while out for a walk, Cricket uncharacteristically sat down and refused to walk any further. Her owner left her with the neighbor and went home to get the car. By the time she had returned, Cricket was clearly short of breath and was brought immediately to the veterinary hospital for evaluation.

On examination, Cricket was panting and had marked effort. A resting pulse oximetry reading was 87%. She was placed in oxygen and was admitted to the hospital. Dr. Hershey was not available that day, but Cricket was cared for by Dr. Heath. Dr. Heath, in consultation with her senior clinician (Dr. Graham), decided to take some chest radiographs (Figure 60.1). The radiographs were a bit confusing; differential diagnoses included pneumonia, heart failure, and pulmonary thromboembolism. Ultimately, Dr. Heath settled on pneumonia; because of

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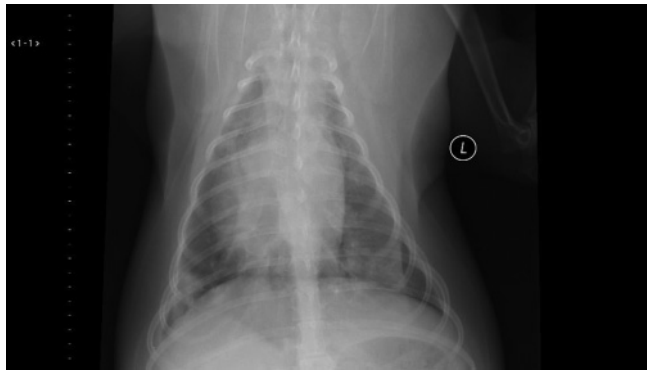

Figure 60.1 A thoracic radiograph from a dog identified with a pulmonary thrombus.

her past experiences, she followed hospital protocol and placed Cricket on an aminoglycoside and a maintenance rate of fluids.

The following morning Cricket was no better, and the plan was continued. Cricket was exceedingly oxygen dependent, and her owner asked if euthanasia was advisable. The owner agreed to give her one more day and see how things developed. The following morning (Monday), new clinicians came on duty and in reevaluating the radiographs realized that there was an area of oligemia (decreased blood flow) and an enlarged pulmonary artery. An echocardiogram was performed, and this showed a large thrombus in the main pulmonary artery. Armed with this new information, Cricket was promptly administered anticoagulants and over the following 4 days made a complete recovery. Dr. Heath, who was eager to learn, contacted Dr. Graham, who was also off-duty, to report the good news and ask if they should look at the films again. Dr. Graham became angry at her and told her that if her advice was not any good, then she was not to consult with her again.

Key Points

- Pulmonary thromboembolism (PTE) should be suspected in any patient that develops respiratory distress while on prednisone or with critical illness; PTE is often challenging to detect radiographically and may be a diagnosis of exclusion. No harm exists in giving antibiotics, but anticoagulation should be considered as well.

(*Continued*)

Key Points (Continued)

- Pulmonary thromboembolism needs to be suspected to be treated!
- Dr. Graham's response to Dr. Heath was inappropriate. No individual is always right, and an environment where "lifetime learning" is supported is essential for individuals to feel challenged and to enjoy their careers. Care should be taken to encourage learning, rather than promoting an "I'm always right" approach.

61

Go Team!

Highlighting the role of experienced technicians in management of cases

Nugget, an 11-year-old Golden Retriever, came to the emergency service for vomiting and not feeling well. His owners hoped it was nothing serious; he did, like many Retrievers, have a history of eating socks and underwear. However, after a quick ultrasound by the emergency clinician, Dr. Bangs, it was clear that the story was more concerning. Dr. Bangs explained that there was fluid around the heart, pericardial effusion, and that what Nugget really needed (and needed now) was to have the fluid removed with a needle. The family was very sad that Nugget had to stay in the hospital, and even more upset when they learned that the prognosis was quite grim if the fluid was due to a tumor. They said their goodnights and went home to await the call from the cardiologist in the morning.

Dr. Daisy Bangs was a recent graduate, but she was ready and eager to help treat Nugget. She did love performing procedures, and pericardiocentesis was fun and rewarding, and she had some experience with the procedure. It was toward the end of Dr. Bangs' shift, but she would stay and do the procedure. Fiona Collinsworth was the senior emergency room technician on duty; she had worked in the emergency room for over 8 years, and her calm nature and good judgment had helped many a patient and new veterinarian. Fiona set up for and assisted with the pericardial tap.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

The procedure did not go as well as Dr. Bangs had hoped. Rather than the 300–400 mL of fluid she had hoped to retrieve, she only got 45 mL. Multiple arrhythmias developed each time she tried to tap the pericardial space, and after trying three times she finally elected to stop. With any luck, she had nicked the pericardium enough to permit adequate drainage and relief of the cardiac tamponade. Fiona, however, was concerned. She had seen many pericardiocentesis attempts, and this one did not go smoothly. Dr. Bangs was a sweet person, but she did get distracted from the work at hand and sometimes she was a bit too eager to get done with her shift —Fiona hoped this was not one of those nights. She had a feeling that Nugget was not out of the woods yet.

About 30 minutes after the attempted pericardiocentesis, Nugget's heart rate on the continuous monitor had increased back to over 200 beats per minute. His mucous membranes were pale, and his respiration had increased. Fiona quickly identified this deterioration and notified Dr. Bangs, who said she was busy and trying to get her reports done so she could go home. Fiona countered that she was worried about Nugget and felt it was likely that Nugget had reeffused into the pericardium or was bleeding into the chest. Frustrated, Dr. Bangs raised her voice and asked her to leave her alone. Fiona returned to evaluate Nugget and found him in cardiac arrest. CPCR was not successful, and autopsy showed a massive pericardial clot, causing tamponade. No hemangiosarcoma or other tumor was found.

Key Points

- Communication between experienced technical staff and junior clinicians is a common area of conflict. In this case, Dr. Bangs, who was likely tired and frustrated with herself for failing to perform a successful procedure, acted in a very poor fashion. Technical input is vital and all concerns should be addressed in a professional and positive manner. Technicians with years of experience often hold key pieces of knowledge that are hard gained from years of experience. Young veterinarians, in contrast, are sometimes working a bit too hard to prove themselves and to show off what they know. Failure to heed the concerns of technical staff not only reduces the quality of medical care, it can disrupt the work environment. Veterinarians who repeatedly fail to listen to the advice of senior technicians can be labeled as stubborn or uncaring. While technicians might not have all the answers, their input should be given due weight in the overall management of the case.

Key Points (Continued)

- Another point for consideration is the decision to tap the pericardial sac at the end of a shift. Pericardiocentesis for cardiac tamponade is often an emergency, but in this case the dog was stable prior to the tap and it might have been possible for the next shift to perform the procedure. A good rule of thumb is to never perform a critical procedure at the end of your shift. It is best not to pull a chest tube, administer a higher dose of a new narcotic, or perform procedures with potential for complications just before you plan to leave the building.

62 Not Just Another Blocked Cat

Outlining conflict between client cost constraints and clinician wishes

A 1-year-old, male neutered Maine Coon cat was presented to an emergency doctor for further evaluation and therapy of urethral obstruction that had been originally identified at his primary care veterinarian. Laboratory testing at that point documented mild azotemia (creatinine 2.4 mg/dL). Urethral catheterization had been attempted multiple times; however, an indwelling catheter was not able to be placed. The primary care veterinarian (Dr. A) relayed that she had treated few blocked cats but had previously been able to unobstruct them without apparent difficulty. An ultrasound of the urinary bladder was done and revealed multiple uroliths. The cat was referred to the emergency hospital for further therapy. The primary care veterinarian had advised that a combination of a perineal urethrostomy (PU) and cystotomy would be required to resolve the clinical signs. The client commented that she was concerned about cost and asked if it would be better to euthanize the cat. Dr. A recommended treatment and advised that the prognosis was excellent, although urinary diseases may be quite frustrating.

On arrival at the emergency referral hospital, the cat was still sedated. It was a busy night and the receiving doctor (Dr. B) quickly admitted the cat, with a brief conversation about reattempting to pass a urinary

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

catheter and performing surgery only if necessary. Dr. B reiterated that PUs were potentially risky in young cats due to infection or stricture and that many stones may be treated medically.

The cat was resedated, intubated, and anesthetized, and intravenous fluids were initiated. A urethral catheter was passed relatively easily, but no urine was retrieved. The catheter flushed "funny" and there had been a "sliding through tissue sensation," which prompted concern for a urethral tear. A contrast cystourethrogram confirmed a urethral tear. The owner was called, and a recommendation was made for surgical placement of a urinary catheter that would be left in for many days, to allow for urethral healing. The owner was very upset on the phone and indicated that she had significant financial constraints. Dr. B indicated that doing nothing was not an option and that the only humane choice was either surgical management or euthanasia. The owner consented to surgery and the cat was transferred to the surgical service at the hospital.

A perineal exploratory was performed, revealing a urethral tear just caudal to the ischium. The surgeon was able to pass a urinary catheter and the decision was made to let the urethra heal by second intention with a urinary catheter in place, due to the location of the tear and concern for the degree of inflammation in the distal urethra. Additionally, a cystotomy to remove a large amount of calculi from the bladder and urethra was performed. The cat did well following surgery and started urinating around the catheter four days later. After transfer to the weekend surgical clinician, the urinary catheter was removed (day 5). Two days later, the cat was discharged, urinating well on his own, with no evidence of urine leakage.

Eight hours after discharge, the cat re-presented to an emergency doctor (Dr. C) for listlessness and decreased urine output. On examination, there was a small bladder and evidence of urine leakage from the perineal incision. The owner was extremely angry and felt the urinary catheter was pulled prematurely due to multiple doctor involvement and lack of interclinician communication. She indicated that she had been told by the first surgeon that a contrast study would be performed to see if the urethral tear had healed prior to pulling the catheter. Additionally, the owner expressed concern that a PU had not been performed initially. It was recommended to replace the urinary catheter and perform a urethrogram to check for healing of the tear. Based on the urethrogram and decreased inflammation, the site of the tear was in a position where a PU appeared to be an option. The owner indicated that she could not afford to pursue further treatment and declined surgery.

As a result, leaving the urinary catheter in place with weekly urethrogram evaluation of tear healing was recommended. The owner needed to be away on business and requested medical boarding for the cat. One week later, a repeat urethrogram was performed and there was no leakage noted from the urethra or evidence of a urethral stricture. There was evidence of irritation or inflammation of the urinary tract, including a thickened bladder wall and a dilated area of the proximal urethra; however, urine flowed freely from the bladder out through the penis. The cat was discharged with the owner.

Eight months later, the hospital was informed that the owner was taking legal action regarding management of her cat's disease. Her claim indicated that the doctors involved were negligent in their care of her cat and failed to exercise reasonable care that resulted in additional injury. According to court documents, 4 days after final discharge, the cat was not eating, drinking, or urinating and his rear leg and groin areas were swollen and hardened. The owner took the cat to a local veterinary clinic 2 days later, where PU surgery was performed. Several days following the PU surgery, the owner noted a "rotting" smell and the appearance of "decomposition" of the swollen areas on the cat. The owner returned to the local veterinary clinic and had the cat humanely euthanized. Her total bills for veterinary care were in excess of $10,000.

The hospital's defense team supplied extensive documentation (diagnostics, surgery reports, owner communication logs) regarding management of this cat's disease. The court ultimately dismissed all of the owner's claims, primarily due to the owner's inability to provide proof of her claims. Court documents also stated, "Although (the owner) failed to meet her burden of proof, there can be no doubt that she did everything she could possibly do for (the cat) and that he was greatly loved."

Key Points

- This case was complicated. Urinary obstruction, while a common disease in cats, can range from quite straightforward to very challenging! In this case, Dr. A had initially recommended a cystotomy and PU; however, Dr. B and the surgeons did not proceed initially with this plan. Their motivation for this—avoiding a PU in a young cat—was reasonable, but practically the PU that was ultimately performed resulted in the death of the cat. Urinary diversion is tricky at best; damaged or irritated tissues may have a hard

Key Points (Continued)

time healing. No surgery comes with a promise of a successful outcome. However, in this case, the owner realistically could feel that the plan of the cat's care changed rapidly and without a full understanding of the risks and benefits of each step.

- It is possible that an immediate PU and cystotomy would have been associated with a successful outcome. In some cases, it may be wise to proceed with a more definitive therapy early on, rather than a more conservative therapy, even if the conservative therapy might be ultimately more appealing. An example of this would be an amputation of a leg with a severe degloving injury. It is very likely that, with adequate bandage changes, even a very severe wound ultimately would heal; however, financially it may be preferable to amputate than to address the potential complications that occur with long-term wound management, as well as the ongoing stress and discomfort experienced by the patient.
- In this particular case, the owner's expectations for how the cat's medical management would proceed were not aligned with progression of the case. Financial pressures were a factor in the owner's ability to pursue recommended therapy, and her perception that a PU was ultimately recommended, after already spending beyond her capabilities in the attempt to avoid the PU, created a high degree of frustration.
- Appropriate and timely (signed and dated) documentation of case management is not only imperative to facilitate communication between doctors involved with the same case, but also, in the event that legal action is sought, to provide evidence of sound case management.
- In situations where owners may have been "primed" by others to expect a certain procedure or test, but then additional decisions need to be made that involve a high degree of emotion (life-or-death decision, significant financial impact), communication of a plan and verification of understanding from the owner's perspective is crucial. This is particularly true when several hospitals or clinicians are involved.

63

Whose Fault?

Highlighting communication between a primary care hospital and an emergency clinic

On a Tuesday afternoon, an hour before closing, a 7-year-old, neutered male Shih Tzu named Teddy was presented for a reexamination to Dr. Bass. On the previous Friday, Teddy had a cystotomy to remove numerous cystic calculi, performed by one of the other associate veterinarians in the practice. The owner's complaint was that Teddy seemed uncomfortable and had some bruising around his incision. The owner reported that Teddy's appetite was good and that he was urinating well. Dr. Bass examined Teddy and noted a small amount of bruising lateral to the incision and a small, nonpainful urinary bladder. Teddy had had postoperative radiographs on Friday that had reportedly revealed no further calculi. The differential diagnoses at this time included typical postoperative pain, further cystic or urethral calculi, and cystitis.

Dr. Bass discussed repeating abdominal radiographs, performing urethral catheterization, and culturing Teddy's urine. Based on the lack of dysuria or stranguria, the owner opted against repeating the radiographs or catheterizing Teddy. Teddy was discharged on a nonsteroidal anti-inflammatory medication for postoperative discomfort and inflammation.

The following day, Dr. Bass worked the evening shift at the hospital; when he arrived, the associate who had performed Teddy's cystotomy

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

informed him that the calculi analysis had been completed and revealed that they were calcium oxalate. She was unable to reach the owner but had left a message for her. She also reported that, contrary to policy, no postcystotomy radiograph was taken, as Teddy had "leapt off the table" at the conclusion of the procedure. Later that evening, Teddy's owner called and told Dr. Bass that she had taken Teddy to the local emergency clinic Tuesday night about 3 hours after he had seen him. The owner reported that Teddy had a urethral calculus that was retropulsed into the bladder and a repeat cystotomy was performed urgently upon the advice of the emergency clinician. Teddy was still at the emergency clinic and his owner was going to call to check on him later.

After talking with the owner, Dr. Bass had several appointments to see but was very distracted by the news from Teddy's owners. While going in and out of these appointments, Teddy's case and his responsibility for how things turned out kept running through his mind. The fairest thing Dr. Bass could think of to do was to offer to pay Teddy's emergency clinic charges; when the appointments were finished, Dr. Bass called the owner to check on Teddy and to offer this solution. She gladly accepted the offer and informed Dr. Bass that she had spoken with the emergency clinician on duty about Teddy. Apparently Teddy was still lethargic and bradycardic. The owner was obviously very concerned. She had been instructed to call back after midnight.

Since Dr. Bass had received no communication from the emergency clinic to this point, he decided to call to get his own report on Teddy's condition and to inform the clinic to forward all charges to him. When he spoke with the emergency clinician, he was told that Teddy was stable and his bradycardia was mild. Dr. Bass recommended checking his electrolytes since he was receiving potassium in his intravenous fluids. Teddy's electrolytes were normal, and when the emergency surgeon decreased his buprenophrine dosage, his lethargy and bradycardia resolved. He was discharged home and is doing well.

Key Points

- In hindsight, Dr. Bass wished he had insisted on re-radiographing and catheterizing Teddy. Later investigation had documented that postoperative films had not been taken after the original cystotomy because Teddy recovered too quickly from anesthesia.

(*Continued*)

Key Points (Continued)

- In dealings with the emergency clinic, quicker communication (or any!) would have been appreciated. The out-of-practice costs for Teddy's surgery were in excess of $2500; the primary hospital would have preferred to simply absorb the cost of reoperating Teddy. Teddy could have easily been returned to the clinic for appropriate care, as once a urinary obstruction is relieved, cystotomy is not an emergency procedure.
- Procedures performed at emergency hospitals (often at higher fees) that might be performed by a primary care veterinarian should be undertaken only after full consultation and communication between colleagues at each veterinary hospital.

64 Shelby and the Needles

What to do when a situation has changed dramatically since the last physical examination

Shelby was found collapsed in the backyard—flat out and unable to stand. Mrs. Needle got her neighbor to help lift Shelby into the car and rushed off to an emergency specialty hospital.

Dr. Slocumb simultaneously started to examine Shelby and take a history. Shelby had been previously healthy but was seen 2 days before at her primary care veterinarian with a complaint of stiffness and reluctance to walk. The Needles reported that Shelby had "checked out well," except for some arthritis in the hips. Some blood tests had been done at the exam 2 days ago, and the Needles reported that their veterinarian had called back at the end of the day to report that "Everything on the blood work looks great for a 12-year-old dog" and that it would be fine to start the arthritis medication dispensed earlier in the day.

On exam, Dr. Slocumb could see that Shelby was very pale and quite tachycardic. Dr. Slocumb was a fast worker, and within an hour she had diagnosed anemia, hypoproteinemia, hypovolemia, hemoabdomen, and a hazy pattern in the retroperitoneal space. She was only moderately proficient at ultrasound, but she thought there was a mass near or at the kidney. Regardless of the exact cause, the internal hemorrhage needed to be addressed with surgical intervention. After explaining her findings to the Needles and starting the first transfusion, she called in the emergency surgeon. At surgery a large renal mass was

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

actively bleeding, but it was successfully resected, and the other kidney looked grossly normal.

Shelby's recovery from surgery was a bit slow, but not unexpected for the circumstances. On the first postoperative day, when Shelby was still recovering and under the influence of narcotics, Mrs. Needle was upset and looking to lay blame somewhere. How could this have happened when everything was normal only 2 days ago? Did their veterinarian miss the tumor? Did the drug for the arthritis bring this on? Dr. Slocumb explained that it was true, the tumor did not grow overnight, and that it was present during the recent exam, but that kidney tumors are difficult to diagnose and are very good at "hiding" unless they start to bleed. Dr. Slocumb also explained that theoretically, it might be possible for the arthritis medication to have made a minor contribution to the bleeding, but she did not think the medication had a major role in causing the tumor to hemorrhage. She made a note of Mrs. Needle's questions and reminded herself to call the primary clinic to update them on the case.

Dr. Newman, the Needles' primary care veterinarian, called Dr. Slocumb the next day. The Needles had arrived to review Shelby's case; they were quite upset that he had missed the renal tumor and were worried how this could have happened. They had always wanted to do the best for Shelby; how could this have been prevented? Dr. Newman spent a long hour with the Needles, and ultimately they left happy that Shelby had been in good hands. Dr. Newman, however, was not happy. He had not heard that Shelby was at the emergency hospital until the Needles appeared in his lobby with questions, and he was blindsided by the resulting discussion.

Key Points

- This challenging scenario is all too common. The primary care veterinarian, Dr. Newman, examined a very different dog. The stiffness and reluctance to walk triggered the investigation with laboratory testing and the initiation of a nonsteroidal anti-inflammatory drug (NSAID), but overall the dog looked to be in great shape. Yet only 2 days later the dog had a crisis event, shortly after starting an NSAID. While it is good practice to "go back to the most recent intervention" and consider whether this might have been a contributor in any animal with new clinical signs, in many cases the addition of a medication such as an NSAID is the "red herring" in the story. Certain diseases simply are ticking time bombs and the onset of clinical

Key Points (Continued)

signs is very sudden, as was the case in this dog. Shelby was overweight and stiff at the initial exam, with pain localized to her hips. There was no evidence of cardiovascular instability or of hemorrhage. It can be difficult to determine the best time to end diagnostic testing, especially for common clinical scenarios like presumed osteoarthritis in an elderly dog. The hope that additional testing such as ultrasound or radiographs would redirect therapy in a stiff, elderly Labrador with normal laboratory data and physical examination findings must be weighed against both the cost of testing and the chance that additional testing might cause harm.

- Testing for uncommon diseases sometimes results in spurious findings, termed VOMIT (victim of modern imaging techniques), which themselves lead to additional unnecessary testing and may not be in the best interests of the animal.
- The discussion between Mrs. Needle and Dr. Slocumb was a trigger, or at least a catalyst, for the client complaint. Dr. Slocumb answered in a factual fashion, but Mrs. Needle took away only the parts of the conversation that she wanted to hear: she heard that the NSAID contributed to the problem and that Dr. Newman missed the diagnosis. Dr. Slocumb's caveats that "kidney tumors can hide" and be difficult to diagnose and that "the NSAID was not likely to have played a role" were dismissed.
- It is not appropriate to lie to clients to cover for another clinician, but Dr. Slocumb likely recognized that Mrs. Needle was upset, could not comprehend the entire situation, and was likely heading toward a client complaint. In these situations, the emergency veterinarian (or the specialist who has been referred the case) should feel the obligation to call the primary care veterinarian as soon as possible to alert them to the concerns of the client. When situations like this arise in emergency or referral medicine, there can be an opportunity for the emergency clinician or specialist to intervene in a positive fashion, both with the client and with the primary care veterinarian, to head off the client complaint. Recognizing the warning signs and scenarios that lead to a complaint is the first step in preventing client distrust and a potentially big problem for all.
- Cases with higher risk of client complaint include those that present as an emergency, those with high costs, clients who cannot afford care, cases with multiple veterinarians, animals with multiple diagnoses, animals with changing diagnoses, and animals with unanticipated clinical outcomes. In these types of cases, second-guessing about the diagnosis or the testing performed or offered by the primary care clinician should be avoided at all costs.

(*Continued*)

Key Points (Continued)

- Bad-mouthing the primary care veterinarian is detrimental to all involved, but even mild suggestions such as "we often do it this way instead" or "we have not had as much luck with that drug so we use this drug instead" can be a catalyst for clients that are already questioning a difficult situation.
- When faced with a client complaint, it is often useful to spend time determining exactly what the client hopes to accomplish with the complaint. For some clients, it is almost entirely about the cost of care, and they are either looking to get out of a large bill or looking to get reimbursed for what they have already paid. In many of these cases, especially when there might be reasonable justification for the client complaint, negotiating a financial settlement will eliminate the complaint and solve most problems. In other cases, clients file a complaint at the State Board of Veterinary Medicine, trying to seek censure of the veterinarian or to have the veterinarian stripped of their license to practice in the state. A small proportion of clients file a complaint in an attempt to create a learning experience for the hospital and to prevent other clients from being faced with the same situation—in these cases an open discussion of how the case has been reviewed in-house and what actions have been taken to reduce the chance of a repeated problem will satisfy the client. Spending time talking with the client to determine their motivations and goals can be time well spent when trying to decide what steps to take next.

65 Slow and Easy

The problems of "selling" an unfamiliar procedure to a client

Petunia's collapsing episodes were a recent development, infrequently occurring over the last 3 weeks. Yet, in the last 24 hours, Petunia had collapsed five times, and she was totally unresponsive during two of these episodes. Trevor Thompson was worried that Petunia was not going to recover from these two most recent episodes, despite the fact that she recovered quickly from all other episodes. Mr. Thompson brought Petunia to his primary care veterinarian, who identified a very slow heart rate. Mr. Thompson was urged to go the regional Emergency Clinic and Referral Center where they could deal with this sort of thing.

Dr. Callahan, an ambitious intern, carefully examined Petunia, an 11-year-old spayed female Labrador–Shepherd cross. Dr. Callahan noted the slow heart rate, about 35 beats per minute, and there was a long pause with no cardiac activity at all. During this pause, Petunia got weak and almost fell over, but she did not faint. With the clear exception of bradycardia, Petunia appeared to be healthy overall.

The quick in-house blood tests done shortly after presentation confirmed Dr. Callahan's suspicion that most major organ systems were working well, although the blood lactate was high and the kidney values were slightly elevated. An electrocardiogram (ECG) was performed and the bradycardia was determined to be due to complete heart block, or third-degree atrioventricular (AV) block (Figure 65.1).

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Figure 65.1 An ECG showing 3rd degree AV block. Note the unconducted p-waves and ventricular escape rhythm.

Dr. Callahan shared the blood work, ECG, and clinical picture with Dr. Hatt, the senior emergency clinician on duty. Dr. Hatt indicated that the immediate placement of a permanent transvenous cardiac pacemaker would be the best approach, with a good to excellent prognosis, assuming no myocardial disease is present on the echocardiogram. Dr. Callahan returned with Petunia to share this information with Mr. Thompson. Shortly, Dr. Callahan returned, stating that Mr. Thompson would like to simply place a temporary pacemaker until his son can arrive home from college, and then they will elect to euthanize Petunia to prevent her from suffering during these episodes.

Dr. Hatt started to inquire about the conversation with Mr. Thompson and was concerned by this decision. Was the decision based on financial limitations? What were Mr. Thompson's main concerns? Since the episodes should be eliminated by successful pacing, why would the owner be concerned about suffering during these episodes? At what stage in the conversation did placement of a temporary pacemaker get presented as an option, since this would be an unusual course of action if a permanent pacemaker was not going to be placed? Dr. Callahan indicated that she had not seen a pacemaker placed and that she was a bit unsure about the main concerns of deciding factors for Mr. Thompson. Dr. Hatt asked permission to go speak to the client further, and Dr. Callahan readily agreed to this option.

Dr. Hatt introduced herself to Mr. Thompson and proceeded to review Petunia's history and prior health. She explained in more detail about the pacemaker procedure and reiterated that, while it is the Thompson family's decision to make, most dogs do very well with pacemakers. Petunia's owners elected to go ahead with the procedure, and the surgery was completely uneventful. A postoperative ECG showed the improvement in Petunia's heart rate and rhythm (Figure 65.2). Petunia was discharged from the hospital in 3 days, back to her regular self.

Figure 65.2 An ECG after transvenous implantation of a pacemaker. Note the pacing spikes immediately before the QRS complexes.

Three months later, at Christmas, Petunia's owners sent a card with her playing in the recent snow "like a puppy again", along with a donation to the hospital to help support care for an owner who might not be able to afford this type of special procedure.

Key Points

- In complicated cases, with newer clinicians, it may be wise to have the most experienced clinician talk initially with the clients (with the junior clinician in attendance). As much as veterinarians often hate to discuss "sales," this is a vital part of the service that we provide. Explanation as to pros and cons of procedures are important to help the client decide what is right for them. Confidence in explaining how a good outcome might be achieved is critical in convincing owners to proceed with costly care.
- In this case, Petunia's owners were in hindsight unprepared for the discussion of a transvenous pacemaker, and they thought it seemed very dramatic and that they were being "selfish" in trying to prolong Petunia's life. The intern had never seen a dog with a pacemaker and was only theoretically familiar with how it might be done. A frank discussion about the actual degree of invasiveness (only moderately invasive), as well as the real potential for significant improvement, lead to the clients making a decision they were ultimately very happy with.
- While teaching and referral hospitals are often the site of excellent teaching, some of the best learning comes in a supported environment, with the more junior veterinarian learning in the presence of a more experienced clinician, in real-life situations.

66

The Bandage

An example of noncollegial behavior

Dr. Roberta Jones finished rounds with trepidation. In the last run in the intensive care unit was a large Great Dane (Bo) with an open tibial fracture. The dog had been hit by a car last night, and while cardiovascularly stable, the admitting doctor had not placed a splint or large bandage to stabilize the fractured leg. The wounds in that area had, however, been adequately clipped and cleaned. Dr. Jones asked the overnight doctor why no bandage had been placed on the fractured leg; the overnight doctor replied that the intern was worried that the cotton would stick to the wounds and that the dog had come in around 3 A.M. and was scheduled for surgery this morning. Dr. Jones became concerned, because at the nearly the same moment, Dr. Lafayette was beginning his rounds. While an outstanding detail-oriented surgeon, he was almost consistently irritated with the transgressions of the emergency service, ranging from inadequate estimates to poorly positioned radiographs, to failure to submit various requests to the anesthesia or radiology services. He was going to be very upset at this failure to place the bandage. Dr. Lafayette asked to speak with Dr. Jones and began a convincing diatribe about the lack of the bandage, the general importance of the bandage, and the urgency of such a bandage. Dr. Jones knew from experience it was futile to argue with Dr. Lafayette

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

even though she was not there when the bandaging error was made and had in fact already begun to try to assess the situation.

In any case, it looked as if the dog would be going for surgery shortly, and if not, the surgery service could promptly place the bandage of their choosing.

As the morning stretched on, Bo had not been taken to surgery, nor had a bandage been placed. Dr. Jones was still frustrated with her interactions with Dr. Lafayette—it seems she often caught the brunt of the anger, and he did not seem to realize that Dr. Jones also valued good wound care. Dr. Jones continued to monitor Bo, and his lack of both surgery and bandage, and in checking with the anesthesia technicians she realized that Bo was not going to surgery until 3 P.M. She realized that Bo had been on the emergency room service without a bandage from 3 to 7 A.M., or 4 hours, and by this point in the day Bo had been on the surgery service for 7 hours without evidence that the "critically important" bandage had been placed. Thus, Dr. Jones placed a large bandage on Bo's leg. She used four rolls of cotton, and when she was done the bandage sounded like the perfect "ripe watermelon." However, as the last piece of tape was applied, the anesthesia tech came to get Bo for his surgery. Dr. Jones watched with mild amusement as Dr. Lafayette removed the bandage she had carefully placed. The bandage was a good one, taking about 20 minutes to remove.

Key Points

- Wound care and adequate stabilization of a fracture are important.
- While it might be the easiest to direct complaints to the first person that you see, a better teaching moment includes a frank discussion with the primary clinician about why their plan was not ideal.
- If discussion with the primary clinician is not possible, the complaint should be made to a senior clinician with knowledge of that person's involvement and skills.
- Dr. Jones was petty in placing a bandage she knew was going to be removed shortly. While Dr. Lafayette's behavior was not ideal, a more professional solution would have been preferred.

67 We'll See What the Blood Work Shows

The importance of timely client communication

Brandy, a 12-year-old spayed female St. Bernard, is seen through the emergency service by Dr. M, with a presenting complaint of lethargy, poor appetite, and recent weakness. Her owners (the Coopers) explain that, while they love Brandy, they are worried her quality of life has been deteriorating recently. They have been considering euthanasia and believe that is the path they would choose if "anything bad" was found. However, they are eager to get to the bottom of the problem and agree to admit her to the hospital.

On physical examination, Brandy is thin, with pale mucous membrane and equivocal hepatosplenomegaly. Blood is collected for a complete blood cell count and chemistry profile, and a urine sample is obtained by cystocentesis. Diagnostic imaging, including radiographs of her chest and abdomen, are planned. An intravenous catheter is placed, and Brandy is started on intravenous fluids and famotidine.

In rounds that evening, Dr. M transfers Brandy to the care of the overnight doctor. He has not yet seen the results of the laboratory testing or diagnostic imaging, but he relays that Brandy appears stable and he describes the family's concern for her quality of life. Dr. M promises to look at the results and report back with any concerning results.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

The evening doctor (Dr. H) busies herself in the intensive care unit helping to stabilize a variety of pets. However, about 9 P.M., she remembers that she has not heard from Dr. M about the results, so she goes to evaluate them herself. Interpretation of the complete blood cell count documents acute lymphoblastic leukemia with 100,000 circulating blasts. The imaging results confirm hepatosplenomegaly. Dr. H calls Dr. M to determine "the plan" and Dr. M says that, while he saw the results, he wasn't sure what they meant, and he thought someone could call the Coopers in the morning with that information; perhaps they should consider a bone marrow aspirate?

Dr. H hangs up on Dr. M in frustration and calls the Coopers, describing that Brandy has a form of cancer and that, while there may be some treatment options, the prognosis is guarded. The Coopers immediately elect to euthanize Brandy, and come in to visit her within the hour. They comment to Dr. H how grateful they are to have an answer and that they are glad Brandy did not suffer.

Key Points

- While giving "bad news" is never pleasant, in this case, Dr. M should have heard and appreciated the clients' comments concerning euthanasia. For junior veterinarians, consultation with more experienced colleagues is vital. As soon as practical (and absolutely before leaving for the day) all test results should be communicated to clients. Going home, with the plan of following up the next day, is almost always a bad plan, as clients (and the PETS) deserve prompt notification of significant test results.

68

What Antibiotic Is Best?

Highlighting communication issues between senior veterinary clinicians

Pugsley, a 6-year-old spayed female Pug, was recovering from a hemilaminectomy when she was noted to be coughing and to have a swollen incision. Her past medical history was unremarkable; she had been seen by the neurology service for ataxia, and over the past several days she had had first a magnetic resonance imaging scan and subsequently surgical decompression of her T12–T13 and T13–L1 sites. Despite being only ataxic preoperatively, postoperatively she was paretic, with deep pain intact, but without motor function. Due to the respiratory difficulty, Pugsley was returned to the intensive care unit (ICU) for ongoing care and monitoring. The senior ICU clinician on service advised that Pugsley's antibiotic regime include amikacin, due to the concerns about a nosocomial (hospital-acquired) infection. The senior neurology clinician disagreed and felt that coverage with enrofloxacin and ampicillin should work fine; he did not like aminoglycosides and was concerned about possible nephrotoxicity. The ICU clinician strongly disagreed; studies in the ICU at this hospital had confirmed that all isolates from patients that had been hospitalized for more than 48 hours (as Pugsley had) were invariably resistant to antibiotics other than aminoglycosides. However, the neurology clinician remained unconvinced and, moreover, banned the neurology resident from using anything other than enrofloxacin. This was exceedingly

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

frustrating for the ICU service, as they were uncomfortable with that plan. The ICU senior clinician complained to hospital administration about the neurologist, and the neurologist counter-complained. Finally, a consensus to perform a tracheal wash was reached, with the thought of using the final culture and sensitivity data to guide therapy. While those results were pending, the neurologist insisted that enrofloxacin be continued. Each day, Pugsley worsened and, finally, on the fourth day of hospitalization she suffered a cardiopulmonary arrest and could not be revived. The final culture results documented a multi-drug-resistant *Escherichia coli* that was sensitive only to amikacin and imipenum.

Key Points

- Hospital-acquired infections are commonly multi-drug resistant; knowledge of the specific hospital's resistant patterns is vital when looking to appropriately treat a patient with a suspected hospital-acquired infection.
- Culture results from all hospitalized patients should be monitored so that commonly resistant organisms are treated appropriately.
- Interpersonal relations between strong-willed individuals can be challenging at best. Specifically in this case, both parties were stubborn. No one individual can be the most up to date on every topic; consultation and collaboration improves patient care and limits mistakes.

69 Molly and the Chicken Bone

A case outlining the importance of reevaluating patients referred for a second opinion

Molly, a 6-month-old, female mixed-breed dog, was referred to a university veterinary emergency service for endoscopy to remove a gastric foreign body. The previous day she had eaten an entire chicken leg bone, which she had stolen off a dirty dish in the kitchen. Her owners were initially not concerned as they thought that she would be able to digest it, but overnight she had been vomiting up small amounts of fluid and was very lethargic. A radiograph taken by her primary veterinarian revealed a large chicken leg bone in her stomach. No other foreign material was evident. She was referred to a specialist for endoscopy because the owners did not have the money to have a gastrotomy performed (an estimated $2000 for surgery and perioperative care with intravenous fluids, gastroprotectants, analgesia, etc.).

On presentation to the specialty hospital, Molly was found to be depressed, but otherwise her physical examination and vital signs were normal.

One of the interns on emergency duty at the time admitted her with a $1000 estimate for endoscopy. Molly's owners had already spent a few hundred dollars at their primary veterinarian's office, and they had to spend a bit of time to get money together for the deposit. Fortunately, they were able to come up with the funds.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

As the intern was in the process of calling in anesthesia and a medicine resident to perform the endoscopy procedure, the attending emergency room (ER) doctor walked into the ER to see how things were going with the intern and her cases. The intern described Molly's situation and told the attending that everyone was called in for the emergency endoscopy procedure. However, the ER attending challenged the intern to think about other ways to approach the situation, particularly with the dog's owners wanting to do what was best for Molly, but having significant financial constraints. While they were pondering this thought, the ER attending administered Molly an intravenous dose of apomorphine (alternatively, a subconjunctival dose can be used). Within seconds, Molly began hypersalivating and proceeded to vomit up the entire chicken leg bone! Molly was then reunited with her very concerned owners, with the total cost to the owners being only US$175.

Shortly thereafter the intern called Molly's primary veterinarian to inform him what had happened with Molly. The intern was a little worried that he might be angry with her for not having had Molly scoped, as they had recommended. Quite to the contrary, he was overjoyed that Molly was able to vomit up the chicken bone, saving the owners money and preventing an anesthetic event and invasive procedure for Molly!

Key Points

- While induction of emesis is contraindicated in the case of some toxin and foreign-body ingestions, such as caustic substances and fish hooks, it is an excellent option for many cases and is associated with much less morbidity and with lower cost to the client. It is recommended that the relative risks and benefits of inducing emesis for removal of a gastric foreign body (after appropriate imaging) be considered carefully, and on a case-by-case basis.
- While the primary care veterinarian undoubtedly wanted what was best for Molly, it is important, particularly as a veterinarian working in a referral situation, to completely review the case and develop one's own plan, as some management options may not have been considered upon initial evaluation.
- As it turns out, the primary veterinarian had considered induction of emesis, but decided against it because Molly had already vomited fluid and had not vomited up the bone. However, the emetic effects of apomorphine are so potent that it can induce more forceful emesis than naturally occurring vomiting, allowing for more material to be expelled.

70 Know the Nodes

Why physical examination is so important

Riley was a 4-year-old, very aggressive, overweight, male intact Rottweiler who presented to the veterinarian for a few days of lethargy and inappetance. He had been previously healthy, was on no medications, and did not have access to any toxins. He was drinking and urinating normally, had no travel history, was always supervised when outside, and had no gastrointestinal signs. Because of his aggressive nature, a cursory physical examination was performed and diagnostics were recommended.

A complete blood cell count, serum chemistry analysis, and urinalysis on a free-catch sample were completed, and no abnormalities were noted. Because of the inappetance, abdominal radiographs were performed and were also found to be normal. Riley was sent home with some gastric protectants for suspected gastroenteritis, and his owners were told to recheck if no improvement was seen within a few days.

Four days later, Riley's owners called the veterinarian to let him know that Riley was really no better. He was still lethargic and now was not wanting to eat anything at all. The owners had not brought him back in, as they had to travel out of town unexpectedly. However, now that they were back, they were quite concerned: Riley had visibly lost weight, was holding his head down, and was salivating excessively. The veterinarian recommended a referral to the local specialty

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

hospital, as he had run the diagnostics he was capable of and still did not have an answer as to why Riley was not improving.

Thankfully, the specialty hospital agreed to see Riley that day. The owners brought the initial diagnostic tests with them to the specialist and warned the new doctor and technician about how aggressive and unpredictable Riley could be. A full history was taken, and Riley was then brought into the treatment room for a muzzle and full physical examination. Immediately after the muzzle was placed, the specialist found that Riley's mandibular and prescapular lymph nodes were very enlarged, measuring 6 cm across. In addition, axillary nodes were palpable. The lymph nodes were aspirated, and lymphoblastic lymphoma was diagnosed.

Key Points

- A thorough physical examination should always be performed, regardless of the demeanor of the patient. Obvious abnormalities can be missed, and other diagnostics may not delineate the source of the problem, as in this case.
- Client communication in this case can be tricky, as the specialist should not infer to the client that the initial veterinarian missed the presence of the enlarged lymph nodes 4 days prior. Although the lymph nodes were likely enlarged at that time, the specialist did not examine Riley that day, so it remains an unknown. If the owner wished to pursue the issue, discussion with the primary veterinarian should occur, with full disclosure of the initial physical examination findings in the medical record.
- Mistakes do occur, and physical examination findings can be missed. Being honest and straightforward about potential errors in examination of a client's pet will help to ensure a strong doctor–client relationship in the future.

71

Nancy's Neck Pain

A case outlining why a specialist may be helpful

A phone consultation was sought with a board-certified veterinary neurologist by a frustrated Dr. Smith. He had just rechecked a $4\frac{1}{2}$-year-old, spayed female Beagle dog named Nancy. Earlier that week, Nancy had presented to him with a complaint of severe neck pain. Her owners reported that, within a couple of minutes of letting her outside on Monday morning, Nancy started screaming loudly and persistently. Nancy was not supervised while outside but she was in a fenced yard, so trauma seemed unlikely. Her owners immediately ran outside to see what had happened and found her standing in one spot, her head held low, crying out loudly. They tried to encourage her to come back inside, but she was reluctant to move. Ultimately they had to tempt her inside with her favorite food.

Inside, Nancy was not much better. She tried to eat but as soon as she put her head down to the bowl she started screaming and made no further attempts to eat. When Dr. Smith saw her that morning, she did indeed have severe neck pain such that you could barely touch her without her crying out. This made a full examination difficult, but from what he could tell, she was using her legs normally. She also had a slightly high temperature (102.9°F, 39.4°C) that he attributed to pain and anxiety.

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

Dr. Smith had discussed with the owners some of the differential diagnoses for neck pain, including cervical intervertebral disk disease (IVDD), a cervical spinal cord space-occupying lesion (e.g., neoplasia), cervical soft tissue injury (i.e., neck sprain- or strain-type injury secondary to trauma), and intracranial disease.

Given financial constraints, the owners elected conservative management with crate rest and pain relief. Nancy was sent home with a week's worth of oral tramadol (2 mg/kg orally every 8 hours) and carprofen (2 mg/kg orally every 24 hours). The following day Nancy was still very painful so they called Dr. Smith, who recommended adding gabapentin for additional analgesia, and increasing the doses of both her existing medications (up to 4 mg/kg of tramadol every 8 hours and 2 mg/kg of carprofen every 12 hours). By Thursday Nancy's owners still had seen no improvement. The crying and howling was unrelenting, and Nancy still wouldn't eat (which is very unusual for her). They just felt horrible for her and so brought her back in to see Dr. Smith, to see if there was anything else he could do.

At the time of recheck Dr. Smith was concerned that, given the lack of improvement, Nancy would need to be referred for a full workup with a neurologist, which would likely include a magnetic resonance imaging scan of her brain and neck, and a cerebrospinal fluid (CSF) tap and analysis; this generally costs around US$2500. Nancy's owners were devastated, as they really didn't have the money to pursue such extensive testing, let alone afford neck surgery if it was a cervical disc (likely another US$2500). They wanted to do everything for Nancy but these costs were just not possible for them. Nancy's owners were considering euthanasia when Dr. Smith decided to just call the university and see what they thought about Nancy's case. He too would have been devastated to have to euthanize Nancy at such a young age, but he just didn't know what else to do. He was a little embarrassed to call the university given that it was unlikely that he was going to be able to refer his client, but overcame this concern and called anyway.

Dr. Smith consulted with Dr. Spock from the university neurology service. He explained Nancy's situation and sought advice. Dr. Spock recommended that Nancy be referred regardless of the financial situation of the owners, as long as they could afford the US$100 examination fee, as it would be useful for him to just evaluate the dog. He discussed with Dr. Smith the possibility of a disease known as Beagle pain syndrome (a sterile, steroid-responsive meningitis arteritis) that can cause horrific neck pain, often in the absence of other neurologic signs. While the other differentials that Dr. Smith was considering were also plausible, this was something that could easily be ruled in or out. Dr. Spock

advised that, although imaging is ideally recommended, a presumptive diagnosis of beagle pain syndrome can be made on the basis of signalment, clinical signs, and the results of a CSF tap. In fact Dr. Spock said that he had some time in his schedule that afternoon, so Nancy's owners could bring her straight over and he could do the CSF tap that day if they were able.

Accordingly Dr. Smith discussed this option with Nancy's owners and Nancy was seen by Dr. Spock that afternoon. As previously, Nancy had severe neck pain and a mild fever on examination, with no other obvious neurologic abnormalities. With her owners' permission, Nancy was anesthetized and a CSF tap performed. Nancy did well for the anesthesia and procedure; CSF cytology revealed profound neutrophilic inflammation consistent with Dr. Spock's suspicion of Beagle pain syndrome. Given that an underlying infectious meningitis could not be ruled out, samples of CSF were submitted for culture and serology. Since she had been receiving nonsteroidal anti-inflammatory medications for the prior 3 days, Dr. Spock allowed a 24-hour washout period until starting corticosteroids. Nancy's owners continued to rest her and provided tramadol and gabapentin for analgesia. Nancy was started on immunosuppressive doses of prednisone after the washout period, to which she had a good response. Doxycycline had been started, given that tickborne disease could not be ruled out, but was subsequently stopped when the infectious disease testing came back negative.

At a recheck with Dr. Smith 10 days later, Nancy's neck pain had essentially resolved and she was back to eating and drinking normally. Nancy's owners were very glad that Dr. Smith had referred them see Dr Spock. Much to their surprise their visit with Dr. Spock had only cost them about US$500 and Nancy was back to her normal self!

Key Points

- Most specialist veterinarians are very happy to provide advice over the phone at no charge. Such a consultation is welcomed and encouraged even if the client is potentially unable to afford referral and full workup. In this age of progressively advancing veterinary specialist medicine, consultation with a specialist should be viewed as part of the diagnostic process for any case seen in practice that is not straightforward. It is also important that pet owners are given the option of referral.

Key Points (Continued)

- This may be the only case of beagle pain syndrome that Dr. Smith will see in his career as a general practitioner, but by consulting with a neurology specialist he was able to draw on their expertise and experience, allowing him to broaden his list of differential diagnoses. Because of the referral, a diagnosis was achieved and Nancy was successfully treated with a good long-term outcome.

Appendix: How to Set Up Your Own Morbidity and Mortality Conference

Format

Cases should be organized and presented in a format to include pertinent historical findings, physical examination, laboratory tests, imaging modalities, surgical intervention, treatments, and outcome. If possible, necropsy results should be included. Differential diagnoses should be presented prior to definitive diagnosis. Questions should be generated and included in the case presentation. Patient and client confidentiality should be maintained by not including names, case numbers, and so on.

Discussion

The goal of the morbidity and mortality (M&M) rounds is to present a forum in which cases can be discussed and evaluated by different clinicians in all specialties. To that end, individual case presentations should be limited to 30–40 minutes with an additional 20–30 minutes set aside for audience discussion and debate. Pathophysiology related to the clinical case of interest may be appropriate in your presentation, but not at the expense of questions, comments, and insights offered by

Small Animal Emergency and Critical Care, First Edition By L.L. Powell, E.A. Rozanski, and J.E. Rush

clinicians in your audience. We would like to support an open forum for the discussion of cases when complications arise, and to begin to learn from these cases without the fear of presenting clinicians feeling persecuted or "looked down upon." We can hopefully make this point clear and strive to make these sessions educational, and at the same time, improve patient care.

Confidentiality

It is standard practice in human M&M rounds for discussion of patient cases to be held in complete confidentiality within the M&M group session, primarily because of doctor–patient confidentiality. We feel we should adopt this confidentiality agreement for our rounds as well. Basically, all that is discussed within the confines of the rounds will not be allowed to be discussed following the M&M session.

Confidentiality agreement

I, _____, promise to maintain strict client/patient confidentiality, and will not discuss cases presented within M&M rounds except during the rounds session.

_____ _____

Signature Date

Index

acute lymphoblastic leukemia 203
A-a gradient 11
adding antibiotics 92, 204
advanced diagnostic imaging 28, 45, 52, 155
adverse drug event 8, 25, 28, 31, 94, 134
aggressive dogs 208
agonal breathing 119
air embolism 3
albumin 113
alpha-linoic acid 35
amputation 21
anesthesia complication 3
ascites 67
assisted ventilation 158
attention to detail 31, 77, 83, 88, 90, 108, 130, 151, 162

bandaging complications 167
biliary obstruction 52
bladder rupture 169
blastomycosis 47
blood pressure 45, 71
brachycephalic 81
brain tumor 155
bronchoscopy 83
bronchospasm 8

canine albumin 113
cardiomyopathy 69,90
cardiopulmonary-cerebral resuscitation (CPCR) 3, 8, 142, 162, 184
catheter issue 31
collapse 8
communication within practice 14, 50, 57, 92, 96, 104, 119, 138, 144, 186, 200
computed tomography 154
conjunctivitis 71
conservative therapy 138, 206
cortisol 63
coxofemoral luxation 167
"crazy" clients 160
cruciate ligament 151
C-section 85
CT guided biopsy with Jamshidi needle 38
cyclosporine 114, 115
cystic calculi, urinary 190

diabetes 25, 90, 147
diabetic ketoacidosis 90, 147
diagnostic error 45, 50, 71, 83, 175, 208
dialysis 35
diaphgramatic hernia 54
discharge instructions 167
discussion on finances 8, 21, 142, 190
disseminated intravascular coagulation 119
dosing error 8
drug dosing error 28
dysphagia 8
dystocia 85

E. coli 6, 96
Ehmer sling 167
endemic disease 7
esophagitis 164
ethylene glycol 28, 60
exploratory surgery 88, 130
extra hepatic biliary obstruction (EHBO) 52, 102

feline asthma 106
fluid therapy with heart disease 69
foreign body 83, 92, 110, 116, 149, 206
fracture 138, 200

gastric dilatation-volvulus 119
glaucoma 74

heatstroke 81
hemangiosarcoma 47, 130, 142
hemolytic anemia 71
hepatic disease 157
hospitalized pet behavior 57, 81
hunting dog 47
hydrogen peroxide 164
hypernatremia 57, 69, 96
hypoadrenocorticism (Addison's disease) 60, 63, 151
hypoglycemia 60
hyponatremia 67

iatrogenic complication 50, 169, 175, 183
immune-mediated thrombocytopenia 144
immunological reaction 113
immunosuppression 94
insulin 25, 31
Internet usage by clients 134
itraconazole 47

junior doctor 60, 92, 96, 102, 119, 138, 149, 167, 169, 175, 183, 197

lactulose 57
linear foreign body 3, 31, 77, 88
liver failure 157
lymphoma 209
lytic lesion 21, 38

massive transfusion 142, 144
mastectomy 154
medical records 124, 144, 160, 186
meningitis 211
metabolic acidosis 90
metabolic alkalosis 88
missed infection 6
MRI examination 45
muscle tremors 157
mushroom toxicity 157
myasthenia gravis 8

nasogastric tube 17
neck pain 210
non-collegial behavior 200, 204
nosocomial infection 204

opportunistic infection 94
owner contact for hospitalized patient 149, 202
owner education/options/communications 6, 38, 50, 85, 94, 104, 116, 119, 142, 144, 149, 151, 162, 169, 186, 193
oxygen therapy 47, 50
oxytocin 85

pacemaker 198
pancreatitis 52, 102
panting (excessive) 57
pericardial effusion 67, 183
perineal urethrostomy (PU) 188
pneumonia 17
point of care testing 45, 77
portosystemic shunt 57
potential drug side effects 134
preferential client treatment 28, 147
pre-renal azotemia 63, 69
presenting complaint 116, 154
primary care and emergency veterinarian communication 25, 60, 71, 83, 147, 186, 190, 193, 206
procedural error 11, 14, 17, 21, 25, 28, 50, 54, 71, 88
progression of disease 190
pulmonary edema 3
pulmonary thromboembolism (PTE) 181
PZI insulin 25

rabies 100
red eye 71
referring to a specialist 35, 50, 147, 206, 210
renal failure 6, 17, 35, 127
respiratory distress (brachycephalic) 81
respiratory failure 47
routinue surgery/case 11, 186

seizures 35, 57, 155, 157
sepsis 6, 8, 77, 88, 92, 113, 149, 176
spay 14
spontaneous pneumothorax 11, 50
struvite crystalluria 169
surgical sponges 14
syncope 197

teaching styles 180
technical error 11, 14, 17, 25, 31, 38, 50, 96
technician-doctor interactions 104, 147, 183
telephone advice 164
third degree atrioventricular block 197, 198
thoracic trauma 54
thoracocentesis 11, 50
thoracostomy tube 11
toxin ingestion 35, 157, 164
toxoplasmosis and immunosuppression 94
tracheal collapse 104
tumor, abdominal 175, 193
tumor, brain 155
tumor, mammary glands 154
tunnel vision 63, 67, 102, 130, 151

urethral calculi 190
urinary catheter 6, 190
urinary obstruction 6, 169, 186
urine specific gravity 63, 69
uroabdomen 170

volume overload 35
vomiting 3

zinc toxicity 71, 108