

# Diseases of the Endocrine System

## LEARNING OBJECTIVES

When you have completed this chapter, you will be able to:

- Explain the interrelationship between the nervous system and the endocrine system.
- Understand the clinical pathological changes that occur with each endocrine disease.
- Describe how the absence of a specific hormone can have clinical effects on the animal.
- Explain to owners the treatment regime necessary for their pets.

## OUTLINE

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## KEY TERMS

Alopecia

Excoriation

Homeostasis

Idiopathic

Obtundation

Polyphagia

- Treatment with vitamin D and calcium will be lifelong. It must not be discontinued.

## Hypocalcemia or Hypoparathyroidism

Numerous causes of hypocalcemia in dogs and cats have been reported. Parathyroid-related disease, chronic renal failure, acute pancreatitis, and puerperal tetany (eclampsia) are among the most common causes. Therapy for hypocalcemia resulting from parathyroid-related disease, chronic or acute renal failure, or acute pancreatitis includes correction of the underlying cause and vitamin D and calcium supplementation.

## Parathyroid-Related Disease

The most common cause of hypocalcemia related to the parathyroid gland involves inadvertent surgical removal of the glands during a thyroidectomy or other neck surgery. Primary hypoparathyroidism is an uncommon disorder in both dogs and cats.

## Chronic and Acute Renal Failure

Chronic renal failure is an extremely common disorder in dogs and cats and represents a common explanation for mild-to-moderate hypocalcemia. Hypocalcemia is usually related to the metabolic acidosis that develops with renal failure.

## Acute Pancreatitis

Precipitation of calcium soaps within the pancreatic tissue may be related to the development of mild hypocalcemia.

## Puerperal Tetany (Eclampsia)

Puerperal tetany secondary to hypocalcemia occurs most commonly in the postpartum period but may be seen in late gestation. It can be life threatening. Predisposing factors include improper perinatal nutrition, heavy lactation, and inappropriate calcium supplementation. The disease is seen most commonly in dogs and is uncommon in cats. Recognition of the clinical signs of eclampsia is important because therapy should begin immediately. The goal of treatment is to increase blood calcium levels with administration of IV infusions containing calcium.

The prognosis for eclampsia is good if treatment is prompt. An effort should be made to correct nutritional

deficiencies and to diminish lactational demands of the dam. Hand-feeding or early weaning of the puppies, or both, is encouraged. Recurrence of eclampsia with subsequent pregnancies has been reported.

## Clinical Signs

- Irritability
- Restlessness
- Salivation
- Facial pruritus
- Stiffness, ataxia
- Hyperthermia
- Tachycardia
- Muscle tremors and tonic-clonic contractions
- Seizures

## Diagnosis

- Treatment should not wait for laboratory confirmation of hypocalcemia
- Total serum calcium levels less than 6.5 mg/dL

## Treatment

- Slow, intravenous infusion of 10% calcium gluconate solution (monitor heart rate and rhythm while administering calcium solutions)
- Diazepam IV to control seizures
- Oral supplementation of calcium should be started once the immediate symptoms are controlled
- Calcium carbonate tablets or capsules
- Calcium glubionate (Neo-Calglucon) syrup
- Improve the nutritional plane of the dam by feeding a balanced diet

## Information for Clients

- Avoid excessive calcium supplementation during pregnancy.
- Feed a well-balanced dog food; increase amounts fed as pregnancy progresses.
- Development of signs in a pregnant animal is an emergency situation. Call your veterinarian immediately.
- This disease may recur with subsequent pregnancies. Owners should reconsider using animals predisposed to eclampsia for breeding.
- Hand-feeding of puppies with supplemental feeds may be required until the dam's calcium levels stabilize. Early weaning may also be desired.

centers. If visual pathways are intact, cataract surgery can successfully restore the animal's sight.

Cataracts that result secondary to other disease states will require medical management of those diseases before surgical removal.

### Clinical Signs

- Progressive loss of vision
- Opaque pupillary opening (usually noticed by owner)
- Signs related to systemic diseases such as diabetes mellitus or hypocalcemia

### Diagnosis

- Perform a complete ophthalmological examination.
- Assess vision based on completion of an obstacle course, lack of menace response, and failure to track visual responses (use cotton balls)
- Pupillary light response is usually normal
- Test serum chemistries to rule out concurrent systemic disease
- ERG should be used to rule out retinal degeneration or optic nerve disease

### Treatment

- Surgical removal of the cataract is necessary
- Treatment of any other disease that may result in the formation of the cataract must be completed first

### Information for Clients

- Most cataracts are inherited, so affected animals should not be used for breeding.
- Certain breeds are prone to cataract, retinal degeneration, or both.
- Many animals can have quality lives even with bilateral cataracts.
- To decrease the chance of postoperative complications, most surgeons will remove only one cataract.
- Surgery requires referral to a veterinary ophthalmologist with special training; this is expensive.
- Function of the visual pathway must be ensured before surgery.

### Anterior Uveitis

The uvea is the pigmented vascular tunic located between the fibrous and nervous tunics. It includes the iris, the ciliary body, and the choroid. Inflammation of this tissue is known as uveitis.

Anterior uveitis may have several causative factors: trauma, extension of local infections, foreign bodies, neoplasm, or thermal trauma. Bacterial, viral, and mycotic diseases may undergo hematogenous spread to the uvea. Parasites and protozoa also may affect the tissue. Some cases may be immune mediated. Whatever the cause, the symptoms will be similar; prompt treatment is necessary to prevent permanent damage to the eye.

### Clinical Signs

- Epiphora
- Blepharospasm
- Photophobia
- Presence or absence of vision defects
- Corneal edema (cornea will be gray or white)
- Chemosis of the conjunctiva
- Scleral injection
- Prolapsed third eyelid
- Pain
- Change in color of the iris, if chronic

### Diagnosis

- Clinical signs
- History
- Complete blood cell count, serum chemistries to rule out systemic disease
- Immunology screening panel to rule out brucellosis, toxoplasmosis, blastomycosis, cryptococcosis, leptospirosis, infectious canine hepatitis (ICH), feline infectious peritonitis, and feline leukemia virus (FeLV) infection
- Radiography or ultrasound examination of the eye
- Tonometry: IOP may be low (4–8 mm Hg) or increased (>27 mm Hg)

### Treatment

- Identify and eliminate the immediate cause of the uveitis, if possible
- Control inflammation
  - Topical steroids: dexamethasone ophthalmic ointment every 4 to 6 hours
  - Flunixin meglumine (Banamine): IV in dogs only, once daily
- Non-steroidal anti-inflammatory drugs in dogs
- Atropine 1% ophthalmic ointment helps restore the integrity of vascular permeability and prevent

### Clinical Signs

- Febrile episodes
- Lymphadenopathy
- Persistent infections unresponsive to treatment
- Weight loss
- Gingivitis
- Ocular lesions
- Slow-healing traumatic wounds
- Behavior abnormalities
- Chronic upper respiratory infections
- Anemia

### Diagnosis

- In-house serology: Membrane-bound ELISA test is sensitive and specific for the presence of antibodies

### Treatment

- Reverse transcriptase inhibitors are expensive, but easily available:
  - Zidovudine (AZT Retrovir, Burroughs Wellcome): three times daily

- Interferon- $\alpha$ : PO every 24 hours for 5 days on alternate weeks

### Supportive care

- Limit contact with other cats to decrease exposure to secondary pathogens
- Avoid routine vaccinations
- Limit vaccines to rabies as required by law

### Preventive

- Keep cats inside; avoid contact with feral cats
- Vaccination: may result in a cat that tests positive on future FIV tests

### Information for Clients

- This is a progressive disease.
- The average life span from diagnosis to death is about 5 years.
- To prevent this disease, keep cats indoors and limit contact with feral or free-roaming cats.
- Test all new additions to the cat's household.
- Incidental infection among cats in a household is unlikely.
- FIV has not been found to grow in human cells.

## REVIEW QUESTIONS

- When determining whether an anemia is regenerative or nonregenerative, one must look at the:
  - Complete blood count
  - Absolute reticulocyte count
  - Red blood cell count
  - Red blood cell morphology
- What is the tick vector responsible for the spread of canine ehrlichiosis?
  - Dermacentor variabilis*
  - Amblyomma americanum*
  - Rhipicephalus sanguineus*
  - Boophilus annulatus*
- A buccal mucosal bleeding time longer than 4 minutes in a healthy, young Doberman might indicate the presence of:
  - Heinz body anemia
  - von Willebrand disease
  - Immune-mediated hemolytic anemia
  - Iron deficiency
- Few cats with feline lymphoma will test positive for FeLV.
  - True
  - False
- List three drugs that are useful in the treatment of canine lymphosarcoma.

in wounds that have gone unnoticed by owners. Heavy coats and neglect predispose animals to this problem.

### Diagnosis

- Owners often report matted hair, a bad odor, or a painful reaction when the animal is petted in a specific area
- Maggots may be found on physical examination

### Treatment

- Clip hair from all lesions
- Flush the areas with copious amounts of water to remove larvae
- Manually remove larvae not washed off
- Daily wound cleaning and treatment must be done
- Administer oral antibiotics to combat the infection; use one with a good spectrum for skin (Keflex, cephalixin, triple sulfas)
- Keep the pet indoors to prevent reinfestation

### Information for Clients

- Myiasis is a disease of neglect. Clients need to check their outdoor pets frequently, especially during the summer months.
- Heavy-coated animals should be clipped during the hot, humid summer months to avoid damage to the skin.
- Avoid using toxic dips or sprays on wounds to remove larvae.
- Keep pets indoors during peak fly hours to prevent infestation (usually early morning and late afternoon).
- Keep pet's outdoor environment clean to avoid attracting flies.

## Lice

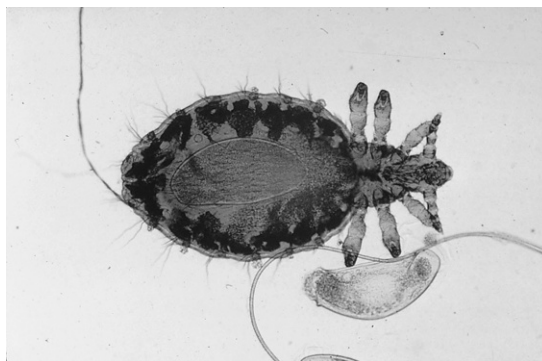
Lice are host specific and spend all of their lives on that host (Fig. 6.11). They are found on debilitated, dirty, ill-kept animals and are also commonly seen on poultry and pigeons. Lice infestation is a disease of neglect.

### Diagnosis

- Pet may become ill-tempered and agitated because of the presence of lice
- Lice cause intense itching
- Anemia can develop from blood-sucking lice
- Presence of lice or nits on the hair coat is diagnostic (Fig. 6.12)



**Fig. 6.11** Sucking louse *Linognathus setosus* of dogs. (From Hendrix CM, Robinson E. *Diagnostic Parasitology for Veterinary Technicians*. 3rd ed. St. Louis, MO: Mosby; 2012.)



**Fig. 6.12** *Linognathus setosus*: gravid female sucking louse and associated nit on hair shaft collected from a dog. Nits are oval, white, and usually found cemented to hair shaft. (From Hendrix CM, Robinson E. *Diagnostic Parasitology for Veterinary Technicians*. 3rd ed. St. Louis, MO: Mosby; 2012.)

### Treatment

- Treat all the animals in the house using an insecticide dip, shampoo, or dust. Clip all hair on the animal. Bathe with a good shampoo. Treat with an insecticide dip, dust, or spray
- All bedding and grooming tools must be washed thoroughly
- Fipronil
- Isoxazolines
- Ivermectin can be used orally. *However, this use is "off-label"; therefore, a signed release should be obtained from the owner*

### Information for Clients

- Humans cannot get lice from pets.
- The pet cannot get lice from humans.

The musculoskeletal system is responsible for movement and shape in all animals. Animals must be able to move, find food, seek shelter, and escape predators to survive. Without a rigid frame (the skeleton), flexible articulations (joints), and a system of pulleys (muscles, tendons, and ligaments), animals would be little more than lumps of tissue. The integration of these systems provides *movement*, one of the basic characteristics of life.

Disruption of the musculoskeletal system can occur as a result of the following:

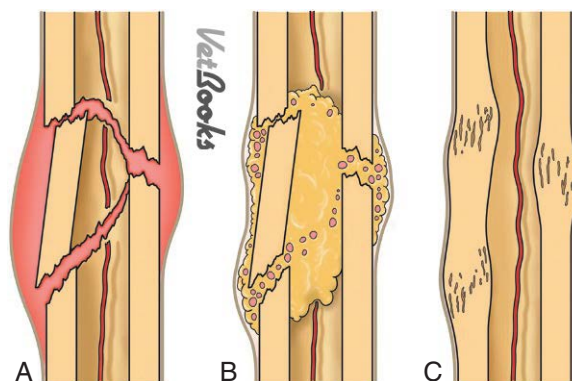
- Trauma—fractures, ligament ruptures
- Degenerative disease—osteochondritis dissecans (OCD), degenerative joint disease (DJD), nonunited anconeal process
- Inflammation—myositis, panosteitis
- Poor conformation—luxating patella
- Neoplasia

## ANATOMY OF THE MUSCULOSKELETAL SYSTEM

A complete review of the anatomy of the musculoskeletal system is beyond the scope of this text; however, a brief overview of bone and muscle metabolism and joint function is necessary to appreciate how disease of this system affects the health of the animal. Often, the muscular and skeletal systems are combined because without one the other cannot function.

### Bone

Long bone begins its formation in the fetus as a cartilage model. As the fetus develops, this cartilage is converted to bone through a process called *endochondral ossification*. The cartilage is replaced with osteoblasts, osteoclasts, and osteocytes, all of which are active in producing and shaping new bone. Long bones, such as the humerus and the femur, have shafts (diaphysis) comprising compact bone, whereas the ends (epiphysis) are filled with spongy bone. Spongy bone is also called *cancellous bone*. Flat bones, such as those found in the skull, also begin as cartilage but are converted to bone in a manner different from long bones. These bones are formed through intramembranous ossification (Fig. 7.1). Bone formation takes place here in a connective tissue membrane, which is then converted at multiple sites into both cancellous bone (internal) and compact bone (superficial). Students are familiar with



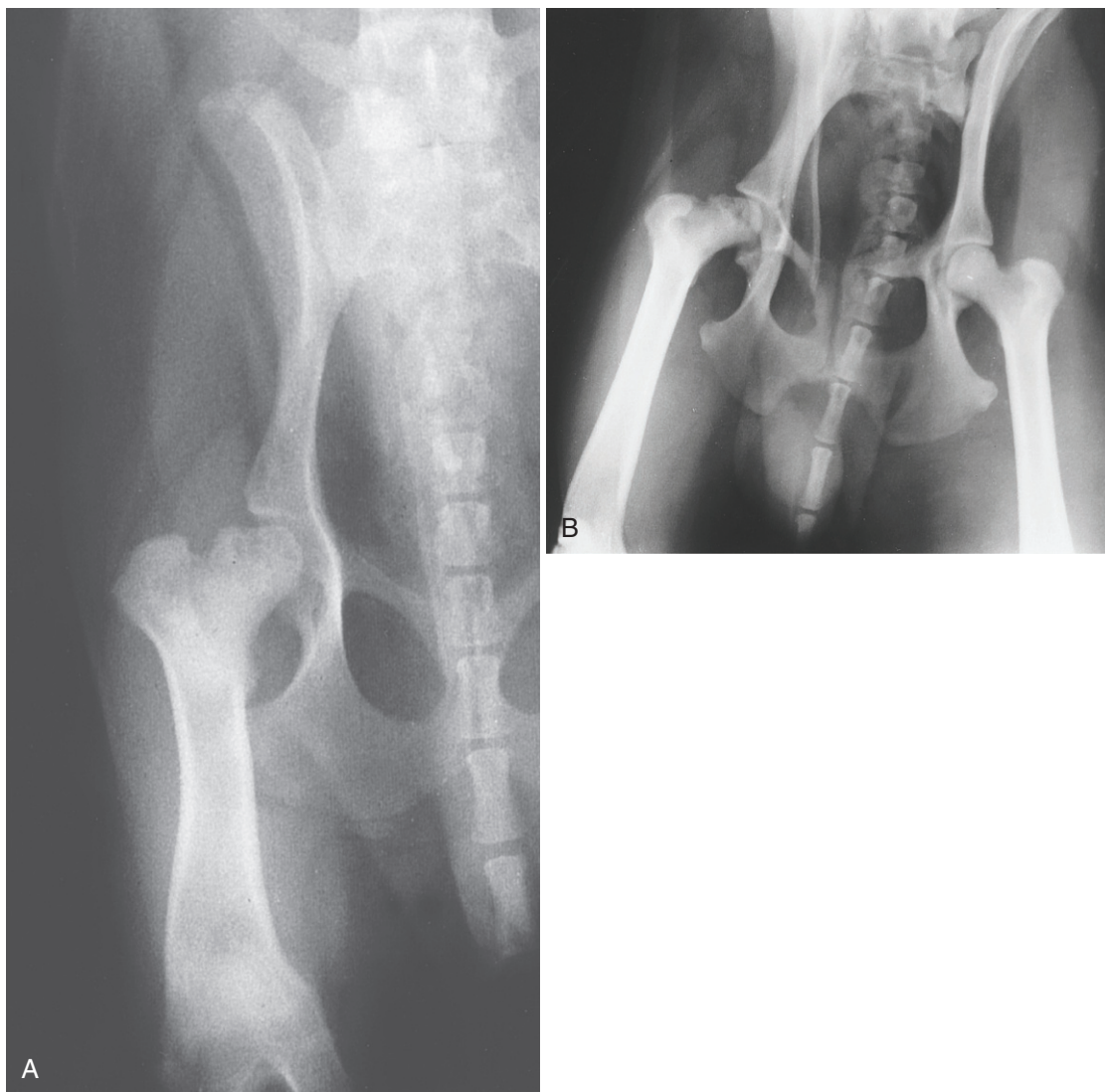
**Fig. 7.1** (A) Comminuted fractures fixed with biologic techniques of indirect reduction, major segment alignment, and optimal stabilization appear to heal with a combination of direct differentiation of mesenchymal cells to osteoblasts and endochondral ossification. (B) The fracture site fills with endosteal and bridging callus. (C) Resorption of woven bone and formation of lamellar bone at the fracture sites result in remodeling of bony callus to cortical bone. (From Fossum TW. *Small Animal Surgery*. 4th ed. St Louis, MO: Mosby; 2013, by permission).

bone from anatomy models, but they seldom think of bone as living tissue! In the body, bone is constantly being broken down, remodeled, and produced, and as the animal uses bone, it strengthens along the lines of stress, becoming stronger with use. Bone is also a large storehouse for calcium, phosphorus, and certain minerals. Epiphyseal bone is active in red blood cell (RBC) production. Bones are important for movement, protection of underlying tissues, and support. The hormones calcitonin and parathyroid hormone balance the level of calcium in both blood and bone, constantly adjusting levels to meet the needs of the animal.

### Muscles

Skeletal muscle tissue combines with bones to form the musculoskeletal system. This muscle tissue is striated and voluntary. The striations are formed from the overlap of the actin and myosin fibers found in the sarcomere, the contractile unit of the muscle. Contraction of these muscle fibers occurs in the presence of neuronal stimulation at the neuromuscular junction (cholinergic) and with increased calcium released within the muscle fiber in response to this stimulation (Fig. 7.2). Contraction of multiple muscle fibers simultaneously moves the bones attached to those muscles.

Injuries that involve the musculoskeletal system are painful, and analgesics should be used to increase the



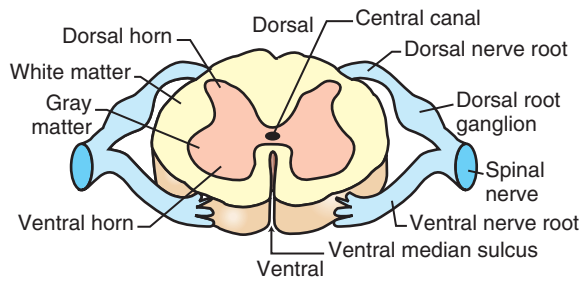
**Fig. 7.10** Legg-Calve-Perthes disease: Note areas of decreased opacity in the femoral head and the loss of the rounded contour of the femoral head. (From Kealy JK, McAllister H, Graham JP. *Diagnostic Radiology and Ultrasonography of the Dog and Cat*. 5th ed. St. Louis, MO: Saunders; 2011.)

age of onset is 6 to 8 months. The lameness is usually acute, is not associated with trauma, and may appear to the client to shift from leg to leg. Male dogs are more commonly affected (66% of cases), with the German Shepherd breed being overrepresented.

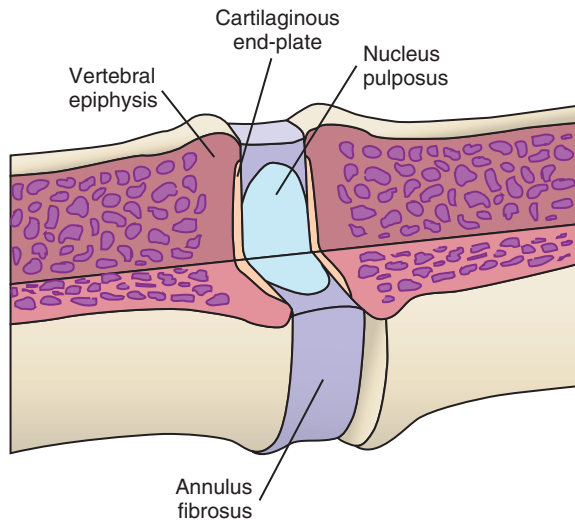
The cause of panosteitis is unknown, but some causes may include viral infection, genetic predisposition, metabolic disease, and allergic or hormonal excess. Viral infection is thought to be the most likely cause. The

disease affects medullary bone marrow and endosteal bone, resulting in degeneration of medullary marrow and thickening of endosteal bone. Long bones such as the ulna, humerus, radius, femur, and tibia are most commonly involved.

Panosteitis is self-limiting, and virtually all affected dogs return to normal within 1 year. During bouts of pain and lameness, analgesics and NSAIDs can be administered to make the animal more comfortable.



**Fig. 8.1** Cross-section of the spinal cord. (From Colville T, Bassett JM. *Clinical Anatomy and Physiology for Veterinary Technicians*. 2nd ed. St. Louis, MO: Mosby; 2008.)

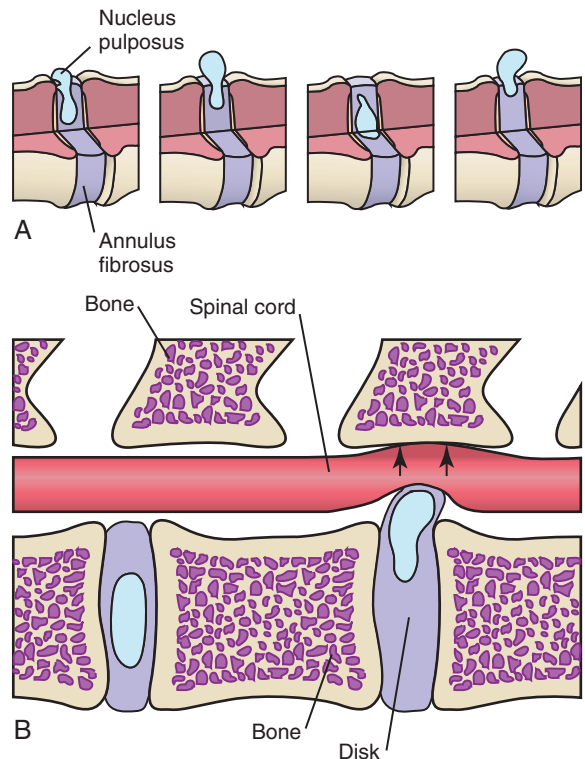


**Fig. 8.2** The intervertebral disk is an elastic cushion between the adjacent vertebrae. This view of an intervertebral disk space shows relations of the disk to the cartilaginous end plates and epiphyses of the vertebrae.

and prevents the vertebral bodies from rubbing against each other (Fig. 8.2).

### Intervertebral Disk Disease

By far, one of the most common disorders involving the spinal cord of small animals is intervertebral disk disease. Disk protrusions can occur in all breeds of dog and occasionally in cats. It has been reported that 75% to 100% of all disks in chondrodystrophic breeds have undergone degenerative changes by 1 year of age. Disk protrusion or extrusion occurs most commonly in the cervical, caudal thoracic, and lumbar spine. Two types of herniations have been reported. Type 1 (common



**Fig. 8.3** Various stages of a ruptured annulus and extruded nucleus, which may be degenerated, fibrotic, or even calcified.

in younger dogs) involves acute rupture of the annulus fibrosus and extrusion of the nucleus pulposus up into the spinal canal. In type 2 herniation (common in older [ $>5$  years] large-breed dogs), the extrusion occurs over a longer period, producing less acute and less severe clinical signs. The severity of spinal cord injury depends on the speed at which the disk material is deposited into the spinal canal, the degree of compression, and the duration of compression. Clinical signs may be related to the location of the lesion (Fig. 8.3).

### Clinical Signs

- Apparent pain; presence or absence of motor or sensory deficits
- Acute onset (type 1 usually)
- Paresis or paralysis that may be unilateral or bilateral
- Decreased panniculus reflex one to two vertebral spaces caudal to the actual lesion
- Altered deep pain response



**REVIEW QUESTIONS**

1. Which of the following is a false statement concerning intervertebral disk disease?
  - a. The severity of spinal cord injury depends on the speed at which disk material is deposited into the spinal canal.
  - b. The severity of spinal cord injury depends on the degree of spinal cord compression.
  - c. The severity of spinal cord injury is related to the weight of the animal.
  - d. The severity of spinal cord injury is related to the duration of compression.
2. What percentage of intervertebral disks is estimated to be degenerative in a chondrodystrophic breed by 1 year of age?
  - a. 30%
  - b. 5%
  - c. 45%
  - d. 75%
3. In the absence of deep pain after a spinal cord injury for greater than 48 hours, the prognosis is:
  - a. Poor
  - b. Guarded
  - c. Favorable
  - d. Excellent
4. Cervical spondylomyelopathy (Wobbler syndrome) is seen primarily in:
  - a. Golden Retrievers
  - b. Toy Poodles
  - c. Dobermans
  - d. Cocker Spaniels
5. Until proven otherwise, animals with alteration of voice or laryngeal paralysis should be suspected of:
  - a. Brucellosis
  - b. Leptospirosis
  - c. Rabies
  - d. Aspergillosis
6. Which of the following diseases does not include the sign of ascending flaccid paralysis?
  - a. Coonhound paralysis
  - b. Tick paralysis
  - c. Embolic ischemic myelopathy
7. Which of the following is not included in the treatment for tick paralysis?
  - a. Manual removal of all ticks on the animal
  - b. Supportive care
  - c. Chemical products for tick removal
  - d. Antibiotics
8. Which of the following would not be a cause of megaesophagus in the dog?
  - a. Congenital disease
  - b. Lead poisoning
  - c. Metabolic dysfunction
  - d. Atlantoaxial subluxation
9. Phenobarbital takes \_\_\_\_\_ days to reach an adequate concentration in the blood. Until this time, animals may continue to exhibit seizure activity.
  - a. 2 to 3
  - b. 7 to 10
  - c. 21 to 30
  - d. 18 to 24
10. Which of the following diagnostic examinations would be of least value in determining a cause for seizures in an older animal?
  - a. CBC, serum chemistries
  - b. Ophthalmic examination
  - c. CSF evaluation
  - d. MRI
  - e. Radiography

Answers found on page 545.

**TECH ALERT**

Tips for technicians dealing with parvovirus:

- Isolate all animals suspected of parvovirus infection until a diagnosis is confirmed. These animals should not be seen in the examination area used for well-patient examinations. Take animals suspected of infection directly to the isolation ward.
- All waste and bedding of infected animals should be disposed of directly from the isolation area.
- Wear protective clothing and shoe covers when treating these animals in isolation. Do not wear these clothes into the rest of the clinic.
- Affected animals require intensive care to keep clean and dry. Frequent cleaning of vomit and bloody diarrhea is unpleasant for the staff, but these substances must not be allowed to accumulate in an area. Secondary infections to wet skin and catheter sites can develop if patients are not cleaned frequently.

**RICKETTSIOSES**

Rickettsiae are small, gram-negative, obligate, intracellular bacterial organisms. Of the three known families, two (Rickettsiae and Ehrlichiae) are pathogens of dogs. Both organisms are tick-borne pathogens, with infection occurring through the saliva during feeding by the tick. Distribution and seasonal occurrence of these diseases are related to the life cycle of the corresponding tick. Transmission of the organism requires attachment of the tick to the host for 5 to 20 hours.

**Rocky Mountain Spotted Fever**

The causative agent of Rocky Mountain spotted fever disease, *Rickettsia rickettsii*, induces vascular endothelial injury. The disease is spread by the ticks *Dermacentor variabilis* and *Dermacentor andersoni*. The transmitted rickettsiae replicate in vascular endothelial cells, causing inflammation, necrosis, and increased vascular permeability. Clinical signs are related to the areas of inflammation. The pulmonary, CNS, myocardial, ocular, renal, and musculoskeletal systems may be involved.

Clinical signs of edema, hypotension, shock, conduction abnormalities, heart blocks or arrhythmia, seizures, coma, pulmonary edema, retinal hemorrhages, and acute renal failure may be seen in infected dogs. These signs are vague and may mimic other infectious and noninfectious

diseases. Diagnosis requires a direct immunofluorescent test for *R. rickettsii* in the skin or tissue biopsy.

Tetracycline and doxycycline are the treatments of choice; rapid improvement is seen after initiation of therapy. Clients should be educated as to the risks associated with tick exposure and the possibility of human infection through the environment.

**Clinical Signs**

- Fever
- Anorexia
- Depression
- Mucopurulent ocular discharge
- Tachypnea
- Coughing
- Vomiting and diarrhea
- Muscle pain
- CNS signs
- Severe weight loss
- Retinal hemorrhages
- Scrotal edema

**TECH ALERT**

Rocky Mountain spotted fever usually appears in the spring and summer months.

**Diagnosis**

- Direct immunofluorescent test of tissue biopsy
- Indirect immunofluorescent test showing a fourfold increase in serum titers
- History of tick exposure
- CBC
  - Anemia
  - Leukopenia to leukocytosis
  - Thrombocytopenia
- Serum chemistry
  - Increased ALT
  - Increased ALP
  - Hypoproteinemia
  - Hypocalcemia
  - Hyponatremia

**TECH ALERT**

Blood from patients with Rocky Mountain spotted fever may be infectious to persons handling it. Avoid contact by wearing protective clothing. Avoid blood from the tick as well.

## Clinical Signs

### *Acute prostatitis*

- Anorexia
- Fever
- Lethargy
- Stiff gait in the rear limbs
- Caudal abdominal pain

### *Chronic prostatitis*

- May be asymptomatic
- History of chronic, periodic urinary tract infections

## Diagnosis

- Urinalysis: urine shows blood, increased white blood cell (WBC) count, and the presence of bacteria
- Physical examination
- Urine culture

## Treatment

- Antibiotic therapy should be instituted for 28 days (acute form). (For the chronic form, use same antibiotic therapy regimen for at least 6 weeks.) The choice of antibiotic should be based on culture and sensitivity results and may be started intravenously if the animal is in serious condition:
  - Enrofloxacin: every 24 hours
  - Trimethoprim/sulfonamide: every 12 hours
  - Erythromycin: every 8 hours
  - Chloramphenicol: every 8 hours
  - Ciprofloxacin: every 24 hours
- Castration may be beneficial
- Prostatectomy, a difficult surgery with serious postsurgical side effects, may be considered

## Information for Clients

- Long-term antibiotic therapy is essential to control prostatitis.
- Prolonged use of antibiotics requires monitoring with prostatic fluid cultures and examinations to ensure that toxic side effects do not develop.
- Castration may be beneficial.

## Prostatic Abscessation

Prostatic abscessation is a serious form of bacterial prostatitis in which pockets of purulent exudate develop within the gland. The disease may present with systemic signs.

## Clinical Signs

- Tenesmus
- Urethral discharge
- Lethargy
- Pain
- Vomiting
- Hematuria
- Fever
- Depression

## Diagnosis

- History and physical examination
- CBC and serum chemistries
- Leukocytosis or normal WBC count
- Liver enzymes may be elevated
- Hypoglycemia
- Hypokalemia
- Prostatic aspiration—hemorrhagic, purulent, septic

## Treatment

- Surgical drainage is the treatment of choice
- Castration
- Antibiotic therapy
- Intravenous fluid therapy (in cases of sepsis or peritonitis)

## Information for Clients

- Prostatic abscessation care is expensive, and the disease is difficult to treat.
- Survival rate is approximately 50% after 1 year.

## Prostatic Neoplasia

Prostatic neoplasia is uncommon in dogs but has been seen in cats. It can develop in both intact and neutered males. All neoplasms that affect the prostate gland are malignant. Clinical signs are similar to other prostatic diseases. Treatment is unrewarding, and a cure is unlikely.

## Priapism and Paraphimosis

Priapism is occasionally seen in dogs. It is usually a problem for the clients, who is embarrassed by the inappropriate erection, but it can also be painful to the dog. Excessive parasympathetic stimulation or possible impairment of venous drainage from the penis may result in priapism. A delay in treatment may result in necrosis of the penis, requiring amputation of the penis.

predisposed to this condition, but there actually appears to be no sex predilection.

### Clinical Signs

- Cough
- Dyspnea
- Weight loss, anorexia
- Vomiting
- Lethargy
- **Acute or peracute presenting signs**
- Salivation
- Tachycardia
- Dyspnea
- Hemoptysis, cough
- Central nervous system (CNS) signs
- Sudden death (uncommon)

### Diagnosis

#### Laboratory

- Microfilarial tests: Cats are usually microfilaria negative or have too small a number of organisms to be detected
- Antigen tests: Cats typically have low worm burdens (one to two worms) that are missed by these tests
- Antibody tests: A negative test is 100% specific; a positive test indicates the following:
  - Infection
  - Past exposure
  - Ectopic infection

#### Radiography

- Radiographs may show enlarged caudal pulmonary arteries (1.6 times the width of the ninth rib at the ninth intercostal space)

#### Echocardiography

- An experienced echocardiography technician can detect linear foreign bodies in the pulmonary artery or right ventricle

### Treatment

- The use of adulticide in cats is *not* recommended because most infections are self-limiting

#### Supportive care

- Cage rest and confinement
- Cortisone PO to reduce inflammation

### Prevention

- Ivermectin (Heartgard, Merial, Duluth, GA.): PO every 30 days

- Milbemycin: 2000 micrograms per kilogram (mcg/kg)
- Revolution: a monthly spot-on preparation

### Information for Clients

- Feline heartworm disease is a self-limiting disease in cats (elimination of most adult worms occurs within 2–4 years).
- Both outdoor and indoor cats are at risk for infection, but cats are less likely to be bitten by mosquitos than are dogs.
- Cats living in areas where heartworm disease is prevalent should be on monthly prevention.

### Feline Viral Respiratory Infections (Feline Viral Rhinotracheitis, Calicivirus)

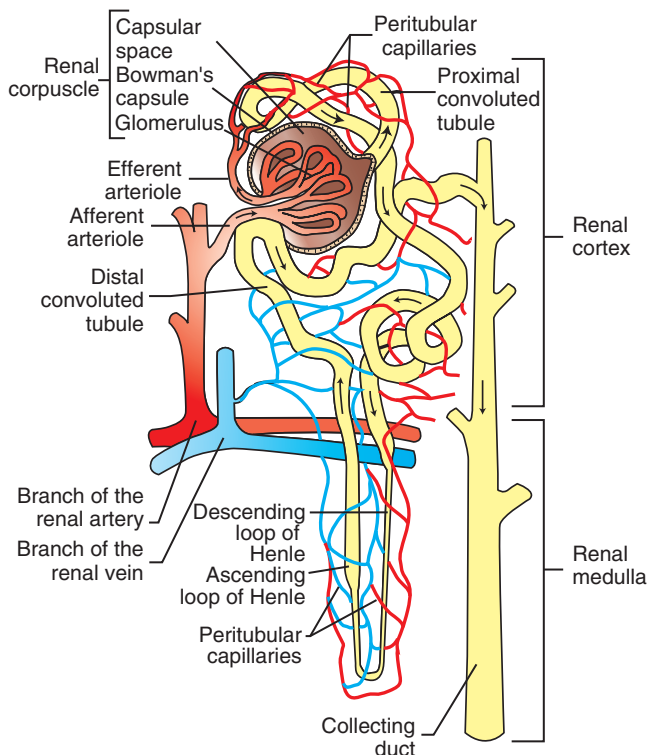
Even though vaccines are readily available, feline respiratory diseases caused by viral agents continue to be a problem in house cats, in multicat facilities, and in feral cats. The two viral agents responsible for most respiratory problems are feline herpesvirus (FHV) and feline calicivirus (FCV).

### Feline Herpesvirus (Feline Viral Rhinotracheitis)

Feline viral rhinotracheitis (FVR) is a highly contagious upper respiratory disease of cats, with a high morbidity and moderate mortality rate, and it may be extremely severe in young kittens. Infections occur year-round in both vaccinated and unvaccinated cats, with clinical symptoms being more severe in the unvaccinated population. Transmission of the virus is via aerosolization (sneezing) and by direct cat-to-cat contact. Queens may transmit the disease to their kittens during grooming. The virus is not hardy and is usually inactivated in the environment within 18 to 24 hours. Cats usually shed the virus for up to 3 weeks after infection; food dishes, clothing, bedding, and toys can act as fomites for spread of the disease.

### Clinical Signs

- Acute onset of sneezing
- Conjunctivitis (usually severe), purulent rhinitis
- Fever
- Depression
- Anorexia
- Ulcerated nasal planum
- Excessive salivation



**Fig. 12.3** Fluid flow through the nephron. (From Colville T, Bassett JM. *Clinical Anatomy and Physiology for Veterinary Technicians*. St Louis, MO: Mosby; 2008, by permission.)

for this disease is unknown, although a virus may be the causative agent. The disease can be divided into two forms: (1) ulcerative and (2) nonulcerative, or (1) obstructive and (2) nonobstructive. Most cats will have the nonulcerative form. The disease appears to be self-limiting in most cats, with clinical signs subsiding within 1 week to 10 days. *Any* treatment appears to help because of the self-limiting nature of the cystitis.

Cats with undocumented bacteriuria should not be treated with antibiotics. Needless antibiotic treatment only results in an increased number of antibiotic-resistant organisms.

Change of diet may be the most beneficial treatment, especially if it results in dilute urine without an increase in urine pH. If possible, cats should be fed canned food or have water added to dry food.

Cats should be given places to hide; toys and scratching poles allow cats to exercise normal play behavior and reduce stress, which has been shown to help in the treatment of this disorder.

Use of analgesics such as buprenorphine, butorphanol, or fentanyl patches is advocated to reduce pain and decrease clinical symptoms. A dose just sufficient to calm the cat is given orally once daily at bedtime. Antiinflammatories such as meloxicam or robenacoxib may also be useful. Liver enzymes should be monitored while the cat is receiving these medications.

#### TECH ALERT

Avoid the use of indwelling urinary catheters in these cats. If using a catheter to obtain a urine sample, make sure it is done as aseptically as possible.

#### Clinical Signs

- Hematuria (frank blood or a pink urine)
- Dysuria (pain on urination)
- Inappropriate urination (e.g., floors, sinks, bathtub)
- More frequent urination (small volumes)