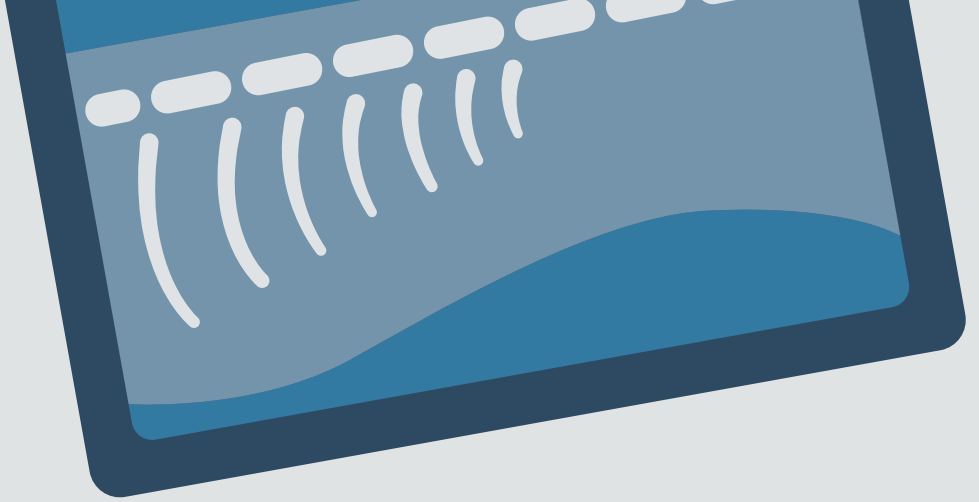


The 5 W's of Canine Developmental Orthopedic Diseases

Who, What, When, Where, and Why?





Introduction

Fortunately, there are a limited number of orthopedic conditions that primarily affect young dogs. While many of these conditions are easily diagnosed, however, others may have some overlap and can be difficult to keep straight in your mind. A structured approach can help you learn these conditions and recall them when necessary, whether that is on the NAVLE®, on clinics, or at your first job!

Avascular Necrosis of the Femoral Head

Who?

This condition primarily occurs in toy and small breed dogs. Predisposed breeds include Miniature Poodles, West Highland White Terriers, Manchester Terriers, Boston Terriers, Cairn Terriers, Bichons, Miniature Schnauzers, Miniature Pinschers, Cocker Spaniels, Pomeranians, Yorkshire Terriers, and others.

What?

Affected dogs present for unilateral hindlimb lameness, which may vary from mild to severe. On physical exam, these dogs may have hindlimb muscle atrophy and pain or crepitus during manipulation of the coxofemoral joint. Mild cases may initially be subclinical and only detected on careful orthopedic exam.

When?

The onset of lameness is typically observed between 4-11 months of age.

Where?

Radiographs performed early in the course of disease show radiopacity of the lateral epiphyseal area of the femoral head. This progresses to lysis of the femoral head and a possible “apple-core” appearance, accompanied by flattening of the femoral head and possible femoral neck fracture.

Why?

This condition is caused by a blood supply disruption to the femoral head. The resulting ischemia leads to femoral head deformity and lameness. Due to strong breed predispositions, a hereditary component is suspected, particularly in Miniature Poodles and West Highland White Terriers.¹ This process cannot be reversed; therefore, a femoral head and neck ostectomy is recommended for treatment.

Elbow Dysplasia



Who?

This condition is most common in large-breed dogs. Predisposed breeds include Golden Retrievers, Labrador Retrievers, German Shepherds, Rottweilers, Bernese Mountain Dogs, and Weimaraners.

What?

Clinical signs include forelimb lameness, pain on elbow palpation/manipulation, decreased elbow range of motion, and joint effusion.

When?

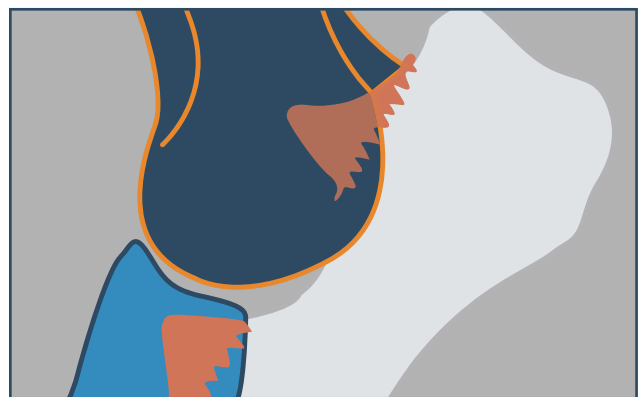
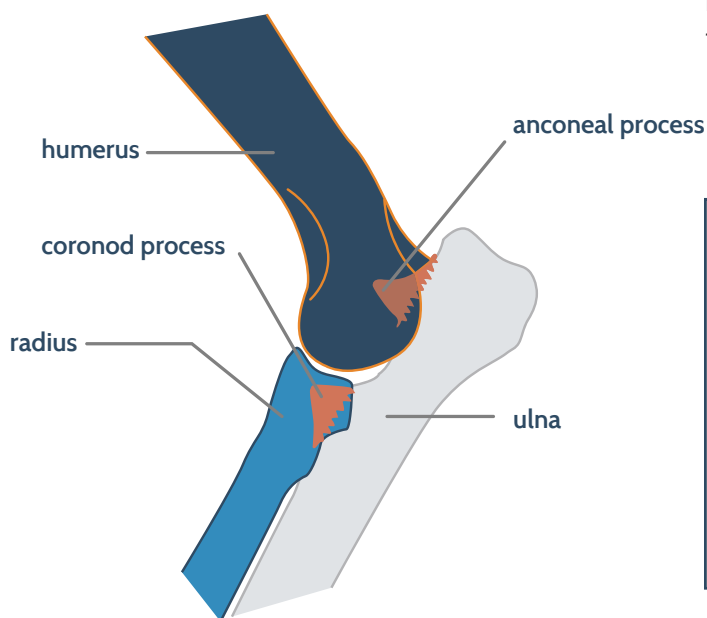
While many affected dogs present early in life, at less than one year of age, others do not present until they reach 2-5 years of age.²

Where?

Radiographs of the affected elbow typically reveal evidence of an ununited anconeal process, fragmentation of the medial coronoid process, and/or osteoarthritis secondary to joint incongruity. Some cases show no radiographic abnormalities and may require CT/MRI for diagnosis.

Why?

This condition is thought to be caused by asynchronous growth of the radius and ulna during maturation. The cause of this asynchronous growth is undetermined. A number of causes have been theorized, including diet, trauma, and genetics, but the true cause is likely multifactorial. Surgical correction is often warranted, although some mild cases can be addressed with medical therapy using NSAIDs.



¹Balsa I, Robinson D. 2016. Juvenile Orthopedic Disease in Dogs & Cats, Part 1: Musculoskeletal Development & Pediatric Bone Diseases. Today's Veterinary Practice. Retrieved from: https://todaysveterinarypractice.com/wp-content/uploads/sites/4/2016/05/TVP_2016-0506_JuvenileOrthopedic.pdf

Osteochondritis Dissecans

Who?

This condition affects large and giant-breed dogs, with males more frequently affected than females.²

What?

Affected dogs present for unilateral forelimb lameness. Owners often report that the lameness is worse after heavy exercise and improves with rest. On physical exam, affected dogs often exhibit pain on flexion or hyperextension of the shoulder. Muscle atrophy may also be observed along the spine of the scapula.

When?

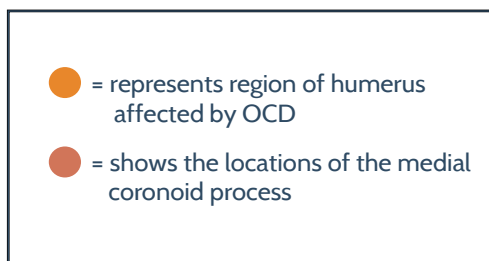
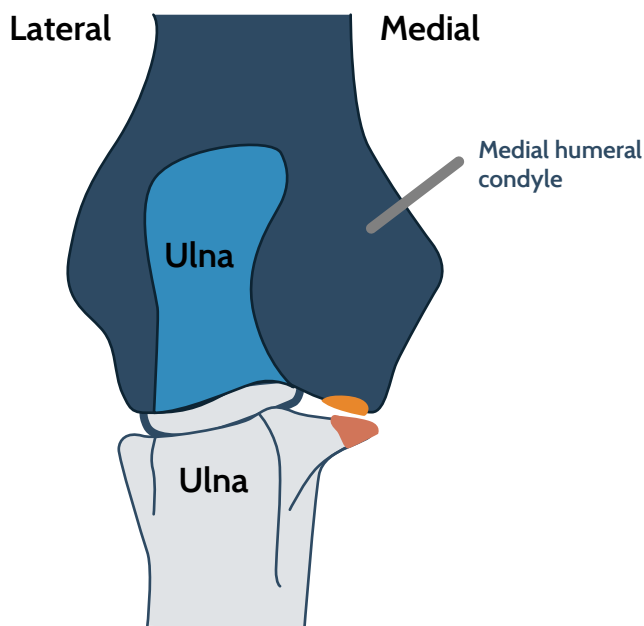
Clinical signs often develop at 4-8 months of age.

Where?

On radiographs, bilateral changes are seen on the humeral head. The first radiographic sign is typically flattening of the caudal humeral head, which gradually progresses to a concave defect in the humeral head. In some cases, the flap may calcify and be visible within the joint.

Why?

Osteochondritis is an endochondral ossification disorder, although its underlying cause is unknown. Nutritional factors are suspected to play a role. Surgical correction is necessary.



²Hulse D. 2002. Juvenile Orthopedic Disease. Presented at World Small Animal Veterinary Congress.

³Munjar TA, Austin CC, Breur GJ. 1998. Comparison of risk factors for hypertrophic osteodystrophy, craniomandibular osteopathy and canine distemper virus infection. *Vet Comp Orthop Traumatol.* 11:42-48.

⁴Johnson JA, Austin C, Bruer GJ. 1994. Incidence of canine appendicular musculoskeletal disorders in 16 veterinary teaching hospitals from 1980 through 1989. *Vet Comp Orthop Traumatol.* 7:56-69.

⁵Peterson ME, Kutzler M. 2011. *Small Animal Pediatrics: The First 12 Months of Life.* St. Louis: WB Saunders.



Hypertrophic Osteodystrophy

Who?

HOD primarily affects large and giant-breed dogs, with males more commonly affected than females. Predisposed breeds include Boxers, German Shepherds, Golden Retrievers, Labrador Retrievers, Irish Setters, and Weimaraners. The estimated incidence of this condition is 2.8 in 100,000.³

What?

Affected dogs typically present for lameness and reluctance to move. These dogs often have signs of systemic illness, such as fever, lethargy, inappetance, and/or diarrhea. Painful swelling of the long bones is observed on physical exam.

When?

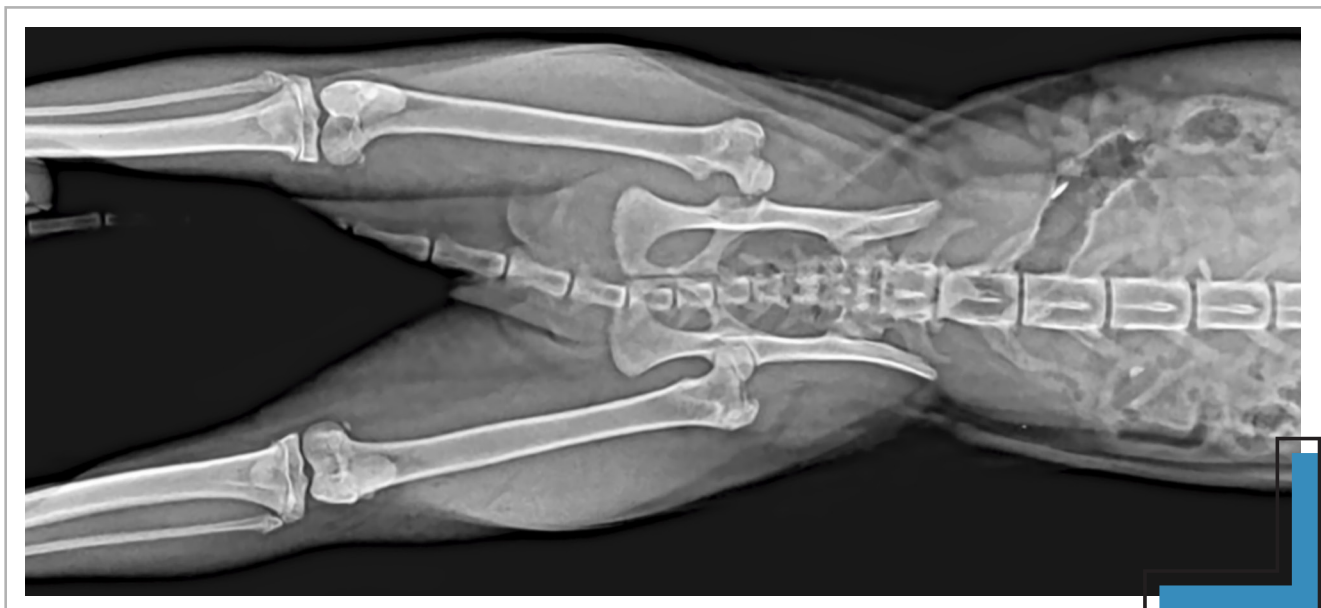
This condition is typically diagnosed at 2-6 months of age.

Where?

This condition is often bilateral, typically affecting the radius, ulna, and tibia. The most characteristic radiographic finding is a “double physis,” or a radiolucent line in the metaphyseal region of the bone near the physis. Other findings include periosteal reaction near the physis and palisading new bone formation along the periosteum.

Why?

The cause of this condition is unknown in most cases. Infectious diseases have been suspected as a potential cause, but evidence is lacking.¹ The condition is heritable in Weimaraners.¹ The condition is typically self-limiting, although NSAIDs (and, in some cases, corticosteroids) may help alleviate clinical signs. Severe cases may require hospitalization for IV fluid therapy.





Panosteitis

Who?

Panosteitis primarily affects large and giant breed dogs. A 1994 study estimated the incidence of panosteitis at 2.4 per 1000 patients.⁴ Predisposed breeds include German Shepherds, German Shorthaired Pointers, Doberman Pinschers, Great Danes, Afghan Hounds, Irish Setters, Airedales, Golden Retrievers, Labrador Retrievers, Afghan Hounds, Saint Bernards, Bernese Mountain Dogs, and Newfoundlands.¹

What?

Affected dogs typically present for a history of shifting leg lameness. On physical exam, pain may be noted on palpation of long bones. No other signs of systemic illness are typically observed.

When?

This condition is most commonly diagnosed between 5-12 months of age, although it may arise earlier and has been seen in dogs up to 5 years old.¹

Where?

Panosteitis most commonly affects the ulna, although it may also affect the radius, humerus, femur, or tibia. In early stages, the radiographic appearance of affected bones may be normal. Over time, the appearance of bone within the medullary canal becomes abnormally coarse and a periosteal reaction may be observed.

Why?

The cause of panosteitis is unknown. It is theorized that it may be caused by increased dietary protein or calcium levels causing changes at nutrient foramina that increase intraosseous pressure.⁵ Treatment is supportive, focused on rest and NSAIDs, and recurrence may occur.



Hip Dysplasia

Who?

This condition is most common in large-breed dogs. Predisposed breeds include German Shepherds, Golden Retrievers, Labrador Retrievers, Rottweilers, Mastiffs, and others.

What?

Affected dogs may demonstrate a variety of hindlimb gait abnormalities. Older dogs may demonstrate lameness, hesitation to be active, and hindlimb muscle atrophy. In puppies, a bunny-hopping gait may be observed. On physical exam, affected puppies often have a positive Ortolani sign, although this can be difficult to appreciate without sedation.

When?

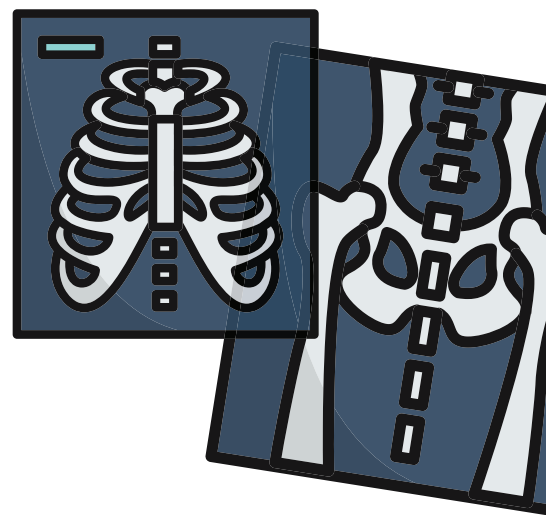
Patients typically present at one of two time periods. Some dogs present at 5-8 months of age, although these dogs often show spontaneous improvement at 15-18 months of age.² The majority of dogs present later in life, due to chronic degenerative joint disease (DJD) that occurs secondary to hip dysplasia.

Where?

Radiographs reveal subluxation or complete luxation of the coxofemoral joint, which may be unilateral or bilateral. In older dogs, signs of secondary DJD can also be observed. A common early sign of DJD is a line of enthesophytes on the caudal aspect of the femoral neck. Over time, the femoral neck becomes thickened and the acetabulum becomes shallow and sclerotic.

Why?

Hip dysplasia is a multi-genetic, heritable disease, with its expression influenced by environment, nutrition, and other factors. Overnutrition in growing puppies is thought to increase the likelihood of this condition, although definitive evidence for this belief is lacking. Surgical correction may be necessary (a number of surgical approaches are described), although medical management may be appropriate in mild cases.



Stay Up To Date

While the cause of many of these developmental diseases is not fully understood, research is ongoing. As you begin your career, stay aware of developments in these areas in the hopes of gaining insights that will help you prevent and manage these conditions in your patients.



About the Author

Cathy Barnette is a practicing small animal veterinarian, freelance writer, and contributor to VetPrep and VetTechPrep. She is passionate about both veterinary medicine and education, working to provide helpful information to veterinary teams and the general public. In her free time, she enjoys spending time in nature with her family and leading a Girl Scout troop.