

# The Orthopedic Examination in Dogs: A Fast and Effective Tool

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Even if many lamenesses in dogs appear somewhat mysterious at first glance, they can be approached step by step, and their cause can, in most instances, be localized to specific bones or joints. The purpose of this presentation is to describe these diagnostic steps: know the most common orthopedic disorders, keep the signalment in mind, collect a thorough history, observe the dog standing, changing position, and walking, palpate the dog, prepare a short list of differential diagnoses, and confirm your suspicions with radiographs.

## STEP 1. KNOW THE MOST COMMON ORTHOPEDIC DISORDERS

The majority of lamenesses are caused by a handful of diseases.<sup>9</sup> In the forelimb, elbow dysplasia with or without fragmentation of the medial coronoid process and osteochondritis dissecans of the humeral head are most common. In the hind limb, hip dysplasia and cranial cruciate ligament injuries are most common (Table 1).

**Table 1.** Orthopedic problems ranked by decreasing prevalence

Problem	Incidence
Canine hip dysplasia	10%
Pelvic fracture	8%
Cruciate ligament injuries	8%
Patellar luxation	7%
Femoral fractures	7%
Coxofemoral luxation	5%
Radial and ulnar fractures	4%
Other	51%

If we extend the list to 20 diseases, we cover 99 percent of the lamenesses. Ideally, we should have in mind one or two statements about the 1) definition, 2) importance (prevalence and severity), 3) etiology, 4) pathogenesis, 5) heritability, 6) clinical signs, 7) diagnosis, 8) treatment, and 9) prognosis of each common orthopedic problem. For example, Table 2 lists the facts related to canine hip dysplasia. It is important to note that **soft tissue injuries are extremely rare** in dogs, with the exception of racing greyhounds. Most often, lameness can be attributed to a specific joint or long bone problem.

## STEP 2. BASE YOUR FRAME OF MIND ON THE DOG'S SIGNALMENT

The dog's age, sex, and breed, and conformation are very important clues to what might be the cause of lameness. Growing dogs have developmental orthopedic diseases and physal fractures. Large-breed dogs have elbow and hip dysplasia, osteochondritis dissecans, hypertrophic osteodystrophy, panosteitis, and other diseases. Small-breed have patellar luxations and Legg-Perthes disease. Adult dogs have degenerative joint disease (as a consequence of developmental diseases), fractures, and luxations. Intact male dogs are more likely to be a victim of vehicular trauma than other dogs. Older dogs from giant breeds have an increased incidence of osteosarcoma.

## STEP 3. COLLECT A THOROUGH HISTORY

The most important question in the history collection: *Is there a history of trauma?* Should help you separate orthopedic trauma and orthopedic diseases. The second question: *When did the*

*lameness start?* Should help you differentiate acute and chronic problems. A few additional questions: *Is the lameness progressing? Is it worse after exercise? What leg is involved? How is the dog doing when climbing steps? ... jumping up? ... jumping down? Is he playing as much as before? Is the dog sick? Is he wobbly or dragging his legs?* Should help you judge the nature and severity of the lameness. Most owners know a lot about their dog's lameness but generally, they have not organized these thoughts. When questioned properly, the owner will uncover a lot of information about their lame dog. Most of the time the duration of lamenesses is underestimated because owners tend to think that the lameness started when they discovered it.

**Table 2.** Synthetic knowledge of an orthopedic disease: example for canine hip dysplasia

Category	Findings for canine hip dysplasia
Definition	Abnormal development of the hip joint
Importance	
Prevalence	Most common orthopedic disease in many large breeds
Severity	Debilitating disease, not life-threatening
Etiology	Multifactorial: dog size, conformation, nutrition, and trauma
Pathogenesis	Most likely instability of the joint leading to joint incongruity and secondary degenerative joint disease
Heritability	Moderate. 7% normal offsprings of dysplastic parents
Clinical signs	Immature dogs: acute, severe lameness and gait abnormality - Mature dogs: chronic, mild lameness
Diagnosis	Palpation, radiography
Treatment	Conservative: weight, activity, NSAIDS Surgical : immature dogs: juvenile pubic symphysiodesis (JPS), triple pelvic osteotomy (TPO); mature dogs: total hip replacement (THR / treatment) or femoral head ostectomy (FHO / palliation)
Prognosis	Fair (Conservative / FHO) to excellent (total hip replacement)

#### STEP 4. OBSERVE THE DOG STANDING AND CHANGING POSITION

You should gather as much information as possible from the way dogs are standing up, sitting down, or walking, **before** you actually palpate them. Most dogs are much more relaxed before they become the center of attention. Observe the way the dog is resting in the waiting room, getting up to walk into your examination room. If the lameness that the owners describe does not correspond to your initial impression, do not hesitate to take the dog outside for a minute or two and watch the dog with the owner. Most dogs think that they are going home and, in their enthusiasm, their lameness may become more obvious.

When lame dogs are standing immobile, they have two options: they can shift weight from side to side, or from back to front, or front to back. As a general rule, the pain originates in one limb only, dogs will shift weight from side to side, and when pain originates in both hind limbs or both forelimbs, dogs will shift weight forward or backwards, respectively. Dogs are very practical. They adopt the stance that provides the best compromise between the pain perceived and the energy expended. Dogs will lift a leg from the ground only if the effort of lifting that leg is balanced by the decrease in pain perceived. Because the effort of lifting their legs is lesser, small dogs are more often non-weight-bearing than large- and giant-breed dogs. When multiple limbs are involved after vehicular trauma or immune mediated polyarthritis, for example, dogs become recumbent. Several clues may help you recognize that a dog is shifting weight. When the dog is standing, look carefully at the space present between the front feet and the hind feet. If a dog is shifting weight toward his forelimbs, he will have a tendency to have a wide stance in the forelimbs and a narrower stance in the hind limbs (like a bulldog). The most classic form of weight shift is forward, in response to

severe bilateral hip dysplasia or bilateral cranial cruciate ligament injuries. These dogs also tend to have wide rib cages, abducted elbows, and internally rotated antebrachia.

When dogs are sitting, they must hyperflex their stifle and tarsal joints. Dogs with painful stifle joints, most often after cranial cruciate injuries, are reluctant to sit straight and prefer extending their painful leg or legs to the side. When they stand up, they shift their weight to the front of their body to avoid having to push on their hind limbs, in that painful, hyperflexed position.

#### **STEP 5. OBSERVE THE DOG WALKING**

It is important to differentiate lameness and gait anomaly. Classic examples of gait anomalies are chondrodystrophy or dwarfism, growth deformities secondary to physal injuries, fracture malunions, or neurologic diseases. Dogs with gait problems may or may not be painful in their limbs. A head tilt is present with forelimb lamenesses. The head moves up when the sore limb strikes the ground and moves down when the sound leg strikes the ground. With hip lameness, the dog will avoid flexing his hip joint to move the leg forward, and, instead, will shift his pelvis from side to side. This leads to an oscillating movement of the base of the tail, when the dog is seen from the back.

Stance and gaits (walk, trot, and gallop) of growing dogs should be assessed because some problems may only be detected at a specific gait. Some orthopedic problems may be more easily detected at a stance; other problems may be more easily detected at a gallop. Stance should be assessed for lack of joint motion or excessive joint motion. Joint or bone problems associated with constant pain may lead to side-to-side, back-to-front, or front-to-back weight shifts. These problems may include early cranial cruciate ligament disease, osteochondritis dissecans, panosteitis, and others. Many of these include severe inflammation. Some problems are more visible during more rapid gaits. They may be associated with joint subluxation, like hip dysplasia (leading to bunny hopping during gallop) or late cranial cruciate ligament injuries. Weight shifts may lead to secondary orthopedic problems. For example, a back-to-front weight shift may lead to hyperextension of the talo-crural joints. This is most often seen in young dogs of large and giant breeds shifting weight because of hip pain caused but hip subluxation. These dogs appear to be reluctant to extend their hip joint and, instead, stretch their talo-crural joints. Other abnormalities associated with back-to-front weight shifts include intertarsal torsional laxity (also associated with hip pain and reluctance to extend the hip joint) and elbow abduction with internal rotation of the forelimbs (Bulldog stance), often associated with chronic cranial cruciate ligament injuries.

#### **STEP 6. IF NECESSARY, OBSERVE THE DOG DURING MORE STRENUOUS PHYSICAL ACTIVITY**

If the lameness is unclear when the dog is walking, it is often useful to observe the dog while trotting or galloping. Head tilts are often more pronounced when trotting than when walking. Most pups with hip dysplasia will have a characteristic bunny-hop when galloping. It may be useful to watch a dog jump up or down, or climb stairs. For example, hunting dogs with fibrotic contracture of the infraspinatus muscle will have a characteristic circumduction of the forelimb when climbing steps.

## STEP 7. PALPATE THE DOG

Palpation of the dog should include the neck, shoulders, trunk, and all four limbs. Ideally, palpation is started with the dog standing, making comparisons between the left and right side of the body easier. Muscle atrophy of a forelimb often leads to a more prominent spine of the scapula, because of the atrophy of the supraspinatus and infraspinatus muscles. Muscle atrophy of a hind limb leads to a decrease in the size of the biceps femoris muscle. That difference can be determined by comparing the circumference both thighs using a (calibrated) tape measure. While the dog is still standing, weight shifts can be appreciated when feet are lifted off the ground. With a forward weight shift, for example, it may be very difficult to lift the front paws and it is very easy to lift the hind limbs. This also applies to side-to-side weight shifts. Conscious proprioception of all four limbs should be evaluated at that time. If it is decreased, a full neurologic examination of the dog should be conducted. In trauma patients, especially non-ambulatory patients, the neurological examination should include anal tone, panniculus reflex, withdrawal reflex, and deep pain sensation.

Limb palpation is best conducted while the dog is lying down with the feet towards the examiner. If the dog is fractious or nervous, it may be better to start with the limb where the lameness originates. Otherwise, it may be better to collect information on the presumably non-painful limbs before the painful limb is palpated. Information collected during palpation should be compared between the left and right side of the body. It is best to always conduct palpation with the same method, to avoid omission. Classical palpation of the forelimb includes toes, metacarpal bones, carpus, radius and ulna, elbow, humeral condyles and greater tubercle, and shoulder joint. Classical palpation of the hind limb includes toes, metatarsal bones, tarsus, tibia, stifle, femoral condyles and greater trochanter, and hip joint. When palpating joints **C**repitus, **R**ange of motion, **E**ffusion or swelling, **P**ain response and **I**nstability should be evaluated. The first letters of these five parameters form the acronym **CREPI**. These five parameters are evaluated simultaneously: while one hand moves the joint throughout its range of motion, the other hand feels crepitus, effusion or instability, and the examiner looks for a pain response. The evaluation of the range of motion is the most critical part of the palpation because in many instances periarticular inflammation or fibrosis will limit the movement of the joint, especially in smaller, more intricate joints. When palpating bones, crepitus (when a fracture is present), abnormal shape, and pain response should be evaluated. Some joints require specific tests. For example, the Ortolani sign of the hip joint can be evaluated in immature dogs and is a reflection of the degree of subluxation of the joint. A cranial drawer sign is present in dogs with ruptures of the cranial cruciate ligament.

## STEP 8. PREPARE A LIST OF DIFFERENTIAL DIAGNOSES

From the information gathered in the steps above, you should have in mind a short list of potential differential diagnoses. The most likely diagnosis should be your tentative diagnosis. A pup with hip pain most likely has hip dysplasia. A pup with elbow pain may have elbow dysplasia with fragmentation of the medial coronoid process, an ununited anconeal process, osteochondritis dissecans of the medial aspect of the humeral condyle, or panosteitis.

## STEP 9. CONFIRM YOUR SUSPICIONS WITH RADIOGRAPHS

Radiographs should be used to confirm your tentative diagnosis. The dog should be sedated to improve positioning and decrease personnel exposure. Radiographic detail is best when the collimation is used. As a consequence, it is best to limit the radiographic field to your area of

interest. When an unusual lesion is present, in growing dogs, or when the disease is likely to be bilateral, it is beneficial to radiograph the opposite limb either as a comparison, or to rule out the presence of bilateral disease. It is often beneficial to repeat the palpation when the dog is sedated.

#### **STEP 10. WHEN IN DOUBT...**

Different approaches can be used when the cause of lameness remains unknown at the end of the examination. If the lameness is mild and recent, it may be acceptable to limit the dog's activity for two weeks in combination with non-steroidal anti-inflammatory therapy with a non-steroidal anti-inflammatory drug. Corticosteroids should be avoided because they do not provide therapeutic relief unless they are specifically geared toward an immune-mediated problem, because they mask the clinical signs, making future diagnosis more difficult, and because they have numerous significant side effects, including an increase in cartilage degeneration in joints with degenerative joint disease. If the lameness is severe or is chronic or the owners are reluctant to pursue conservative management, it may be beneficial to refer the case to an orthopedist or to use additional diagnostic tests such as nuclear scintigraphy (bone scans), computed tomography, magnetic resonance imaging, arthrocentesis, or arthroscopy. These techniques are only used if the site of the orthopedic problem has already been identified.

When investigating dog lamenesses, a significant part of the diagnostic work is done by gathering signalment and history, and by observing the animal, before palpation is started. With experience, a complete palpation of all four limbs can be conducted in a few minutes. Radiography can then be used to confirm the tentative diagnosis resulting from the previous steps of the examination.

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