



Ten Ways to Improve Your Orthopedic Examination

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Correctly diagnosing any orthopedic condition begins with completing a thorough orthopedic examination. In a stable patient, the orthopedic examination will include a full assessment of the musculoskeletal and neurologic systems. Radiographs and other specific diagnostic tests may also be included.

1 Signalment is Your Friend

The orthopedic examination can begin prior to assessment by considering the patient's signalment. The astute clinician will consider differential diagnoses based on:

- Age
- Breed
- Gender
- Presenting complaint.

For example, a 7-month-old German shepherd dog that presents with a 1-month history of slowly progressing weight-bearing forelimb lameness should have its elbows and shoulders examined for a variety of developmental juvenile orthopedic conditions, such as fragmented medial coronoid disease, ununited anconeal processes, osteochondrosis, and panosteitis.

Obviously, there are a number of other possible differential diagnoses. While it is prudent not to become overly focused, it is also important to remember that certain breeds and ages of dogs are at risk for specific conditions.

2 Use a Systematic Approach

History: The history obtained from the owner should include:

- Duration and persistence of clinical signs
- Whether 1 limb or multiple limbs are affected
- If certain activities exacerbate the signs
- Whether the patient is a pet or a working/competing animal.

Observation: Watching the animal move and observing its gait and behavior, either as it is walked or trotted by a handler or as it wanders around the examination room is an important part of ascertaining the location of the lameness.

Physical Examination:

- Palpate the animal while it is standing, beginning with the toes and moving proximal, evaluating each bone, joint, and ligament/tendon.
- Examine bilateral structures simultaneously to check for loss of symmetry, which can help detect abnormalities.
- See if the animal can sit and subsequently rise; a variety of conditions can prohibit normal, pain-free movement during these actions.
- Have the animal lay in lateral recumbency with the abnormal side down in order to palpate the normal limbs first. Assess for range of motion, evidence of pain or instability, joint swelling, long bone sensitivity, and any other pathologic abnormalities; then repeat the process on the abnormal side.
- Develop your own system/order of examination and repeat the same process for every patient, which ensures that nothing is forgotten or missed.

3 Understand the Goals of Orthopedic Examinations

The initial orthopedic examination serves as an extension of the physical examination, which should always be completed concomitantly.

Once you lay your hands on the dog or cat, completing an orthopedic examination is based on the detection of 2 fundamental findings:

1. Palpating pathologic abnormalities and/or eliciting pain from the manipulation and palpation of specific anatomic structures.
2. Detecting abnormalities or pain of a specific anatomic structure which then prompts performance of additional diagnostics, such as arthrocentesis or radiography.

Many veterinarians new to orthopedic concepts fear that they are not strong enough or have hands large enough to complete certain palpation maneuvers, especially in larger animals. Remember that rarely is diagnosis of a condition completely reliant on a single physical finding. For example, if you cannot adequately manipulate the stifle of a mastiff to assess the cranial cruciate ligament (CCL) for cranial drawer, you can palpate for stifle effusion, medial buttress, and pain upon flexion, all of which potentially indicate a ruptured CCL.

4 Perform a Neurologic Examination

Many sources of lameness and muscle atrophy are attributable to neurologic conditions, which must be distinguished from musculoskeletal conditions as they may require more immediate attention. Examples include cervical intervertebral disk herniation (forelimb lameness) and lumbosacral disease (hindlimb lameness).

The neurologic examination can be done after completing the orthopedic examination.



Figure 1. While supporting the dog under the chest, deeply palpate along the spine for any indication of spinal pain that could be consistent with intervertebral disk disease.

- Support the standing animal under the chest and pelvis during spinal palpation of the thoracic and lumbar spine, respectively.
- Assess for spinal hyperpathia by putting the head and neck through a range of motion (as long as they are not “neck guarding”), deeply palpating the thoracic and lumbar spine, and lifting the tail (**Figure 1**).

- Lift their hips and perform a lordosis examination, assessing for pain.
- Check conscious proprioception of all 4 limbs by knuckling the paws and examining the reaction (**Figure 2**).
- With the animal in lateral recumbency, assess the spinal reflexes, both myotactic and withdrawal.

The completion of these examinations is essential and will help diagnose neurologic conditions that may be the culprit behind lameness, atrophy, or ataxia.



Figure 2. Knuckling the paws over and observing the animal's response is a quick and easy assessment of the patient's conscious proprioception. Completing a neurologic examination simultaneous to an orthopedic examination distinguishes lameness that may be attributable to either source.

5 Use Sedation for Radiographs and Palpation

For fractious or painful animals, the orthopedic examination may be very stressful or painful. Sedation will allow a more complete examination. At this point, it is prudent to have an idea of what to look for because the focus will be on palpating for pathologic changes, including effusion, swelling, or instability.

If the suspected injury or condition has been narrowed down to a specific limb or joint following the examination, radiographs are usually required to confirm or narrow the list of potential diagnoses. There are numerous advantages to sedating a patient for radiographs including:

- Alleviation of stress resulting from restraint, which can be painful to the joint being radiographed.
- Prevention of movement, resulting in a higher likelihood of getting a well-positioned, accurately exposed radiograph with fewer attempts, reducing radiation exposure to everyone involved, including the patient.

Consult with an anesthesiologist for safe protocols and always monitor your patients closely while sedated for any signs of cardiovascular or respiratory compromise. Be ready to reverse the sedation or immediately establish an airway if needed.

A safe and effective reversible cocktail used at our hospital for both dogs and cats is dexmedetomidine (5 mcg/kg) and butorphanol (0.5 mg/kg). If

the animal is particularly painful, you can substitute morphine for the butorphanol and, if overly fractious, the dose of the dexmedetomidine can be doubled.¹

6 Practice Specific Palpation Maneuvers

Much of the orthopedic examination consists of palpating for pathologic changes, and a number of specific palpation maneuvers exist that are highly specific and sensitive to particular joints and conditions.

Examples include:

- **Stifle:** Palpating for cranial drawer (**Figure 3**) and tibial thrust for a ruptured CCL
- **Patella:** Palpating for instability through stifle flexion and extension
- **Coxofemoral Subluxation:** Assessment via the Ortolani and Barden's tests.



Figure 3. Palpating for drawer motion in a stifle suspected of possessing a ruptured CCL. This is 1 of several palpation maneuvers that should be practiced and then performed routinely on animals with hindlimb lameness since ligament ruptures are among the most common orthopedic injuries seen.

Proficiency and accuracy comes from experience and these maneuvers must be practiced regularly in order to distinguish what is normal versus abnormal. A good practice is to perform them on any sedated or anesthetized patient in your hospital (especially the Ortolani examination in young dogs that are under anesthesia for ovariohysterectomy).

Not only will you gain comfort and accuracy in executing the maneuvers, but you may also

diagnose preclinical hip dysplasia in more than a few dogs.

7 Repeat Radiographic Positioning Identically Every Time

Reading orthopedic radiographs is often pattern recognition. For example, when reading pelvic radiographs of a young dog for evidence of hip dysplasia, look for specific signs, including femoral head coverage, osteophytosis along the femoral neck, and remodeling of the femoral head.

It is essential that the pelvis is positioned straight

and in an identical fashion in every patient radiographed. In doing so, artifacts that present from a poorly positioned patient will not distract the practitioner from focusing on the signs of the suspected condition.

Similarly, always examine your films in the same orientation. In our hospital, we have a saying that “all dogs run to the left,” meaning that radiographs of all joints and long bones have the cranial view oriented to the viewer’s left (**Figure 4**). This way, the eye does not become confused by viewing differently oriented joints and bones, but rather can focus on signs of pathology instead.



Figure 4. Displaying lateral radiographs of the elbow and shoulder: all dogs run to the left (radiographically). Orienting your radiographs in the same direction every time increases the sensitivity of determining pathologic change.

8 Know What Radiographic Signs of Osteoarthritis Mean

When taking radiographs of a painful joint, the object inciting the instability is frequently not seen.

The perfect example is a stifle that has suffered a rupture of the CCL (**Figure 5**). The torn ligament and subsequent meniscal tears are not radiographically visible despite the fact that both are potential sources of lameness. Similarly, fragmentation of the medial coronoid process may not be specifically visualized on a radiograph of a young dog with elbow dysplasia.

What are noticeable in these cases; however,



Figure 5. Know the radiographic signs of osteoarthritis. In this radiograph of a canine stifle, we can see osteophytosis (green arrow), increased joint effusion (yellow arrow), and subchondral sclerosis (blue arrow), which have occurred secondary to a CCL rupture.

are the subsequent radiographic signs of secondary osteoarthritis. These include:

- Joint space narrowing
- Osteophytosis along the joint margin
- Joint effusion
- Subchondral sclerosis.

Dogs rarely get primary osteoarthritis of the major diarthrodial joints, so such changes are indicative of underlying pathology.² Cats, on the other hand, may develop primary osteoarthritis of these joints as they age, and do so frequently in the complete absence of an inciting cause.³ Thus, whereas osteoarthritic changes in a canine joint are secondary to another disease, similar changes in feline joints may simply be the result of the aging process.

9 Don't be Afraid of Arthrocentesis

Arthrocentesis is crucial for:

- Distinguishing arthropathies as suppurative or nonsuppurative via cytologic examination
- Obtaining synovial fluid for culture and susceptibility if septic arthritis is suspected.

Many veterinarians are afraid of “tapping” a joint for fear of doing damage to structures within. While this is a valid concern, with a little practice

and review of anatomy, arthrocentesis can be a straightforward and low-risk⁴ procedure.

- Practice good aseptic technique by shaving and scrubbing the skin with an antiseptic solution, wearing sterile gloves, and using sterile needles (22- or 25-gauge depending on the patient's size) and syringes.
- Be familiar with the anatomy of the joint in question to avoid major arteries, veins, nerves, and myotendinous structures.
- Palpate for the point of maximal joint distension and direct your needle there. For highly effusive joints (which constitute a large number of cases that require arthrocentesis), the capsule is distended with fluid and the area of greatest distension is frequently where the aforementioned structures you wish to avoid are not present. For joints that are less effusive, distension (the bulge) can be created by pressing on the opposite side of the joint.
- Once the needle is in, it may be redirected slightly or its depth altered if you are unable to withdraw fluid easily.
- Withdraw the needle if your sample becomes tinged with blood. The sample is still usable, but limiting blood contamination makes it easier to evaluate.



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interest is limb deformity correction, a topic which he lectures on nationally and internationally. Dr. Fox received his DVM from Michigan State University; then completed an internship and surgical residency at University of Missouri. He also received a PhD from University of Missouri in pathobiology (study of cartilage tissue engineering). Dr. Fox was the recipient of the Golden Aesculapius Teaching Award and the Pfizer Award for Research Excellence in 2006.

10 Pursue Advice & Continuing Education

Becoming proficient in orthopedics isn't just mastering fracture repair or arthroscopy. Rather, making early and accurate diagnoses and instituting appropriate medical management of orthopedic conditions is paramount to the long-term prognosis of the patient, especially if surgery is ultimately required. When in doubt, get help, either by calling for advice from a surgeon who specializes in orthopedic surgery or attending seminars or any number of continuing education opportunities available. ■

CCL = cranial cruciate ligament

References

1. Personal communication. Keith R. Branson, DVM, MS, Diplomate ACVA, University of Missouri.
2. Rychel JK. Diagnosis and treatment of osteoarthritis. *Top Companion Anim Med* 2010; 25:20-25.
3. Kerwin SC. Osteoarthritis in cats. *Top Companion Anim Med* 2010; 25:218-223.
4. Berg RIM, Sykes JE, Kass PH, Vernau W. Effect of repeated arthrocentesis on cytologic analysis of synovial fluid in dogs. *J Vet Intern Med* 2009; 23:814-817.