



# Taking the Lead on Orthopedic Examinations



Veterinary professionals have been trying to perfect the orthopedic examination for decades. Advanced imaging techniques (eg, infrared thermal imaging, computed tomography [CT] scans with 3D reconstruction) and diagnostic methods (eg, force plate or kinematic gait analyses) help considerably. However, despite these highly sensitive objective tools, veterinary technicians play an integral role in reaching a diagnosis.

## First Impressions

Veterinary technicians begin collecting vital information before the examination, first noting patient posture and behavior while greeting the client and then as the patient is escorted into the examination room (see **Patient Observation**). Stress prevention, which helps successful patient compliance, should also be-

gin before the veterinary technician, patient, and client enter the treatment room.<sup>1</sup> Using low-stress handling techniques (see **READ ALL ABOUT IT**, page 40) and allowing few diversions (eg, mats, water bowls, tables that move) in the examination room ensure a better experience and may improve the quality and reliability of examination findings.

## Show Where It Hurts

Orthopedic examinations are challenging and vary according to the examiner's expertise level, so it is critical that team members replicate examinations accurately in every patient.

Whether working in general practice or with a board-certified veterinary sports medicine and rehabilitation specialist, the team should be able to perform a standardized systematic physical examination and take a thorough history. Team members should also be knowledgeable about the underlying condition and its management to prevent omissions of important findings.<sup>2</sup>

Use simple, direct questioning during the evaluation (see **Patient History**).<sup>2</sup> Clients should always be asked to touch or point to the affected limb they think is causing the problem and to clearly state why the patient is being evaluated. While body systems are reviewed, behavioral and physical responses to pain, which vary from patient to patient, should be recorded. Responses may include body postures (eg, cowering, flattened ears) and facial expressions (eg, grimacing, narrowed eyes) and are usually the first clues to the patient's behavioral state.<sup>3</sup>

## Do We Speak the Same Language?

Orthopedic examinations can be difficult to interpret and require more than a basic understanding of animal anatomy and directional terms (see **Anatomic Locations**).<sup>4</sup> Each anatomic location has a bony prominence that serves as an attachment point for tendons or ligaments. Depressions house muscle bellies.

Bone, tendon, ligament, and even nerve interactions and composition are important for assessing joint motion in the fore- and hindlimbs. Joint motions are most commonly named according to the distal bone movement relative to the proximal bone. Normal joint motion involves both physiologic and the smaller, less observable accessory motion and is named by one body segment approaching or moving away from another body segment or movement of some referenced bony landmark.<sup>5</sup> Limb motion is usually described by motion of the joint rather than a body

## Anatomic Locations<sup>4</sup>

- **Forelimb:** Scapula, humerus, coronoids, radius, ulna, carpal bones, sesamoid bones
- **Hindlimb:** Ilium, ischium, femur, greater trochanter, patella, tibia, tibial tuberosity, fibula, sesamoid bones (ie, fabella), hock (ie, talus, calcaneus, central tarsal bone, tarsal bones I to IV), metatarsal bones
- **Spine:** Cervical, thoracic, lumbar, sacral, and coccygeal regions.

## Patient Observation

- Is the patient standing and holding a limb?<sup>16</sup>
- Is the patient sitting with his or her back supported by a wall or the client?
- Is equal weight distributed on all limbs or is weight being shifted to one region?
- How does the patient get up off the floor? Does he or she need assistance?
- Does the patient seem stiff initially but get better with exercise?
- Is there supination or pronation, varus, or valgus of a limb?
- How does the patient move on the practice floor and outside?
- Where is the head positioned at a stance, walk, and trot? Does it bob up or down? Does the patient hold more to one side? Perform a standardized lameness grading system.
- Is the tail limp or taut to one side of the body?

segment (see **Anatomic Definitions**, page 40).<sup>6</sup>

Assess objective measurements for joint motion with a goniometer (see **Figure 1**, page 40), which quantitatively records joint angles in degrees using specific bony landmarks for each joint.<sup>7</sup>

Assess muscle girth at standard anatomic sites using a tension tape device such as a Gulick tape measure, which differs from a regular tape measure by its tension device that provides reproducible measurements (see **Figure 2**, page 40). Use these measurements to determine muscle size, body composition, swelling, and other changes over time. Tension tape measurements provide baseline information used to monitor progress or severity of muscle loss<sup>8</sup> at the thigh and above and below the elbow. Measurements can be taken with the patient in a weight-bearing or nonweight-bearing position and should be recorded in

## Patient History<sup>2</sup>

### Ask the client:

- How long has the patient been lame?
- Which leg seems to be affected most (especially if more than one limb is affected)?
- Are signs worse at a particular time of day?
- Does the patient's lameness improve or worsen with exercise? If the patient can go on walks, how far can he or she go? Does he or she walk in continuous movements or need many rest stops?
- Is the patient in pain? (See **READ ALL ABOUT IT**, 2015 AAHA/AAFP Pain Management Guidelines for Dogs and Cats, page 40.)
- Can you describe the patient's home environment (eg, stairs, types of flooring, bedding, food)?
- What can the patient no longer do because of the lameness or injury (eg, sporting events, hiking, walks around the block)?
- What are the goals for the patient?



**Figure 1.** A goniometer is used to evaluate carpal flexion.



**Figure 2.** Thigh muscle girth is measured with a tension tape device.

Photos courtesy of Kristen L. Hager

## Anatomic Definitions<sup>6</sup>

- **Abduction:** Limb movement away from the midline
- **Adduction:** Limb movement toward the midline
- **Circumduction:** Movement at a joint during which a bone or body segment outlines the surface of a cone or circle
- **Extension:** The limb reaching out, a digit elongated, the back arched dorsally, and the neck arched ventrally
- **Flexion:** The limb retracted or folded, a digit bent, the back arched dorsally, and the neck arched ventrally
- **Pronation:** Internal limb rotation
- **Rotation:** Cranial aspect of the limb rotating toward the midline
- **Side bend:** By the trunk or head
- **Supination:** External limb rotation
- **Valgus & Varus:** Common deformities of many chondrodystrophic breeds that can be surgically corrected if caught early while growth plates are still open.

the original measuring position when rechecked.<sup>9</sup>

### Gait Examination

The veterinary team must work together to assess a patient's gait. Understanding normal gait patterns and proper handling techniques is critical before interpreting abnormal gaits or troubleshooting handler errors.

Dogs use 4 main gaits: the walk, trot, canter, and gallop<sup>10</sup> (see **Common Canine Gait Patterns**<sup>11</sup>). The amble and pace are also commonly used but are inefficient (in the author's experience) because of a lifetime of improper gait training by a handler or overall poor conditioning.

Dogs first think about putting their feet down in an ordered pattern and struggle most with the trot.<sup>12</sup> Early signs of hip dysplasia (eg, bunny hopping) may become evident at this trotting stage; catching hip dysplasia early allows clients to consider early

intervention procedures and make nutritional adjustments.<sup>13</sup>

When gaiting a patient, a controlled environment with no distractions will produce the most accurate movement analysis.<sup>14</sup> With the patient on a loose lead, the handler should move in a straight line and refrain from looking at the patient and causing inadvertent disturbances. Assess gaits on a firm, nonslippery surface, and observe the patient from the side and from behind, and as he or she moves toward and away from the examiner,<sup>15</sup> who should stand at a distance. The handler should walk and trot the patient by the observer at a constant speed. Depending on the patient, the client may be the best handler, but a veterinary technician is preferable.

### Team Take-Home Points

Orthopedic examinations are complex, and the veterinary team should have enough experience to properly interpret signalment, history, and



## READ ALL ABOUT IT

- 2015 AAHA/AAFP Pain Management Guidelines for Dogs and Cats. [https://www.aaha.org/professional/resources/pain\\_management.aspx#gsc.tab=0](https://www.aaha.org/professional/resources/pain_management.aspx#gsc.tab=0)
- Yin S. *Low Stress Handling, Restraint and Behavior Modification of Dogs & Cats: Techniques for Developing Patients Who Love Their Visits.* Davis, CA: CattleDog Publishing; 2009.


# Common Canine Gait Patterns<sup>11</sup>

- **Amble:** A gait pattern used when a dog is walking and speeding up gradually, giving the appearance of both limbs on the same side of the body moving together. As long as there are moments where 3 feet are on the ground, this gait is considered a fast walk that is normal, although not generally preferred. Dogs tend to use this gait when they are tired but want to move more quickly or when they are not fit enough to trot at a slow speed.
- **Canter:** A complex gait that should not be mistaken for lameness; dogs use 2 different styles of canter, causing a rolling appearance, particularly when viewed from behind.
- **Gallop:** Dogs use the power of their muscular, flexible spine, and abdomen, producing 2 moments of suspension.
- **Pace:** This gait is often seen when the ambling dog gradually speeds up; both limbs on the same side of the body move forward together so only 2 feet are on the ground, followed by a period of suspension. The pace is very inefficient because the center of gravity moves from side to side and the dog wastes effort centering the body instead of driving forward.
- **Trot:** The trot, where the diagonal and rear limbs move forward and strike the ground at the same time, is the best gait to determine lameness and the only one where the contralateral limb never assists the forelimbs and pelvic limbs in weight-bearing. It is also slow enough for the experienced human eye to observe stride length and foot placement.
- **Walk:** This is the slowest canine gait and the only one where the dog has 3 feet on the ground at times.

*Note: During an orthopedic examination, the veterinary technician would rarely observe a patient cantering or galloping and should not request such a speed.*

examination and gait assessment findings. The veterinarian relies on the veterinary technician to report accurate patient information, observations, and client interpretation of the presenting complaint.

Veterinary technicians who understand how to assess patient behavior, movement, posture, and gait patterns, and have a thorough knowledge of low-stress handling techniques, anatomy, and how to take accurate histories and objective measurements can be the lead caretaker of an orthopedic

patient from the moment he or she arrives at the practice. 

**Editor's note:** *Kristen Hagler has more than 10 years' experience with physical rehabilitation patients. She collaborates with veterinarians to develop disease- or performance-appropriate rehabilitation plans to keep patients at their optimal activity levels.*

## References

1. Albright J. Basic Science of Veterinary Rehabilitation. In: Millis DL, Levine D, eds. *Canine Rehabilitation and Physical Therapy*. 2nd ed. Philadelphia, PA: Elsevier; 2014;31.
2. Millis DL, Mankin J. Orthopedic and Neurologic Evaluation. In: Millis DL, Levine D, eds. *Canine Rehabilitation and Physical Therapy*. 2nd ed. Philadelphia, PA: Elsevier; 2014;180.
3. Albright J. Basic Science of Veterinary Rehabilitation. In: Millis DL, Levine D, eds. *Canine Rehabilitation and Physical Therapy*. 2nd ed.

- Philadelphia, PA: Elsevier; 2014;31.
4. Riegger-Krugh C, Millis DL, Weigel JP. Canine Anatomy. In: Millis DL, Levine D, eds. *Canine Rehabilitation and Physical Therapy*. 2nd ed. Philadelphia, PA: Elsevier; 2014;41-50.
5. Riegger-Krugh C, Millis DL, Weigel JP. Canine Anatomy. In: Millis DL, Levine D, eds. *Canine Rehabilitation and Physical Therapy*. 2nd ed. Philadelphia, PA: Elsevier; 2014;51-54.
6. Riegger-Krugh C, Millis DL, Weigel JP. Canine Anatomy. In: Millis DL, Levine D, eds. *Canine Rehabilitation and Physical Therapy*. 2nd ed. Philadelphia, PA: Elsevier; 2014;51-54.
7. Jaegger G, Marcellin-Little DL, Levine S. Reliability of goniometry in Labrador retrievers. *Am J Vet Res*. 2002;63(7):979-986.
8. Basic Science of Veterinary Rehabilitation. In: Millis DL, Levine D, eds. *Canine Rehabilitation and Physical Therapy*. 2nd ed. Philadelphia, PA: Elsevier; 2014;217-221.
9. Coates JC. Evaluation and Rehabilitation Options for Orthopedic Disorders of the Pelvic Limb. In: Zink CM, Van Dyke JB, eds. *Canine Sports Medicine and Rehabilitation*. Ames, IA: Wiley-Blackwell Publishing; 2013;299.
10. Zink CM. Locomotion and Athletic Performance. In: Zink CM, Van Dyke JB, eds. *Canine Sports Medicine and Rehabilitation*. Ames, IA: Wiley-Blackwell Publishing; 2013;20.
11. Zink CM. Locomotion and Athletic Performance. In: Zink CM, Van Dyke JB, eds. *Canine Sports Medicine and Rehabilitation*. Ames, IA: Wiley-Blackwell Publishing; 2013;21-24.
12. Zink CM. Locomotion and Athletic Performance. In: Zink CM, Van Dyke JB, eds. *Canine Sports Medicine and Rehabilitation*. Ames, IA: Wiley-Blackwell Publishing; 2013;25.
13. Roush JK. Surgical Therapy of Canine Hip Dysplasia. In: Tobias KM, Johnston SA. *Veterinary Surgery: Small Animal*. Vol 1. St. Louis, MO: Saunders; 2011;849-864.
14. Goff L, Crook T. Physiotherapy assessment for animals. In: McGowan CM, Goff L, Stubbs N, eds. *Animal Physiotherapy Assessment, Treatment and Rehabilitation of Animals*. Ames, IA: Wiley-Blackwell Publishing; 2007;147.
15. Moses PA, McGowan C. Neurological and muscular conditions. In: McGowan CM, Goff L, Stubbs N, eds. *Animal Physiotherapy Assessment, Treatment and Rehabilitation of Animals*. Ames, IA: Wiley-Blackwell Publishing; 2007;108.
16. The Physical Rehabilitation Evaluation. In: Millis DL, Levine D. *Canine Rehabilitation and Physical Therapy*. 2nd ed. Philadelphia, PA: Elsevier; 2014;211-213.