

## **Maximizing Success in the Lameness Examination – The Forelimb**

**Thomas Gibson BSc, BEd, DVM, DVSC, Diplomate ACVS, Diplomate ACVSMR,  
Grand River Veterinary Surgical Services, Cambridge, Ontario**

Detection of lameness in any limb regardless of forelimb or hindlimb requires a thoughtful approach that is systematic and repeatable. In order to be successful a thorough approach to history taking, recognition of signalment, a complete general physical examination, neurological examination and orthopedic examination are critical. Many people report that identification of forelimb lameness is more challenging but being systematic and thorough will lead to more success in making a diagnosis. Following examination, a careful evaluation of the patient's gait is also necessary. Setting expectations with the client regarding examination findings and what diagnostic steps are being proposed is also very important. Diagnostics take time, may require sedation and will add to the expense of the visit.

### *Signalment, Presenting Complaint and History*

In daily practice, we commonly see orthopedic problems and we can become very good at recognizing patterns. Age, breed, and gender all need to be considered when developing a list of differential diagnoses. A knowledge and understanding of what pathologies can occur at different ages and different breeds will help guide the formation of our list of differential diagnoses. This will in turn guide the diagnostics that will be most beneficial. This being said, we must avoid 'tunnel vision' and remember to consider why the owner has come to the clinic with their dog and what the presenting complaint is. In this day of competitive sporting dogs it may be that the dog's times are declining, it may be they don't want to turn a particular direction. Owner expectations are very important when proposing treatment for forelimb conditions as success rates following treatment can certainly vary.

The history and signalment often provide the starting point for identifying the underlying cause of the problem. Past history (trauma, surgery), limbs affected, duration and patterns, activities or times that exacerbate the signs and response to medication and treatments are all important considerations. Animals with a long lameness history may have seen several veterinarians and received multiple treatments. We must be cautious of bias when assessing these patients. Some people choose to remove this bias by performing their detailed examination before taking the history.

### *Patient Assessment*

Systematic assessment includes a complete physical exam, neurological examination and an orthopedic examination. Existing conditions and comorbidities must be considered. Neurologic disorders may be manifested as gait abnormality but may coexist with orthopedic problems making a thorough neurologic examination essential. Spinal palpation of the cervical, thoracolumbar and lumbosacral regions may explain the gait abnormality present.

### *Gait Analysis*

Lameness is a painful condition that leads to reduction in normal weight-bearing on the affected limb or limbs. A gait abnormality or mechanical lameness is an abnormal movement of one or more limbs during locomotion. Use of palpation and determining if range of motion is affected on a certain limb(s) may identify mechanical lameness. Objective measures (pressure mat, force plate) can determine if a true lameness is present. Dogs should be watched at a walk and trot on a surface providing good traction, towards and away from you, and perhaps from the side. A subjective scale is often used to grade the lameness. Grading can be used to monitor changes and/or response to treatment. Agreement can be a challenge with multiple observers. Assess the stance time, stride length, position of the limb through the swing and stance phases. Weight shifting, body shape and body position should be noted. A head bob or weight shifting to hind limbs may present with forelimb lameness. Certain typical gaits can be seen with pathology. Elbow abduction when standing or walking is often associated with elbow pathology. Manipulation of a joint such as being held flexion and extension may exacerbate lameness immediately after the joint is released.

### *Orthopedic Examination*

Orthopedic examination should be performed in a systematic, repeatable fashion. Often muscle symmetry and atrophy can be assessed while watching the dog move freely in the exam room during history taking. This can be fine-tuned with standing palpation and examination at the walk. Thorough examination while standing or in recumbency looking for effusion, pain with flexion or extension, heat and swelling should be performed with the aim of localization to a joint or particular region. The standing position may be best for accentuating muscle asymmetry. Joint effusion is often most apparent when weight bearing. The standing position will often reveal off loading of an affected limb. The typical approach is working from distal to proximal with examination of the affected leg last. Digits, pads, and interdigital tissue should be examined for evidence of foreign bodies, pad lesions, nailbed infections or neoplasias as all of these can cause profound lameness. Careful palpation of all joints is recommended looking for effusion, thickening, pain, crepitus, instability and loss of range of motion. An attempt should be made to isolate the joint being examined. Goniometry should be used if range of motion is reduced or increased. Long bone palpation between muscle and fascia should be performed. Flexion/extension, rotation and varus/valgus stress should be performed on all joints. Shoulder flexion and elbow extension will tighten the biceps mechanism allowing palpation of the biceps tendon in the intertubercular groove of the proximal humerus as a test for biceps tenosynovitis.

Certain circumstances will require palpation under sedation. This is often the case in painful or fractious patients. Sedation will often improve the quality of the orthopedic examination and dexmedetomidine +/- an opioid (butorphanol or hydromorphone) are protocols commonly used for examination +/- radiography, ultrasound, arthrocentesis or computed tomography (CT). Sedation also facilitates determination of the abduction angle of the shoulders to test for medial shoulder instability.

### Differential Diagnoses

The intention of the physical, neurological and orthopedic examination combined with the signalment and patient history is to formulate a list of potential differential diagnoses to explain the cause of lameness. The following table summarizes the common differential diagnoses for forelimb lameness in the dog.

Table 1 – Common Differential Diagnoses for Forelimb Lameness in the Dog

<b>Anatomic Location</b>	<b>Differential Diagnoses</b>
<b>Phalanges and Metacarpal</b>	<ul style="list-style-type: none"> <li>Pad laceration</li> <li>Foreign Body</li> <li>Damaged nail</li> <li>Nail bed neoplasia</li> <li>Luxation</li> <li>Fracture</li> </ul>
<b>Carpus</b>	<ul style="list-style-type: none"> <li>Carpal laxity syndrome</li> <li>Degenerative Joint Disease (DJD)</li> <li>Osteoarthritis</li> <li>Hyperextension injury</li> <li>Fracture</li> <li>Luxation</li> <li>Medial/Lateral instability</li> <li>Inflammatory arthropathies</li> </ul>
<b>Radius/Ulna</b>	<ul style="list-style-type: none"> <li>Hypertrophic Osteodystrophy (HOD)</li> <li>Hypertrophic Osteopathy (HOP)</li> <li>Angular limb deformity</li> <li>Panosteitis</li> <li>Neoplasia</li> <li>Fracture</li> </ul>
<b>Elbow</b>	<ul style="list-style-type: none"> <li>Osteoarthritis</li> </ul>

	<ul style="list-style-type: none"> <li>Fragmented coronoid process (FCP)</li> <li>Ununited anconeal process (UAP)</li> <li>Osteochondrosis dissecans (OCD)</li> <li>Luxation/Subluxation</li> <li>Fracture</li> <li>Radioulnar incongruity</li> <li>Neoplasia</li> <li>Inflammatory arthropathies</li> <li>Septic arthritis</li> </ul>
<b>Humerus</b>	<ul style="list-style-type: none"> <li>Panosteitis</li> <li>Neoplasia</li> <li>Fracture</li> </ul>
<b>Shoulder</b>	<ul style="list-style-type: none"> <li>Osteoarthritis</li> <li>Osteochondrosis dissecans (OCD)</li> <li>Luxation/Subluxation</li> <li>Fracture</li> <li>Neoplasia</li> <li>Biceps tendinopathy</li> <li>Supraspinatus tendinopathy (ST)</li> <li>Infraspinatus contracture</li> <li>Medial shoulder instability</li> <li>Septic arthritis</li> </ul>
<b>Scapula</b>	<ul style="list-style-type: none"> <li>Luxation</li> <li>Fracture</li> <li>Neoplasia</li> <li>Neurogenic muscle atrophy</li> </ul>

## *Diagnostic Tests for the Forelimb*

The following is a list of commonly used diagnostic tests and techniques for diagnosis of forelimb lameness.

Table 2 – Common diagnostic tests and techniques

<b>Test</b>	<b>Specific utility</b>
<b>Radiographs</b>	Plain, stressed, skyline, oblique – instability, tendinopathies Fracture diagnosis
<b>Musculoskeletal Ultrasound</b>	Shoulder – biceps and supraspinatus tendinopathies Brachial plexus tumours
<b>Advanced Imaging - CT/MRI</b>	Fractures (CT) Elbow disease – FCP, Incongruity, OCD (CT) Shoulder OCD (CT) Medial glenohumeral instability (MRI) Cervical disc disease
<b>Arthrocentesis</b>	Inflammatory arthropathies – IMPA Degenerative joint disease Septic arthritis

### *Summary*

Diagnosis and management of forelimb lameness in dogs is often a challenge for even the experienced clinician. Clients should be made aware of this during initial discussion and expectations following interpretation of diagnostic findings should be outlined. Is medical or surgical treatment an option for the patient and client? What is the prognosis? Results of diagnostic tests should always be considered along with history and physical examination findings to determine if the lameness makes sense in light of the results. These challenging lameness cases require systematic and sometimes time consuming workups that may involve multiple visits, treatment trials, complex imaging or exploratory surgery to confirm the diagnosis.