What Is The Evidence?

Problem

A 5-year-old male Labrador Retriever weighing 29.1 kg (64 lb) was referred to the University of Missouri Veterinary Medical Teaching Hospital for evaluation of lameness of the right forelimb. The dog was used for hunting purposes but was also considered a family pet. The owner reported a slight decrease in duration and quality of the dog’s athletic performance over the past year, with a definite lameness beginning approximately 6 weeks before the referral, after the dog had jumped down into a stream while hunting. Physical and orthopedic examinations revealed the dog was in good body condition (score of 5 on a 9-point scale) and had moderate weight-bearing lameness (grade of 3 on a 5-point scale) and asymmetric forelimb muscle mass with the right brachial muscles appearing atrophied in relation to the left brachial muscles. Results of neurologic examination were unremarkable. No evidence of pain was detected during palpation and manipulation of the shoulder, elbow, and carpal joints of either forelimb, and no other abnormalities were detected.

The dog was sedated with xylazine and morphine to allow for orthopedic palpation of the forelimbs and radiography of the shoulder and elbow joints. While the dog was sedated, shoulder-joint abduction angles were measured as 34° on the right and 31° on the left; no shoulder-joint drawer sign or mediolateral instability was apparent in either limb. Radiographs of the shoulder joints and left elbow joint were unremarkable. Radiographs of the right elbow joint revealed sclerosis at the base of the semilunar notch of the ulna and a loss of a distinct silhouette of the medial coronoid process of the ulna. A presumptive diagnosis was made of fragmentation of the medial coronoid process of the right ulna with radiographic signs consistent with early osteoarthritis.

The owner expressed a desire to pursue comprehensive diagnostic assessment to determine optimal treatment for the dog, with a primary goal of relieving the pain and lameness and a secondary goal of returning the dog to hunting. The owner’s decision was not limited by financial costs. Options for additional diagnostic procedures for determining the definitive location and cause of the forelimb lameness were discussed with the owner and included ultrasonography, computed tomography, magnetic resonance imaging, nuclear scintigraphy, and diagnostic arthroscopy of the elbow joint, shoulder joint, or both.

Formulation of the Clinical Question

The problem identified was unilateral forelimb lameness. Signalment, history, examination results, and radiographic findings did not allow for a definitive diagnosis to be made such that a clear treatment plan and prognosis for return to full athletic function could be communicated to the owner. The supervising clinician believed it was imperative to provide the owner with more information regarding the source and severity of the problem prior to any invasive diagnostic or surgical procedures.

Clinical Question

Which diagnostic test or tests provide the most clinically useful information for identifying the source of forelimb lameness in dogs prior to surgery?

Evidentiary Search Strategy

Given the supervising clinician’s familiarity with the clinical and research aspects of forelimb lameness in dogs, a practical and efficient evidence-based approach to decision making was undertaken by means of a targeted literature search for the most recent and pertinent articles on the subject of suitable diagnostic methods. The PubMed electronic database of medical literature published between 1948 and August 2008 was searched with the keywords canine, forelimb, and arthroscopy for elbow joint incongruity) were be

On the basis of the abstract review, 5 articles were identified as having potential relevance for clinical decision making in the present scenario: 1 report of a prospective study in which the question of diagnostic value of assessments of forelimb lameness was directly addressed, 2 reports of the diagnostic value of assessments of shoulder joint instability, and 2 review articles. A more broad or more narrow search could have provided more evidence for review on this topic. However, reports of studies conducted to evaluate orthopedically normal limbs, single diagnostic tests (eg, synovial fluid analysis), or a specific forelimb disorder (eg, comparison of radiography, computed tomography, and arthroscopy for elbow joint incongruity) were believed unlikely to provide data that would allow for the most efficient or accurate diagnosis in a busy clinical setting for the type of forelimb lameness detected in the dog of this report. Therefore, such reports were not included in the review of pertinent evidence.

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Review of the Evidence

The evidentiary value of articles was evaluated by use of a ranking system based on type of study design. The articles chosen to help answer the clinical question provided level 3 (case-control studies) and level 4 (case series studies) evidence and therefore offered weak evidence for broad application to clinical scenarios. The strongest evidentiary value was found in the 2 clinically based studies. However, both of these studies were considered level 3 studies in that the control and cohort groups were not comprehensive or free from selection bias, the diagnostic tests assessed did not have validated reference standards to which their performance could be compared, and long-term follow-up assessments of functional outcomes were not performed. Whereas these clinical studies provided the strongest evidence for clinical decision making at the time the search was performed, cautious application of the findings to the patient and honest communication of the findings to the client were necessary.

Evidence gathered from the literature suggested that the biceps tendon test, evaluation for a shoulder joint cranial drawer sign, measurement of joint abduction angles, and the medial-lateral joint instability test can be useful in determining the presence or absence of shoulder-joint disease in dogs. It also suggested that ultrasonographic evaluation of the shoulder joint is clinically useful for ruling in and ruling out diseases other than those associated with the subscapularis tendon, medial glenohumeral ligament, or lateral glenohumeral ligament and that radiographic evaluation of the elbow joint is useful for clinical decision making in dogs with forelimb lameness. Specifically, radiographs have high sensitivity and specificity for detecting causes of forelimb lameness associated with elbow joints, and abduction angles and results of ultrasonography have high probabilities of predicting joint instability and pathological changes in soft tissue and the cranial compartment of shoulder joints, as measured by positive likelihood ratios.

Ancillary sources of information, including veterinary textbooks, review articles, and reports from the human literature as well as the authors' clinical experiences, suggested that computed tomography and magnetic resonance imaging are also clinically useful for determining the presence, nature, and severity of pathological changes in canine elbow and shoulder joints. Importantly, whereas diagnostic arthroscopy of shoulder and elbow joints is considered the clinical gold standard for determining the presence of intra-articular pathological change in dogs, it is a surgical procedure requiring anesthesia, does not allow for determining extra-articular sources of lameness, and is not always conclusive because arthroscopic pathological change in elbow joints is common when shoulder joint disease is diagnosed and vice versa.

Given the aforementioned evidence, what decision would you make?

Clinical Decision and Outcome

On the basis of the published evidence examined and the supervising clinician's clinical experience, ultrasonography of the right shoulder joint was performed. No abnormalities were detected during assessment of the supraspinatus, infraspinatus, and teres minor muscles; biceps tendon of origin; subscapularis tendon of insertion; medial glenohumeral ligament; and contours of the articular surfaces of the glenohumeral joint. Magnetic resonance imaging of the right forelimb to include the elbow and shoulder joints and the brachial plexus and diagnostic arthroscopy of the right shoulder and elbow joints were discussed as options in the diagnosis and treatment of the dog. The owner opted for diagnostic arthroscopy on the basis of the dog's signalment and history, examination findings (including the lack of neurologic abnormalities, the presence of radiographic pathological change in the right elbow joint, the lack of pathological change in the shoulder joint detected via palpation, radiography, and ultrasonography), and the desire to treat relevant pathological change as expeditiously and comprehensively as possible. Performance of only elbow-joint arthroscopy was discussed with the owner, but because the evidence suggested that arthroscopic pathological change can exist in the absence of clinical, radiographic, and ultrasonographic abnormalities; a definitive diagnosis for the cause of the lameness had not been identified; and diagnostic arthroscopy of the shoulder joint is associated with little or no morbidity, the owner opted to be as comprehensive as possible in obtaining a definitive diagnosis and treatment.

Arthroscopic evaluation of the right shoulder joint revealed no evidence of pathological change. Arthroscopic evaluation of the right elbow joint revealed fragmentation (slab fracture) of the lateral portion of the medial coronoid process of the ulna, grade 1 (on a 4-point scale) pathological change in the articular cartilage on the apposing surface of the medial aspect of the humeral condyle, and focal craniomedial compartment synovitis. This was determined to be the most likely source of lameness in the dog and was treated by arthroscopic removal of the fragmented portion of the coronoid process and debridement of the medial aspect of the coronoid process.

Immediately after surgery, the dog was treated with an NSAID and tramadol. The day after surgery, it was discharged from the hospital with instructions to the owner for routine incision care, and directions to take the dog for short-leash walks outdoors for urination and defecation only and confine it when unobserved for 3 weeks. After this initial period, the owner was instructed to allow the dog to return to full function by progressively increasing the duration, frequency, and intensity of activity over the subsequent 6 weeks.

The dog was reexamined by the supervising clinician 8 weeks after surgery. At that time, the dog had slight effusion of the right elbow joint and mild (grade 1/5) weight-bearing lameness of the right forelimb. The right brachial muscle mass was subjectively larger than before surgery, and the owner reported that the dog’s strength, degree of activity, and endurance had improved. Nine months after surgery, the owner re-
ported that the dog was doing well, with no lameness evident during daily activities. It had also returned to hunting with occasional lameness and signs of soreness after full days of hunting, which responded to rest and NSAID treatment.

**Discussion**

At this point in the progression of evidence-based medicine in veterinary orthopedics, so-called current best evidence for clinical decision making will almost invariably involve the synthesis of peer-reviewed articles, review articles, and textbooks as well as clinical experience of the clinician and those consulted. This is particularly true in dogs with forelimb lameness because validation of diagnostic and therapeutic modalities is in its infancy. Forelimb lameness in dogs is a difficult clinical situation with respect to definitive localization and determination of the true and complete source or sources of pain and lameness. As such, each component of forelimb function, including the nervous system, bones, and musculotendinous and intra- and extra-articular tissues, needs to be carefully evaluated as a potential cause. It seems apparent from review of the current literature that the cause of forelimb lameness is often attributed to pathological changes identified in the shoulder or elbow joints on the basis of subjective diagnostic findings, without substantiation by comprehensive assessment, correlation of multiple diagnostic findings, or validated tools for evaluating outcomes after interventions. Therefore, it is essential that clinicians attempt to comprehensively assess forelimbs for all pathological changes present through evaluation of patient history and performance of a complete orthopedic examination, joint-specific palpation, radiography, arthroscopy, and advanced imaging and to carefully follow outcomes to make optimal decisions and add to the collective database of evidence in this arena. This highlights the need for prospective clinical studies in which standardized and validated outcome measures are used so that clinical decision making for cases of forelimb lameness in dogs includes application of high-level, relevant evidence by the individual clinician treating the individual patient and informing the client in the optimal manner.

**References**