# ARTHROSCOPIC DIAGNOSIS IN CANINE JOINT DISEASE

Ingrid Gielen, DVM, PhD, MSc

Department of Medical Imaging & Small Animal Orthopaedics,
Faculty of Veterinary Medicine,
Ghent University, Belgium.
Email: ingrid.gielen@ugent.be

## Introduction

The history of musculoskeletal imaging began with Roentgen's discovery of X-rays in 1895. Plain radiography has since become the initial, and in many cases, the only imaging modality for the diagnosis and follow up of orthopaedic disease. A wide range of imaging options is now available but the "perfect" imaging protocol does not exist because imaging parameters will be both patient and disease specific. Radiography, ultrasonography, scintigraphy, CT or MRI may be used alone or in any combination. The protocol finally selected will depend on the history, clinical findings and the questions that should be addressed by the examination. Other important criteria include the strengths and limitations of the modality in question, of course whether or not the modality is available on site, radiation hazards and other safety issues. Economic considerations will also have to be taken into account.

The introduction and systematic use of arthroscopy in small animal orthopaedics really revolutionised the diagnosis and treatment of joint lesions. Arthroscopy is a minimal invasive technique allowing perfect visualisation of intra-articular structures in much more detail than exploratory arthrotomy. The development of arthroscopy in small animal surgery has lagged behind that of the human and equine fields because of the lack of instrumentation for small joints, cost of equipment, and scepticism regarding its practicality and efficacy. The application of arthroscopy to the relatively small joints of the dog has been made possible through the development of small joint arthroscopy equipment, but the appropriate expertise has to be elaborated by the surgeon by extensive training with a steep learning curve. The drawback of arthroscopy is probably that only the surface of articular structures can be assessed and that in inflamed joints the visibility can be reduced due to inflammatory changes like extensive production of synovial villi. This mainly causes problems in evaluating the stifle joint. Arthroscopically assessment of subchondral lesions is not possible if the overlying cartilage is intact. For this reason the combination of computer tomography (CT) and arthroscopy is in our opinion the ideal combination to evaluate joint disease especially within **the elbow**. In the elbow OC lesions can be picked up earlier with CT and arthroscopically. Although in the elbow joint flexor tendon enthesopathy can be picked up arthroscopically, in this type of disease CT (after iv. contrast) and /or MRI are beneficial in the final diagnosis. In picking up coronoid disease CT has been proven to be an excellent technique almost as efficient and accurate as arthroscopy. The use of arthro-CT looks very promising in evaluating cartilage lesions in medial compartment syndrome and correlates well with the arthroscopic findings.

In **the shoulder** joint most pathologies like OCD and a large number of bicipital lesions can be evaluated with radiography and arthrography. Ultrasound, in the hands of experienced users, can be an excellent technique to assess shoulder lesions. The advantage of arthroscopy is that direct inspection of OCD- and biceps lesions can be performed and be treated afterwards. Due to the minimal invasive nature of the technique bilateral lesions can be treated within the same surgical intervention. Avulsion or incomplete fusion of the caudal glenoid ossification centre of the scapula is an indication for arthroscopic evaluation. In these cases arthrography and CT can be of help to decide if the fragment is loose in the joint capsule and causes inflammation and pain. Then the fragment is arthroscopically loosened from the joint capsule and removed. If one wants to evaluate the surrounding soft tissues MRI is superior to arthroscopy. MRI- and CT-arthrography are promising in the evaluation of the glenohumeral ligaments if shoulder instability is suspected.

Arthroscopy of **the stifle** joint is technically more demanding as elbow and shoulder joints. The limited joint space and usually accompanying inflammation hinders the joint inspection. Adequate visualisation requires the use of a motorized shaver and electrocautery by radiofrequency, as well as flow management with more fluid and higher pressure. Indications for stifle arthroscopy are partial cranial cruciate rupture, meniscal lesions and OCD lesions. Especially assessment of meniscal damage remains challenging even with MRI and arthro-CT. CT is very useful to assess avulsion fractures of the cranial- and caudal cruciates, the popliteus tendon and extensor digitorum longus tendon mostly in young animals. In these cases arthro-CT is useful to assess fragment stability.
Arthroscopy of the **tarsocrural** joint is a demanding technique allowing assessment of the joint cartilage, the synovial membrane and treating OCD lesions. Lesions can affect the medial (75%) or lateral (25%) talar ridge. Prior to the arthroscopic treatment, CT examination allows us to evaluate the exact location, size, and number of fragments of the OCD defects. Depending on the location of the fragments a plantar or a dorsal approach of the tarsocrural arthroscopic intervention is decided. CT-arthrography can be used to assess fragment stability.
Within the **hip** joint, arthroscopy can be used to evaluate the status of the dorsal acetabular rim which should be intact if a TPLO is envisaged. Also CT can be used for this evaluation. With the use of arthroscopy the round acetabular ligament can be visualised as well as the articular cartilage.
Indications to arthroscopically examine the **carpal** joint are cartilaginous traumatic lesions.

**Suggested reading**


Bergenhuyzen, Alain, Kathelyn Vermote, Henri van Bree, and Bernadette Van Ryssen. 2010. Long-term Follow-up After Arthroscopic Tenotomy for Partial Rupture of the Biceps Brachii Tendon. Veterinary and Comparative Orthopaedics and Traumatology 23 (1): 51–55.

Bottcher B, Bruhschwein A, Winkels Ph, et al. Value of Low-Field Magnetic Resonance Imaging in Diagnosing Meniscal Tears in the Canine Stifle: A Prospective Study Evaluating Sensitivity and Specificity in Naturally Occurring Cranial Cruciate Ligament Deficiency with Arthroscopy as the Gold Standard. Vet Surg 2010, 39: 296–305.

de Bakker, Evelien, Ingrid Gielen, Kaatje Kromhout, Henri van Bree, and Bernadette Van Ryssen. 2014. Magnetic Resonance Imaging of Primary and Concomitant Flexor Enthesopathy in the Canine Elbow. Veterinary Radiology & Ultrasound 55 (1): 56–62.

de Bakker, Evelien, Ingrid Gielen, Annemie Van Caelenberg, Henri van Bree, and Bernadette Van Ryssen. 2014. Computed Tomographic Findings of Canine Elbow Joints Affected by Primary and Concomitant Flexor Enthesopathy. Veterinary Radiology & Ultrasound 55 (1): 45–55.

Gielen I, van Bree H, Van Ryssen B, De Clercq T, De Rooster H. Radiographic, computed tomographic and arthroscopic findings in 23 dogs with osteochondrosis of the tarsocrural joint. Vet Rec. 2002: 150; 442-447.

Ingrid Gielen, Jimmy Saunders, Bernadette Van Ryssen, Henri van Bree.
Advances in the Canine Cranial Cruciate Ligament, Editor: Peter Muir, Wiley-Blackwell, 2010. Computed tomography of the stifle, Chapter 20, p. 123-133.

Samii VF, Dyce J. Computed tomographic arthrography of the normal canine stifle. Vet Radiol Ultrasound. 2004, 45: 402-406.

van Bree H. Comparison of diagnostic accuracy of positive-contrast arthrography and JAVMA 1993: 203; 84-88.

van Bree, Henri, Ingrid Gielen, Jimmy Saunders, and Bernadette Van Ryssen. 2003. Computed Tomographic (CT) Features of Elbow OCD Compared with Radiography and Arthroscopy. Veterinary Radiology & Ultrasound, 44:371–371.

Vandevelde B, Van Ryssen B, Saunders JH, Kramer M, Van Bree H. Comparison of the ultrasonographic appearance of osteochondrosislesions in the canine shoulder with radiography, arthrography, and arthroscopy. Vet Radiol Ultrasound. 2006;47:174-184.

Van Ryssen, B, Henri van Bree, and Stefaan Missinne. 1993. Successful Arthroscopic Treatment of Shoulder Osteochondrosis in the Dog. Journal of Small Animal Practice 34 (10): 521–528.

B Van Ryssen, H van Bree, Ph Vyt: Arthroscopy of the shoulder joint in the dog. Journal of the American Animal Hospital Association 1993, 29, 101-105.

B Van Ryssen, H van Bree, Ph Vyt: Arthroscopy of the canine hock joint. Journal of the American Animal Hospital Association 1993, 29, 107-115.

B Van Ryssen, H van Bree, P Simoens: Elbow arthroscopy in clinically normal dogs. American Journal of Veterinary Research 1993, 54, 1, 191-198.

Van Ryssen, B, and Henri van Bree. 1997. Arthroscopic Findings in 100 Dogs with Elbow Lameness. Veterinary Record 140 (14): 360–362.

Wall CR, Cook CR, Cook JL. Diagnostic sensitivity of radiography, ultrasonography, and magnetic resonance imaging for detecting shoulder osteochondrosis/osteochondritis dissecans in dogs. Vet Radiol Ultrasound. 2014 May 21. doi: 10.1111/vru.12179.