



DIAGNOSTIC AND SURGICAL ARTHROSCOPY IN DOGS

Dr. Jean-François Bardet
DVM, MS, DipECVS

Veterinary Clinic
32 rue Pierret
92 200 Neuilly Sur Seine
France

AUTHOR'S PROFILE

Dr. Bardet graduated from the Ecole Nationale Vétérinaire de Toulouse, France, in 1975. From 1977-1981 he was a Resident, and from 1981-1982 Assistant Professor of Orthopaedics, at Ohio State University, Columbus, USA. He is also a Post-doctoral graduate from Colorado State University, and a former Associate Professor of Surgery, Maisons-Alfort, Paris, France. Dr Bardet is a Founder, & Past President of the European Society of Veterinary Orthopaedics and Traumatology (E.S.V.O.T), President of the French Society of Veterinary Surgery, member of the American Society of Orthopaedic Research, an AO Vet. member, a member of the Société Française d'Orthopédie et de Traumatologie and is a Diplomat of the European College of Veterinary Surgery. He runs a specialist surgical referral clinic in Neuilly sur Seine near Paris and is a well known speaker at orthopaedic veterinary congresses.

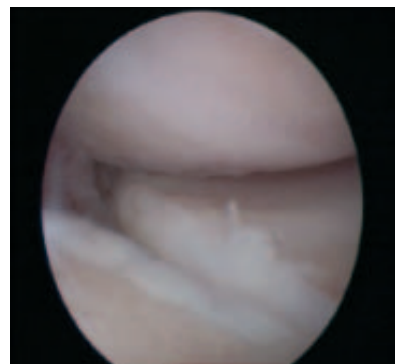
INTRODUCTION

Major advances in veterinary arthroscopy in both the diagnosis, and treatment, of joint pathology have been made in during the past 15 years. Its use has now become commonplace for canine joint disease. The goal of this article is to review the most common uses of arthroscopy in the main joints.

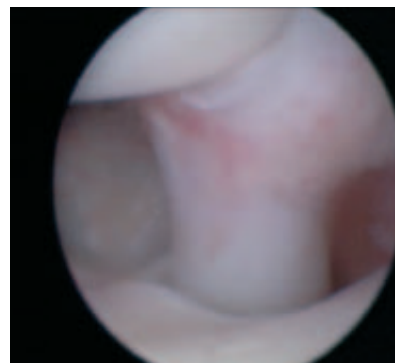
HISTORY OF VETERINARY ARTHROSCOPY

The first use of arthroscopy in European veterinary surgery occurred in horses, and by the mid-1980s, arthroscopy in equine surgery was becoming commonplace. Today, arthroscopy for the diagnosis and treatment of equine orthopaedic diseases is well accepted and routine.

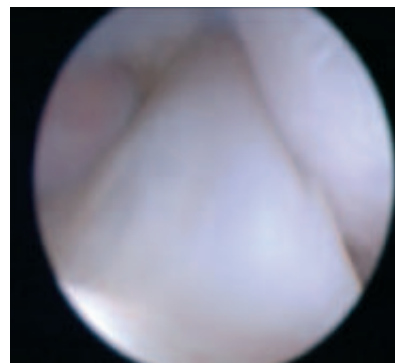
The development of arthroscopy in small animal surgery has lagged behind that of the human and equine fields because of the lack of instrumentation for small joints, cost of equipment, and skepticism regarding its practicality and efficacy. The initial description of the use of an arthroscope in dogs was done by Siemering, who reported findings of stifle arthroscopies and concluded that the instrumentation was useful in the diagnosis of diseases of the canine stifle joint. At about the same time, Bennett and Kivumbi from the United Kingdom reported the usefulness of arthroscopy for the canine stifle joint. Techniques in small animal arthroscopy were substantially advanced by the work of Pearson who reported the technique of arthroscopy of the canine stifle, shoulder, and coxofemoral joint and described the first successful use of arthroscopy in the treatment of osteochondritis dissecans (OCD) of the shoulder. Since that time, the field of small animal arthroscopy has developed through



medial arthroscopic view of an elbow with eburnation of the medial coronoid process (MCP) and medial humeral condyle. Eburnation = degeneration of bone into a hard, ivorylike mass, which occurs at the articular surfaces of bones in osteoarthritis.



normal arthroscopic image of the biceps tendon



normal cranial cruciate ligament

publications in Europe and the United States of advanced techniques, the development of instrumentation specifically designed for small animal arthroscopy, and the establishment of practical demonstration courses worldwide.

ADVANTAGES, DISADVANTAGES AND COMPLICATIONS OF ARTHROSCOPY

The advantages, disadvantages, and complications are summarised in table 1. Arthroscopy is a minimally invasive technique which permits a thoughtful and detailed inspection of all the major joints in dogs.

ADVANTAGES

- Decreased patient morbidity (decreased hospitalisation and post-operative costs)
- Simultaneous treatment of several joints
- Minimal invasiveness (reduced post-operative pain and soft tissue damage)
- Quick patient recovery and return to function
- Less scarring
- Periodic re-evaluation of the joint is possible
- Improved visualisation of intra-articular surfaces and structures
- Reduced surgical risk of infections and complications
- Video connection allows visualisation and is useful for teaching

DISADVANTAGES

- The equipment is expensive and fragile
- Training is required
- The arthroscope and instruments are difficult to manipulate in small joint spaces

COMPLICATIONS

- Extravasation of fluid in the surrounding soft tissues
- Iatrogenic damage to the articular cartilage
- Obstruction of view by haemorrhage, hyperplastic villi, or the fat pad
- Neurologic injury

Table 1. Advantages, disadvantages and complications of arthroscopy

The considerable magnification of joint structures, alongside the mobility of the instruments within the joint space, permits accurate observation of intra-articular structures and their pathological changes. Arthroscopy can reveal discrete or early articular lesions when radiography fails to demonstrate evidence of disease.

There is little morbidity and minimal risk of complications. The two greatest disadvantages of small animal arthroscopy are the cost and care of the equipment and the training and experience required for practical application. In summary arthroscopy results in less surgical morbidity, less post-operative pain and faster recovery compared with arthrotomy, and multiple joints can be treated on the same day.



Understanding and selecting arthroscopic equipment are both vital to the success of arthroscopy. Of primary importance is the quality of the optical system. The equipment must be able to provide an excellent image to enable precise inspection, diagnosis, and therapy. The quality of observation is supported by appropriate fluid control. The establishment and maintenance of adequate fluid flow during the procedure are necessary to maintain observation. This depends on the ingress and egress (inflow and outflow) system and the gravity, or fluid pump, system.

Finally, success in biopsy or therapy requires small, high-quality hand instruments. Proper selection and care of the appropriate equipment enable years of reliable service. The modern arthroscope consists of a telescope and eye-piece. The telescope contains a series of fibre optic cables that carry light into the joint and a tubular lens that carries the image back to the eyepiece. Arthroscopes are differentiated by their outer diameter (i.o. 2.4, 2.7mm and larger), length (short, long), and angle in degrees (0°, 30°, 70°).

Arthroscopes in common use in small animal arthroscopy include any of the diameters and lengths listed; most have a 30° angle. The diameter applies to the telescope portion alone and does not include the diameter of the arthroscope cannula that is necessary for use. The selection of diameter is based on the size of

the joint and the surgeon's preference; larger scopes provide more rigidity and greater field of view, and smaller scopes cause less trauma and have greater mobility.

PERFORMING ARTHROSCOPY

Whereas it is possible to perform arthroscopy directly through the eyepiece of the arthroscope, it is generally impractical. The image of the arthroscope is conveyed to a television monitor through a digital camera that is attached to the eyepiece. Cameras are available with one or three chips and must be used with a specific camera box that processes the image for the television screen. For general use, one-chip cameras provide excellent resolution and recording capabilities, and three-chip cameras are generally necessary only for higher end video or still-image work. Medical-grade monitors are recommended to provide a bright, clear, and accurate image.

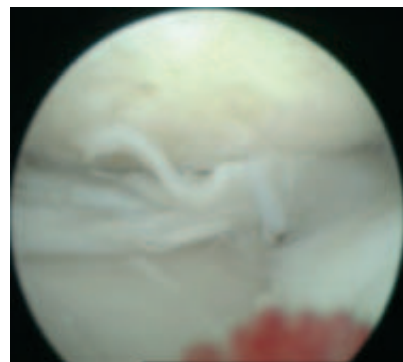
Lighting within the joint is provided by a light source and is directed to the joint by a light cable attached to the fibre optics within the arthroscope.

Hand instruments include probes, knives, curettes and forceps. The most commonly used probes are right angled. Numerous styles of knives and curettes are available for manipulation of soft tissue.

The most common forceps used in small animal arthroscopy are graspers for removal of hard or soft tissues and biters, baskets, and punches for debridement of soft tissues.



arthroscopic view of a torn biceps tendon



view of a torn medial meniscus

SHOULDER

- Osteochondritis dissecans (OCD)
- Diagnostic examination (i.e. biopsy of bone, cartilage, or synovial membrane)
- Shoulder instability (i.e. joint capsule or ligament tears)
- Incomplete fusion of the caudal glenoid ossification center
- Cartilage fracture
- Reduction and stabilisation of a supraglenoid tuberosity avulsion
- Intra-articular fractures
- Bicipital tenosynovitis
- Septic arthritis

ELBOW

- OCD
- Fractured medial coronoid process (FMCP)
- Ununited aconeal process (UAP)
- Treatment of severe degenerative joint disease associated with elbow dysplasia
- Fractures of the humeral condyle, with closed reduction and fixation
- Diagnostic examination (biopsy of bone, cartilage, or synovial membrane)
- Septic arthritis

CARPUS

- Evaluation of ligamentous damage
- Intra-articular fractures, and removal of small bone chips
- Carpus instability
- Diagnostic examination (biopsy of bone, cartilage, or synovial membrane)
- Septic arthritis

Table 2. Diagnostic and surgical applications of arthroscopy in the fore limb of dogs

COXOFEMORAL

- Hip dysplasia (pre- and post-operative assessment of a triple pelvic osteotomy; TPO)
- Osteoarthritis
- Hip dislocation
- Post-traumatic hip pain
- Diagnostic examination (i.e. biopsy of bone, cartilage, or synovial membrane)
- Septic arthritis

STIFLE

- OCD lesions of the lateral and medial femoral condyle
- Injuries of the cranial cruciate ligament: pre-operative cruciate ligament evaluation, cruciate repair failure evaluation
- Injury of the caudal cruciate ligament
- Meniscal examination and treatment (i.e. meniscectomy, meniscal release)
- Long digital extensor or popliteal ligament avulsions
- Repair and debridement of avulsion fractures of the cranial cruciate ligament and caudal cruciate ligament
- Foreign body
- Osteoarthritis
- Acute trauma of the stifle
- Acute traumatic medial patellar luxation and grade 1 and 2 patellar luxation
- Diagnostic examination (i.e. biopsy of bone, cartilage, or synovial membrane)
- Septic arthritis

TARSUS

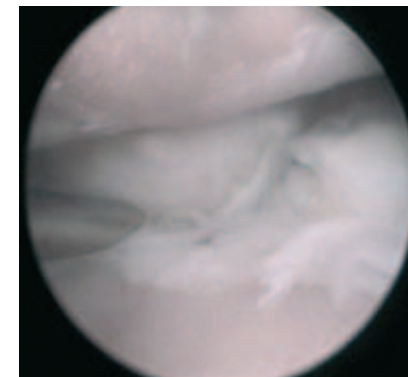
- OCD
- Malleolar and intra-articular fractures
- Osteoarthritis
- Joint instability
- Diagnostic examination (i.e. biopsy of bone, cartilage, or synovial membrane)
- Septic arthritis

Table 3. Diagnostic and surgical applications of arthroscopy in the hind limb of dogs

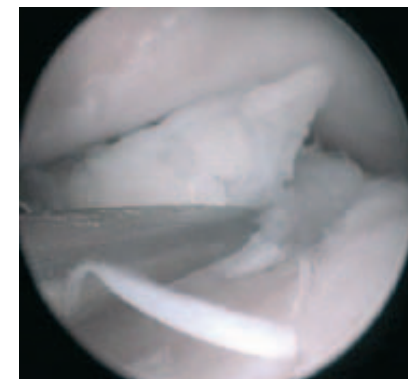
INDICATIONS FOR ARTHROSCOPY

Nowadays, any major joint can be explored and multiple diseases treated under arthroscopy by an expert veterinary arthroscopist. A list of the most common indications can be found in table 2 and 3.

The most common indications for arthroscopy in dogs are the diagnosis and treatment of a fractured coronoid process (FCP) and OCD of the elbow, treatment of shoulder OCD and diagnosis and treatment of shoulder joint instability, pre- and post-operative evaluation of cranial cruciate rupture, pre- and post-operative evaluation of the hip joint associated triple pelvic osteotomy, tarsal and stifle OCD, and exploration of any suspected painful joint.



medial arthroscopic view of an elbow with a loose medial coronoid process (MCP)



excision of the MCP



CONCLUSIONS

Arthroscopy has appeared as an important breakthrough for the veterinary orthopaedist, just as radiology or the CT scan have been for the radiologists. Nowadays, the diagnosis of articular diseases has been refined, such as the diseases of the shoulder joint, and many surgical procedures are done using minimally invasive arthroscopy. Arthroscopy results in less surgical morbidity, less post-operative pain and faster recovery. Multiple joints maybe treated on the same day. The future of arthroscopy is bright in Small Animal surgery: more veterinarians will be able to practice the technique, more articular diseases will be treated under arthroscopy and many more smaller joints will be explored arthroscopically.

FURTHER READING

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