ARTHROSCOPY IN VETERINARY PATIENTS

SYAM K. VENUGOPAL
Assistant Professor
Department of Veterinary Surgery & Radiology
College of Veterinary and Animal Sciences
Mannuthy, Thrissur, Kerala-680 651

Traditionally, the lesions of the joint have been assessed by physical examination and routine radiography. The diagnostic accuracy of intraarticular lesions is limited even with the most demanding radiogaraphic techniques like arthrography. At times, arthrotomy has been performed in an attempt to examine intraarticular structures. But it is a too invasive techinique that the chances of inflicting damage to the articular structures and subsequent complications are high. More recently. arthroscopy has proven to be a non invasive and accurate diagnostic tool, allowing a detailed inventory of lesions and has proven to be beneficial especially in the early diagnosis and planning of treatment regimen in advance.

In 1918, Prof. Takagi of University of Tokyo, Japan made the first attempt at observing the internal appearance of the knee joint of a corpse by means of a cystoscope. He subsequently tried to device and endoscope specially designed for observing the inside of articular cavities and named it an arthroscope. The first arthroscope was completed in 1920, but the optical canula was 7.3 mm in diameter, making it unsuitable for practcal use. Almost at the same time, Dr. Eugen Bircher of Switzerland was using the Jacobeus laparoscopy to examine human kee joints and the credit goes to Dr. Bircher for the first publication on the arthroendoscopy in 1921. Prof. Takagi, in 1931, succeeded in making an arthroscope with a diameter of 3.5 mm and subsequently reported on its clinical usefulness. But, it was a frustrating experience for the arthroscopic surgeon during those days due to the lack of appropriate instrumentation and the initial interest got gradually waned off. In the 1950's, however, the Japanese developed a special expertise in electronics and optics. Dr. Masaki Watanabe, who had been one of Takagi's pupils, developed a better arthroscope aided with superior lens systems and lighting systems. Watanabe number -21 arthroscope was the first practical and extremely functional arthroscope and Dr. Watanabe initiated operative arthroscopy in 1962. Dr. R. W. Jackson introduced the techinique of arthroscopy into North America in 1967 and popularized in human orthopaedics. The first report on veterinary use of arthroseope was from Dr. Watanabe, in 1949, when he reported on the arthroscopic findings of hock joint in a horse. More reports on large animal arthroscopy were published by European authors during 1970's. Descriptive studies of the canine joints were reported by Siemering (1978) and Kivumbi (1981) and these reports identified the diagnostic value of arthroscopy in cases of arthrosis that was not visualized radiographically.

Unlike radiography which deals primarily with changes in the bone, arthroscopy deals principally with the changes in the non osseous tissues of the joint such as the synovial membrane and its associated villi, as well as articular cartilage, menisci and intra articular ligaments.It allows examination of intra articular structures of the joint with minimal invasiveness and negligible morbidity.The patients subjected to arthroscopy recover in a shorter period of time without much complications. Arthroscopy allows direct viewing of the synovial surfaces in their natural state.The morphological characteristics of the synovium and articular cartilage are better appreciated because the synovial villi and cartilage lesions are suspended in the fluid irrigation medium and project into the joint cavity. Details of the synovial membrane and articular cartilage damage may not be readily apparent during arthrotomy because these lesions collapse and cling to the underlying surfaces. The magnification properties inherent to modern arthroscope further enhance its value as a diagnostic therapeutic and experimental tool.

THE EQUIPMENT

Small arthroscopes are used to perform arthroscopy in small animals and most examinations can be performed using a 2.7 mm arthroscopy with a viewing angle of 25 or 30 degree in a 4 mm trocar sleeve

In smaller animals (weighing less than 15 kg) and in fibrotic joints, a 2.4 mm or 1.9 mm scope is more useful. There are rigid scopes upto 5.0 mm diameter for large animals. Animals weighing less than 6 kg body weight make arthroscopy impossible due to inadequate joint size.

For inspection directly through the arthroscope, a fibreoptic light source of 150 W (Watt) is sufficient. The use of a video system requires a 400 W light source. For photographic documentation, a 150 W light source is enough with an electronic flash generator. To display a procedure on a monitor, a video camera is attached to the arthroscope, which allow better visibility with comfortable position and good coordination during surgery. This facility is of higher education value for students and assistants as it has got the capability to record and review the procedure.

During the arthroscopic procedure, the joint is continuously irrigated and distended with pressurized fluid. A lactated or acetated Ringers' solution is more ideal than normal saline solution. Alternatively, gas (air or CO_2 or N_2O) can be used to distend the joint. Gases provide a wider field of view and discrete irregularities of the articular cartilage can be more easily discerned.

ARTHROSCOPIC PROCEDURE

All interventions are performed under general anaesthesia. The area involved is clipped, disinfected and draped with a self adherent impermeable sheet. The joint is punctured with a 1.5 inch, 19 gauge needle which can serve as an egress canula afterwards. Synovial fluid is withdrawn to ensure intra articular placement. The joint is distended with irrigation solution. With a second needle, the correct direction of the arthroscope is determined. A stab skin incisions made at the point of needle entry. The joint capsule is penetrated using the sharp trocar locked in the arthroscopic sleeve. The synovial membrane is pierced with a blunt obturator passed through the sleeve after removing the sharp trocar. The blunt obturator is replaced with the arthroscope and the light source and the video camera are connected. The fluid inflow line is attached to the ingress valve of the trocar sleeve and the joint inspection is started.

For insertion of an instrumental canula (the cannula through which surgical instruments are inserted), the joint is again punctured with a needle. The right location and direction are confirmed when the needle can be visuatized through the arthroscope. The cannula is inserted as in the case of insertion of arthroscopic cannula. Once the cannula is correctly positioned, the instruments are inserted into the joint. After the procedure, the skin incisions are closed with staples or simple sutures. Antibiotics are not usually required following arthroscopy.

DIAGNOSTIC ARTHROSCOPY

The most important advantage of arthroscopy is its diagnostic value without much invasion of the joint. Also, it helps to confirm clinical diagnosis before surgery and may even helps to avoid a major arthrotomy procedure if the lesion is amenable to arthroscopic surgery. If the lesion is not suitable for arthroscopic surgery, the examination would at least facilitate better preoperative planning in terms of the placement of incisions and timing of surgery. Another major indication for diagnostic arthroscopy is the documentation of lesions, especially in instances of economic importance (decision making in culling etc.) and in veterolegal cases. Diagnostic arthroscopy can detect early changes of osteoarthritis, cartilage lesions, injury to intraarticular ligaments, synovial membranes and villi, menisci etc. An early detection of these lesions may help the clinician to advise rest to prevent worsening of the lesion.

THERAPEUTIC ARTHROSCOPY

The basic technique used for arthroscopic surgery is called as triangulation, which involves bringing one or more opearting instruments into the field of vision and onto the area of the lesion while watching through the arthroscope. This is a stereotactic maneuver which require considerable skill to develop. The common surgical procedures include removal of degenerative articular cartilages by shaving off and excision of chondral and osseous fractures and flaps using power tools or manual knives. Loose cartilage pieces in the joint cavity (joint mice) can be retrieved by the arthroscope. Meniscal injuries can be transected or partial meniscectomy may be performed using arthroscope. The traumatized, fibrosed or hypertrophied synovial villi are removed using power tools.

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