Arthroscopy for Rheumatologist: Opportunities and Challenges

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Arthroscopy is an accurate, reliable method for arthroscopically examining the interior structure of joints. While there are few rheumatologists who now use the technique of arthroscopy, in most centers referral is made to an orthopedic surgeon who specializes in this technique. This may be more as a result of economic factors than any thing else. The cost of buying and maintaining arthroscopic equipment can be prohibitive. The decision to learn arthroscopy is therefore an individual one based on preference etc. The Arthroscopy Association of North America (AANA) has issued guidelines for practice of arthroscopy that could apply either to rheumatologist or to an orthopedic surgeon. Also membership of AANA is open to rheumatologists.

Office arthroscopy is being developed and flexible scope that can be used with the patient receiving local anesthesia. Although there are many problems yet to be solved with this idea, it seems entirely possible that all diagnostic arthroscopy will one day be done in an office setting which may overcome most of the current reservations that rheumatologists have of doing this procedure.

It has become clear in recent year that the synovium is the primary site of inflammation and a major effector organ in a variety of joint diseases including rheumatoid arthritis (RA). As a result there has been increased interest in studies of pathological changes of the synovium. There are however, several caveats that need to be recognized. Many of the older studies have examined synovial tissue obtained at surgery. In these patients inflammation is not necessarily a prominent feature. Moreover, patients requiring joint surgery obviously represent a highly selective group, in whom specific pathogenic mechanisms may be operative that is associated with the process of destruction. In addition to the stage of disease, the use of drugs provides another possible source of bias in studies of synovial tissue. It has been shown in many studies that it is possible to influence the features of synovial inflammation by anti-rheumatic treatment. Consequently, the analysis of serial biopsy samples has been used as a screening method to test new treatments. It has been suggested that the changes in serial synovial biopsies are more sensitive to change than for example the ACR 20% for clinical improvement. Therefore, a control group patients matched for drugs treatment is ideally included when different patients group are being compared. The Annals of the Rheumatic diseases December 2000 has published a leader article on “Analysis of synovial biopsy samples: opportunities and challenges” by Baeten et al. In this article the authors confirmed a previously suggested relation between synovial inflammation and local disease activity.

History of Arthroscopy

Although crude instruments were used for viewing body cavities in ancient times, it was not until 1805 that Philip Bozzini devised his “Lichtleiter” or light conductor—a bifid tubular instrument, the desired field for examination being illuminated by the reflected light from the candle. Instruments of many types have followed the Lichtlieter Desormaux introduced a cystoscope in 1853 consisting of a series of tubes attached to a gastrogen lamp. Andrews developed a magnesium filament, and Bruck introduced a platinum filament as the light sources. Invention of the incandescent lamp: Edison’s electric bulb, revolutionized the developments. About 1918 Professor Takagi of Tokyo became the first to examine the interior of the knee joint of a cadaver. Over the next several years, refinements in these instruments, primarily reductions in size, has increased the practicality of their use.

Instruments and Equipments

Arthroscope

An arthroscope is an optical system. Three basic optical systems are used in rigid arthroscopies: (1) the classic thin-lens system, (2) the rod-lens system designed by Hopkins, and (3) the graded index (GRIN) lens system. The fibreoptic arthroscopes generally consist of a rod-lens system surrounded by multiple light conducting glass fibrils, enclosed in a specially treated rigid metal sheath. Most important optical characteristics of arthroscope are: (1) the direction of view, and (2) the viewing angle. The direction of view of an arthroscope is normally the angle between the axis of the arthroscope and a line connecting the tip of arthroscope and the center of its field of view. The viewing angle refers to the field encompassed by the lens. Arthroscope consists of an optical lens system, light-conducting fibreoptics, and surrounding sheaths; they vary in diameter from approximately 2 to 6 mm.

Fibreoptic light sources

The fibreoptic cable consists of a bundle of specially prepared glass fibers encased in a protective sheath. For routine general diagnostic inspection in a joint, a 150-watt tungsten bulb is usually sufficient. If photography and video viewing or recording are desired, more intense power sources such as the higher-intensity tungsten and xenon systems are preferable.

Accessory instruments

All instruments should be approximately of the same length as the arthroscope. The basic instrument kit consists of the following:

- Arthroscope, 0 and 30 degree
- Probe
• Scissors
• Basket forceps
• Grasping clamps

Irrigation systems

Irrigation and distention of the joint are essential to all arthroscopic procedures. Joint distention is maintained by normal saline or Ringer’s lactate solution during arthroscopy. Either continuous flow or intermittent distention may be used, as preferred. The two factors that determine the hydrostatic pressure within the joint are the height of the fluid bag and diameter of the tubing. Distention is an important aid in the arthroscopic viewing of any joint, expanding its internal capacity to allow a greater area through which the scope can be manoeuvred, and pushing folds of synovium and other soft tissues out of the way in the viewing area.

Touriquet

In arthroscopic procedures of the distal joints, a tourniquet is optional depending on the procedure.

Anesthesia

1. **Local anesthesia**: Xylocaine/Marcaine mixture with small amount of epinephrine used in a cooperative patient for the synovial biopsy and simple removal of loose bodies.

2. **General anaesthesia** is indicated in the acutely injured knee, where pain is an important factor, when significant intra articular surgery is anticipated, non-cooperative patient, allergy to local anaesthesia and in prolonged procedures.

3. **Spinal/Regional anesthesia** is rarely used; when other anesthesia is contraindicated.

Documentation

It can be carried out in the following ways:

1. Photographs of the inside of the joint by a 35mm reflex camera.

2. Video recordings.

Disadvantages

1. Requires working through small portals with delicate and fragile instruments.

2. Extremely time consuming for inexperienced physician.

3. Extensive and expensive specialized equipment is required.

4. Intra articular manoeuvres produce significant scuffing and scoring of the articular surfaces, specially by an inexperienced physician.

Indications

1. When a thorough history, physical examination and suitable noninvasive and radiographic studies have failed to establish a diagnosis that is needed for appropriate treatment.

2. When treatment of a specific joint problem has failed and there is need for additional information that radiographic or other studies cannot provide.

3. When specific additional diagnostic information can be obtained in a less traumatic way (i.e. biopsy)

Contraindications

1. A minimally deranged joint that will respond to the usual conservative methods of treatment.

2. Local skin infections (risk of joint sepsis).

3. Partial or complete ankylosis (difficult maneuverability of instruments).

4. Major collateral ligamentous and capsular disruptions (excessive extravasations of irrigating solutions into the soft tissues).

CompliCations

A. Damage to intraarticular structures

1. Damage to articular cartilage surfaces.

2. Damage to menisci

3. Damage to fat pad

4. Damage to cruciate ligaments

B. Damage to extraarticular structures

1. Blood vessels

2. Nerves

3. Ligaments and tendons

4. Hemarthrosis

5. Thrombophlebitis

6. Infection

7. Tourniquet paresis

8. Synovial herniation and fistulae

9. Instrument breakage

References


