

Uncensored Saga of Interventional Rheumatology

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INTRODUCTION

Interventional Rheumatology term is currently used to denote various interventions techniques in the specialty. Not many medical professionals are aware of the fact that a physician developed the first Arthroscope. Although Max Nitze invented his cystoscope in 1877 it was as late as 1918, when Kenji Takagi, University of Tokyo, Faculty of Medicine made his first attempt at observing the internal appearance of the knee joint of a cadaver by means of Cystoscope. Medical arthroscopy term was used first time by the author to highlight the importance of this procedure in practice of rheumatology. It has become clear in recent past that the synovium is the primary site of inflammation and a major effector organ in a variety of joint diseases including Rheumatoid Arthritis, as a result there had been increased interest in studies of pathological changes of synovium. There are few rheumatologists who use the technique of arthroscopy. In most centers referral is made to an orthopedic surgeon who specializes in this procedure.

The Arthroscopy Association of North America (AANA) has issued guidelines for practice of arthroscopy that could apply either to a rheumatologist or an orthopedic surgeon¹. Office arthroscopy is being developed with the help of smaller needle flexible scope that can be used in patients under local anesthesia². A new term medical arthroscopy or interventional Rheumatology may be coined for arthroscopy used exclusively for diagnosis of arthritis and synovial research. This term may differentiate arthroscopy performed by surgeons for microsurgery such as tear of ligaments, menisci, etc.

ARTHROSCOPY FOR RHEUMATOLOGIST: MEDICAL ARTHROSCOPY

It has become clear in recent past that the synovium is the primary site of inflammation. It is a major effector organ in a variety of joint diseases including Rheumatoid Arthritis (RA). As a result there had been increased interest in the study of pathological changes of synovium³.

Arthroscopy is an accurate, reliable method of examining the interior structure of joints. While there are very few Rheumatologists who are using this technique, the decision to learn is thus individual based. The Arthroscopy Association of North America has issued guideline for practice of arthroscopy that could apply either to rheumatologist or as orthopedic surgeon.

Flexible scope for office arthroscopies are being developed that can be used with local anesthesia. A new term *medical arthroscopy* can be coined for diagnostic arthroscopy used exclusively for arthritis research. This term may differentiate arthroscopy performed by surgeons, which is repair of meniscus, ligaments and used basically for sports injuries.

In Oct 1992, National Institutes of Health Survey found that nearly half of the programs had a faculty rheumatologist performing the procedure, with all but one of the rest planning to start arthroscopy within 1 to 5 years⁴.

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. Rod lens system
3. The graded index lens system.

The fiber optic arthroscopies generally consist of a rod lens system surrounded by multiple lights conducting glass fibrils enclosed in a specially treated rigid metal sheath. Most important optical characteristics of arthroscope are direction of view of an arthroscope. Arthroscopes consist of an optical lens system, light conducting fiber optics and surrounding sheath.

Fiber Light Source

The fiberoptics cable consists of a bundle of specially prepared glass fiber encased in a protective sheath. For routine general diagnostics inspection 150 Watt tungsten bulbs are usually sufficient.

Other Instruments

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

- Arthroscope 0 and 30 degree
- Probe
- Scissors
- Basket forceps
- Grasping Clamps

Irrigation Systems

Irrigation and distention of joint are essential to all arthroscopic procedures. Joint distention is maintained by Normal saline or Ringer lactate. Either continuous flow or intermittent distention may be used. Distention is an important aid in the Arthroscopic viewing of any joint expanding its internal capacity to allow a better viewing.

Tourniquet

In diagnostic arthroscopic procedure, usually tourniquet is not required.

Anesthesia

1. Local — Xylocaine (short acting) and Bupivacaine (long acting) used in a cooperative patient for synovial biopsies. Author uses only this anesthesia for medical arthroscopy.

2. General — Indicated where pain is an important factor and also in non-cooperative patient or allergy to local anesthesia.
3. Spinal — rarely used.

Indications

1. When a thorough history, physical examination and suitable non-invasive and radiographic studies have failed to establish a diagnosis.
2. When treatment of specific problem has failed and there is need for additional information that other studies cannot provide.

Contra-indications

1. A minimally deranged patient that will respond to the usual method of treatment.
2. Local skin infection.
3. Partial or complete ankylosis—difficult manoeuvrability of instruments.

TECHNIQUE OF MEDICAL ARTHROSCOPY OF KNEE

Arthroscopy is done in the operating room of a day care setting under strict sterile technique.

A thigh-holding device is used to give a fulcrum for stressing opening the knee joint in either the varus or the valgus direction. The end of the table is flexed to 90 degrees, allowing the knee to flex. The skin from the mid thigh distally is prepared and draped as for any limb procedure. Two assistants are ideal, one to handle instrument and other to help hold and maneuver the limb.

The 4.5 mm diameter arthroscopy is inserted anterolaterally through a small skin incision, using a trocar first to pierce the fascial layer and an obturator to enter the synovial cavity. This anterolateral portal is just lateral to patellar tendon at the level 1.5 cm above the anterior edge of the tibia. Ringer's lactate is used as a continuous irrigation fluid, entering the joint through the sleeve of the arthroscope. When searching for a loose body, the direction of flow is reversed. The joint is examined systematically, beginning first with suprapatellar pouch. The synovium is scanned with the knee in extension. Normal synovium is usually thin, flat, and somewhat transparent, with little vascularity. Delicate villi may be seen superiorly or adjacent to patellar borders.

The patella is examined next. Its articular surface should be smooth, glistening and firm to palpation with probe as the knee is flexed, tracking in the femoral

groove can be observed for proper central alignment; to give a better perspective of this gliding action the arthroscope is often moved to a lateral suprapatellar portal.

Arthroscope is then moved laterally to view the paracondylar gutters, loose bodies may lie at the base of these gutters. With the knee extended, the femoral condyles and patellofemoral grooves are scanned for any articular disruption. Normal articular cartilage is white glistening. Any irregularities can be readily observed with the tangential magnified view provided by the arthroscope. In older patient the hyaline cartilage looks somewhat granular and takes on a yellowish, less shiny character. It often loses its ability to rebound quickly from the pressure deformation.

The arthroscope is rotated inferiorly along the wall of the femur to view the edge of the posterior horn of the lateral meniscus. With the knee slightly flexed and a varus internal rotational stress applied to the tibia, the lateral compartment of the joint can be examined. The particular cartilage of the tibia plateau is usually the first site of fibrillation or fissuring as individual age.

The knee is flexed is about 60 degrees for the arthroscope's entry into the intercondylar notch to view the anterior cruciate ligament. Sometime the anterior cruciate ligaments can be pulled aside to permit a clear view of the posterior cruciate ligaments^{5,6}.

The arthroscopic examination is completed by scanning the medial femoral condyle for any articular defects. Occasionally a directly posteromedial puncture is made to evaluate the meniscocapsular junction or the posterior cruciate ligaments.

At the conclusion of the diagnostic inspection, required synovial biopsy is taken. The joint is thoroughly irrigated and. Then the tiny incisions are closed with an adhesive strip. An elastic bandage is applied for mild compression. Patient can go home immediately after the procedure.

Post Arthroscopy Care

After diagnostic arthroscopy, isometric exercise and gentle active range of motion are begun immediately. In general, rehabilitation after arthroscopic procedure is much faster and easier.

Pathologic Findings in Arthritis

Rheumatoid Synovial villi are larger, club shaped, pale, and edematous and are numerous. In the knee they proliferate in the suprapatellar roof along the edge of

the femoral condyles, beneath the menisci, and in the intercondylar notch. The creeping pannus can be pulled from articular edges with a probe demonstrating the erosion of underlying hyaline cartilage. Later stages may show extensive fibrillation ulcers or craters, often in an irregular pattern over the femoral condyles and patellofemoral groove. The joint often contains thick synovial fluid with numerous, small, opaque white fragments, so called 'rice bodies'.

In Osteoarthritis, synovium is not proliferative as seen in rheumatoid arthritis. Particular changes include fibrillation, fissuring, and loss of normal thickness. The patella, central femoral condyles, and tibia plateaus are common sites of wear. There may be craters revealing bare bone and osteophyte.

Crystalline deposits in synovium are seen in the both gout and pseudogout, but those in the latter more often coat otherwise normal appearing articular cartilage

Pigmented villonodular synovitis is nodular, prolific, dense, having a reddish-brown or even orange color. Hemophilic arthropathy can show extensive articular destruction with, hemosiderin-stained synovium.

Synovial chondromatosis is characterized by multiple cartilaginous bodies that are free within the joint. Arthroscopic picture of large irregular loose bodies is characteristic.

Complications

Complications are rare and include:

1. *Infection*
Infection might occur as a complication of Arthroscopy. Strict aseptic care similar to that in any surgical operation on the joint is essential.
2. *Injuries to the cartilage and capsule of the joint*
Injuries to the cartilaginous surface can be prevented if the joint cavity is amply distended with normal saline. The joint heals, leaving a small scar, which usually does not cause any disorder of the joint function.
3. *Hemarthrosis and Traumatic Arthritis*
Traumatic Arthritis resulting from arthroscopy is of short duration. Puncture with an aspiration needle may result in slight bleeding in the joint. This bleeding is self-limiting and can be minimized by washing several times with normal saline.
4. *Quadriceps Inhibition*
Minor Quadriceps Inhibition does occur after each arthroscopic examination.

AUTHOR'S EXPERIENCE

Chaturvedi and colleagues reported their experience of medical arthroscopy in *Journal of Association of Physicians of India*⁷. This was the first report of medical arthroscopy from this region⁸. Few interesting facts have emerged from experience with this tool in the hands of physicians.

It was a difficult task to establish interventional Rheumatology. First hurdle was to convince health administrators about the need of having a separate Arthroscopy unit under Rheumatology. The resistance from orthopedic colleagues was another big problem. Cost of equipment was discouraging. Author still remembers sleepless nights and nightmares of self-learning technique of arthroscopy. The frustration, lack of confidence, fear of complications, unwarranted remarks of colleagues, long learning curve of the procedure, and trauma of discussion of cost effectiveness all combined together had made author's life miserable. Acceptance of author's paper written on the subject by annual conference of American College of Rheumatology in 2002 came as a ray of hope and encouragement to the author. Since then there was no looking back. Repeated presentations of the original work in various national and international meetings augmented the author's confidence about the concept of interventional Rheumatology.

It seems, joint cavity, unlike other cavities, is relatively resistant to infection. In spite of being a day care procedure and a makeshift operation theatre not a single case of infection is observed in 300 arthroscopies. Oral ciprofloxacin is given for five days. Local anesthetic agents Xylocaine for skin and Bupivacaine for intraarticular use are excellent agents for medical arthroscopies. Females are relatively more comfortable when compared with males during local anesthesia. For

easy entry of scope it is better to fill joint cavity with a wide bore needle with normal saline before making an entry port incision. There is no need of stitching of entry portal, and patients are sent home immediately after the procedure.

Non-specific synovitis is the most common term used by pathologists for inconclusive findings and both rheumatologists and pathologists require more experience in this field. Medical arthroscopy has a long frustrating learning curve. The most difficult issue is to explain to the hospital administrators the difference between Surgical and Medical Arthroscopy. While surgery through an arthroscope is entirely different procedure, medical arthroscopy in the hands of a physician certainly enhances the diagnostic potentials. Eyes can only see when mind knows. This tool is waiting for wisdom of physicians.

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