

Arthroscopy of The **Shoulder** Joint

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Arthroscopy is widely used nowadays for the diagnosis and treatment of increasing numbers of disorders of the knee, shoulder, elbow, ankle, wrist and hip. Arthroscopy of the shoulder joint has also been developed as a useful diagnostic device as well as a successful surgical tool in managing disorders of the shoulder joint. Shoulder arthroscopy has a high diagnostic score which bough some shoulder surgeons to contemplate the need for shoulder arthroscopy in the majority of patients presenting with significant shoulder diorders.

Arthroscopy of the shoulder was first described by Burman in the 1930's(1). In 1985 , Ellman of Los Angeles after working for 2 years on cadavers and

models, developed his arthroscopic surgical technique for subacromial decompression(2).

Over the past decade, shoulder arthroscopic techniques and instruments have improved and many surgeons have reduced the number of open joint surgeries performed. Shoulder arthroscopy provides direct visualisation and accurate evaluation of the inflammatory conditions, adhesions, and pathology of the articular fibrocartilage, so an accurate diagnosis of symptomatic shoulder intracapsular disorders is achieved(3). Shoulder arthroscopy provides the basis for performing arthroscopic surgery of Shoulder which is an effective, reliable, acceptable, appropriate and minimally invasive technique for various stages of the internal derangement of shoulder joint.(Fig. 1).

Indications

The indications to use the arthroscope in the treatment of shoulder disorders con-



Figure 1 - Arthroscopy of the shoulder Joint.



Figure 2 - Arthroscope used for examination of the shoulder.



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tinue to expand as technology, proficiency and understanding of the pathology of many of shoulder conditions grow(4).

Diagnostic indications: -

1. For unexplained or unresolved shoulder pain or joint dysfunction.
2. Biopsy for suspected lesions.
3. For confirmation of diagnostic findings.
4. For diagnosis of instability
5. For diagnosis of rotator cuff lesions.

Surgical indications :-

1. Synovectomy
2. Anterior instability of shoulder.
3. Subacromial decompression (acromioplasty).
4. Rotator cuff repair
5. Capsular shrinkage.
6. Capsular release
7. For removal of loose bodies.

Contraindications

The relative contraindications to the use of arthroscopy in the shoulder lies with the individual who does not have a safe, working knowledge of anatomy and

portal access.

The absolute contraindications to shoulder arthroscopy include: -

1. Infection of tissue overlying the joint.
2. Bony ankylosis of the joint.

Position of the patient

Lateral decubitus position:

The patient lies on his or her side with the affected limb up. The arm is connected to a traction device with 4-7 Kg of traction to distract joint, and the arm is kept in abduction 70° and forward flexion 15°(5).

Beach-chair or sittig position:

The patient sits in an upright position, the traction is unnecessary and the shoulder is free to be passively manipulated throughout its full range of motion and conversion to an open technique is easy because the patient is already in the appropriate position(6-7).

Equipment

The Arthroscope

The arthroscope used for examination of the shoulder has a diameter of 4mm. (Fig. 2)

It utilizes a fibroptic tube and a series of lenses to produce a very high resolution image of the joint on a television screen. Both 30 and 70 degree viewing arthroscopes should be available so as to optimize visualization, depending on the portal of use and the complexity of the procedure.

Entry into the joint is made by using a system of trocars (used to penetrate the soft tissue), obturators (used to enter the articular surface) and Cannules (outer sheet in which the arthroscope is inserted) (Fig. 3). The use of a cannula or sheath is strongly recommended to prevent possible damage to the probe tip during introduction into the joint(8).

Arthroscopic instruments.

Many arthroscopic instruments are used to assist in the performance of surgical arthroscopic procedures such as probes (for examination and lysis of some adhesions), grasping forceps (for removal of

loose bodies), biopsy forceps (to obtain specimens for histopathological examination), scissors (for cutting adhesions and other tissues), curettes and motorized shavers (for debridement of the fibrillation, cartilage and loose tissues) (Fig. 4).

Irrigation system

Normal saline solution has been shown to be a safe and effective medium for use in the shoulder. Either gravity assisted flow or a standard arthroscopic pump can be utilized. Saline assists in removing debris or blood, to have clear picture and to maintain pressure inside the joint.

Cameras and videos

A 3 chip video camera is attached to the arthroscope to see the images on the video monitor for the best couler, picture quality and resolution, and the images can be recorded and documented, by connecting a video-recorder to the system (Fig. 5).

Joint Entry Technique.

Arthroscopy of the shoulder is performed using a posterior portal for the arthroscope; in addition, an anterior portal is used for introduction of cannula and surgical instruments, lateral portal is used for subacromial decompression and a superior portal may also be used(9-10).

The puncture wounds heal without causing cosmetic deformity

The posterior portal, is, located 2cm inferior and medial to the poserior angle of the acromion.

The anterior portal, should be above and lateral to the tip of the coracoid process.(In no circumstances be placed inferior or medial to the coracoid process

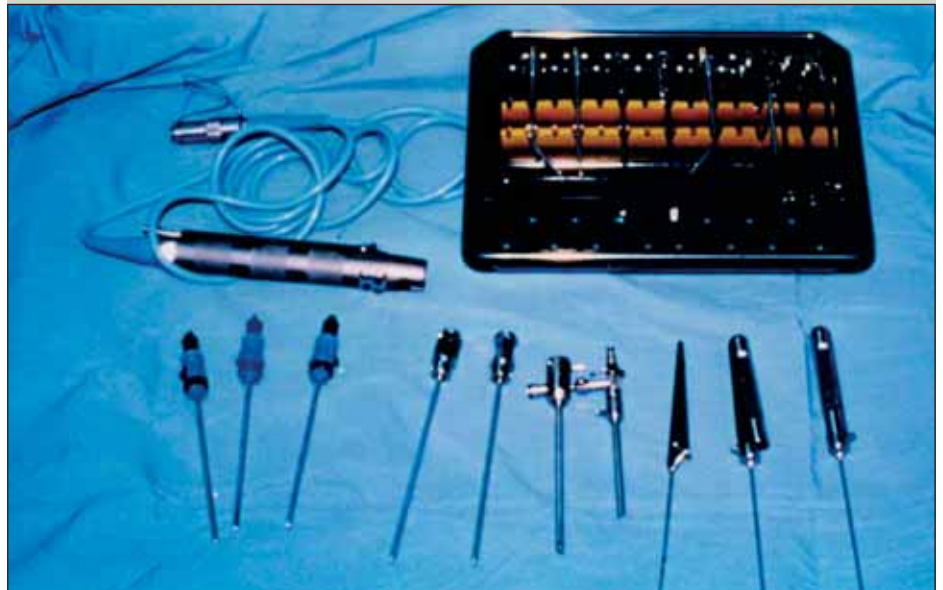


Figure 4 - Arthroscopic Instruments: Probe, Grasping forceps, Biopsy forceps, Scissors and Motorized shavers.



Figure 5 - Irrigation System and the Video Cabinet.

because it will jeopardize the brachial plexus.

The superior portal is placed through the trapezius muscle medial to the acromion.

Through the posterior portal, the trocar is advanced then replaced by the blunt obturator to penetrate the joint, then the cannula is inserted into the joint space and the arthroscope is inserted into the cannula and the irrigation system connected to the side of the portal of the cannula and the joint is irrigated .

The anterior portal is used for the working arthroscopic instruments, which is inserted through a new cannula to permit surgical arthroscopic procedures under the field vision of the monitor.

The arthroscope and the instruments can be changed in either one of the two portals.

At the end of the procedure, the arthroscope and the instruments are removed and the joint is washed out by normal saline to remove all the debris and blood from the joint.

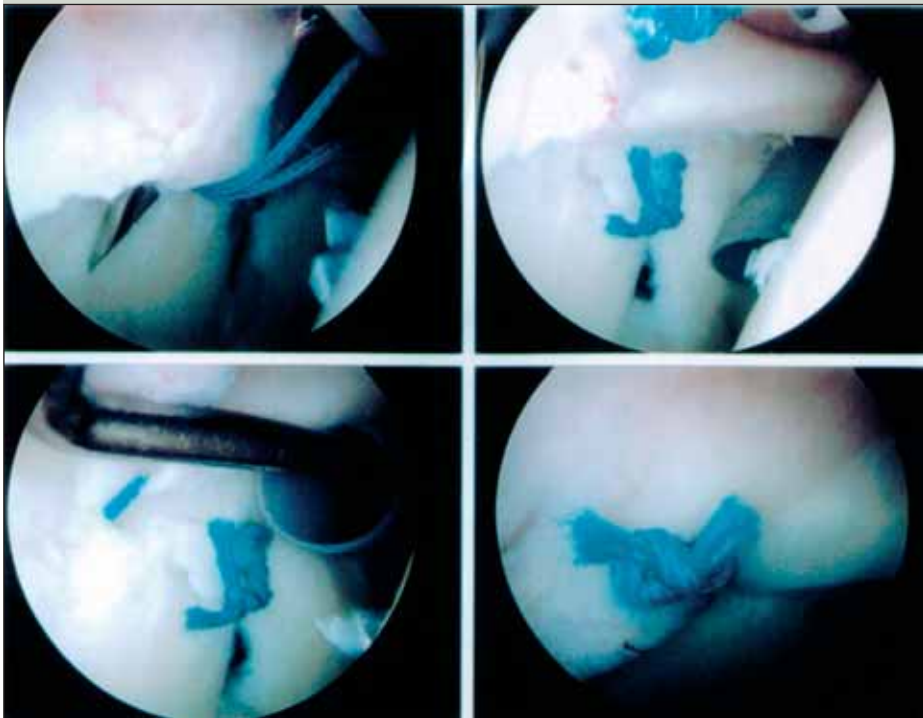


Figure 2 - Shoulder Arthroscopic repair of Labrum for recurrent anterior shoulder instability.

The puncture wounds heal without causing cosmetic deformity.

Shoulder Arthroscopy is a minimally invasive procedure which has diagnostic as well as therapeutic merits: -

Diagnostic Arthroscopy

The major goal of shoulder arthroscopy is to reach an accurate diagnosis and to have a greater understanding of intra-articular pathology.

The common abnormalities which can be seen during diagnostic arthroscopy include(11,12,13): -

1. Long head of biceps.
2. Rotator cuff
3. The glenoid labrum, inferior glenohumeral ligament complex.
4. Labral tears.
5. Glenohumeral ligaments.
6. Inferior glenohumeral recess.
7. Posterior labrum.
8. Hill Sachs lesions.
9. Abnormalities of the synovium.
10. Arthritis.
11. Fractures.
12. Joint replacement.

Arthroscopy offers us a “window” into the shoulder joint and thus enables us to explain more clearly the etiology and pathogenesis of shoulder joint disorders.

At the present time, operative arthroscopy is the “state of the art” treatment for many pathological entities involving the shoulder.

Surgical procedure

Shoulder Arthroscopy consists of the insertion of a rigid endoscope into the joint; it is less invasive than open surgical procedure for the treatment of intra-capsular disorders.

Even though learning arthroscopic technique is a difficult task, most surgeons can perform surgical arthroscopy in an appropriate environment, if they have instruments, assistance, understanding of the techniques, and are willing to devote the time to gain the necessary experience(14).

Prerequisites for successful arthroscopy

1. The surgeon must be familiar with the use of the arthroscope, arthroscopic

- instruments and video-equipment.
2. Pre-operative intravenous antibiotics.
3. General Anesthesia, which provides complete muscle relaxation and can allow manipulation of the shoulder during the procedure.

The plethora of arthroscopic surgical procedures:

1. Removal of loose bodies and trimming of labral tears.
2. Arthroscopic subacromial decompression.
3. Rotator cuff repair.
4. Labrum repair for recurrent anterior shoulder instability(Fig. 6).

Arthroscopic surgery of the shoulder has replaced several open procedures because of minimal morbidity. However, like other joint arthroscopic procedures, it involves a significant learning curve. In addition, it requires availability of special equipment and certain operating

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conditions. It is advisable to achieve enhanced experience and competence in diagnostic arthroscopy and then to practice arthroscopic surgery in a staged manner(15).

There is still place for open surgery and it is reserved for patients with advanced intra-articular disease, recurrent dislocation of shoulder and for joint recon-

struction and failed arthroscopy. Those disorders often require open arthrotomy to achieve better management.

Advantages

The advantages of shoulder arthroscopy are: -

1. Minimal invasiveness of the procedure.
2. Accurate diagnosis of intercapsular pathology.
3. Small incisions of approximately 3mm.
4. Short hospital stay.
5. Little post operative pain.
6. Relatively few minor complications.
7. Rapid recovery.
8. Early initiation.

Disadvantages

The need for: -

1. General anaesthesia.
2. Experienced surgeon (steep learning curve).
3. Expensive equipment.

Complications

An interested surgeon with updated arthroscopic skills and extensive training in shoulder arthroscopy, reduces the risk of developing complications.

Although the complications rate is low (1%), and most of the complications are transient; the surgeon must be careful and gentle when performing shoulder arthroscopy(16,17).

The possible complications include: -

1. Neurological complications (may result from incorrect location of portals).Report injuries are mainly neuropraxia, affecting brachial plexus.
2. Vascular complications (mostly axillary artery).
3. Damage of articular cartilage surfaces.
4. Damage to ligaments and tendons (mainly biceps tendons and tendinous part of the rotator cuff).
5. Haemarthrosis.
6. Broken instruments.
7. Extravasation of irrigation fluid.

8. Infection very rare (reported cases between 0.01-3.2%), careful attention to aseptic technique must be followed.

9. Synovial fistulae are uncommon, and usually closed after 3-7 days of proper antibiotics.

Paying careful attention to anatomic landmarks and portals when performing joint-entry procedures and the proper using of trocars, obturators, and cannulas, can reduce the risk of complications(18).

Laser arthroscopy

Nowadays, Laser Arthroscopy can be used to treat shoulder Joint disorders

and derangement, but it is very important that the clinician must be familiar with physical properties of the Laser use. Various Lasers are available for use in surgery and Orthopaedics, namely Carbon dioxide Laser. The neodymium: Yttrium-aluminum-garnet Laser and holmium Yttrium-aluminum-garnet (19). Only the HO.YAG Laser has been used with effectiveness in shoulder joint arthroscopic surgery.

HO.YAG Laser can precisely and rapidly resect cartilaginous tissues with only moderate necrosis, can function in a saline environment and can be transmitted through conventional optic fibers (20).

REFERENCES

- 1 Buerman MS. Arthroscopy on the direct visualization of joints, an experimental cadaver study. *J Bone Joint* 1931; 8: 669-275.
- 2 Ellman H. Arthroscopic subacromial decompression; analysis of 1-3 years results *Arthroscopy. Journal of Arthroscopy and related Surgery*.1987; 3:173-181.
- 3 Colfield RM. Arthroscopy of the Shoulder.*Mayo Clin Proc* 1983; 58: 501-508.
- 4 Altchek Dw, Skyhar MJ, Warner RF, Schawrtz E. Arthroscopic acromioplasty: A prospective study. *J Bone Joint Surg* 1990; 72A: 1198-1207.
- 5 Andrews JR, Carson WG. Shoulder Joint arthroscopy. *Orthopaedics* 1983; 6: 1157-1162.
- 6 Warner JJP.Shoulder arthroscopy in the beach- chair position: basic set-up. *Op Tech Orthop* 1991; 1:147-154.
- 7 Skyhar MJ, Altchek Dw, Warner RE.Shoulder Arthroscopy with the Patient in the beach-chair position. *Arthroscopy* 1988; 4: 2560259.
- 8 Wiley AM, Older MV. Shoulder Arthroscopy: investigations with a fiberoptic instruments.*Am J Sports Med* 1980; 8 :31-38.
- 9 McCain JP, Leblan WG. Puncture technique and portals of entry for diagnostic and operative arthroscopy of the shoulder joint. *Arthroscopy*, 1996; 7:2,221-232.
- 10 Andrews JR, Carson WG, Orlega K. Arthroscopy of the shoulder: technique and normal anatomy. *Am J Sports Med* 1984; 12: 1-7.
- 11 Mohtadi NG, Vellet AD, Clark ML, Hollinshead RM, Sasyniuk TM, Fick GH, Burton PJ. A prospective, double-blind comparison of magnetic resonance imaging and arthroscopy in the evaluation of patients presenting with shoulder pain. *J Shoulder Elbow Surg*. 2004;13(3):258-265.
- 12 Ogilvie-Harris DJ, D'Angelo G. Arthroscopic surgery of the shoulder. *Sports Med*. 1990;9(2):120-128.
- 13 Ellman H. Shoulder arthroscopy: current indications and techniques. *Orthopedics*. 1988;11(1):45-51.
- 14 De Mulder K, Petre D, Declercq G. Arthroscopy of the shoulder: Current concepts review. *Acta Orthop Belg*. 1999;65(4):447-57.
- 15 Akgun I, Kesmezacar H. Arthroscopy of the shoulder: general principles and stages for promoting competence. *Acta Orthop Traumatol Turc*. 2003;37 1:54-68
- 16 Ogilvie- Harris DJ, Wiley AM. Arthroscopy surgery of the shoulder : a general appraisal. *J Bone Joint Surg* 1986; 68 B 201-204.
- 17 Weber SC, Abrams JS, Nottage WM. Complications associated with arthroscopic shoulder surgery. *Arthroscopy*. 2002;18:88-95.
- 18 Bigliani LU, Flatow EL, Deliz ED. Complications of shoulder arthroscopy. *Orthop Rev*. 1991;20(9):743-51.
- 19 Hayashi K, Markel MD, Thabit G, Bogdanske JJ, Thielke RJ. The effect of non-ablative laser the ultrastructure of Joint capular collagen. *Arthroscopy: The journal of Arthroscopic and Related Surgery*, 1996;12:474-48.
- 20 Fanton Gs, Dillingham ME. 2.1mm Holmium: YAG arthroscopy Laser surgery of the shoulder. In Allen Brillhart ed., Chapter 37, *Athroscopic Laser Surgery*, New York: Springer-Verlag, 1995; 239-251.

Post operative management

The arm is held in a position of comfort postoperatively and pendulum exercises are started the next morning. The patient is asked to refrain from repetitive overhead activities for at least 4-6 weeks and at 6 weeks strengthening exercises are begun as comfort allows.

Conclusion

Arthroscopy is a non-invasive procedure and an excellent tool in diagnosis and surgical treatment of shoulder disorders. The major goals of shoulder arthroscopy are the formulation of an accurate diagnosis and the reduction of patient's symptoms. Numerous studies substan-

tiated the diagnostic value of shoulder arthroscopy.

Current studies indicate that shoulder arthroscopy is a valuable diagnostic modality that is frequently effective in palliating patient's symptoms.

The therapeutic results of shoulder arthroscopy are encouraging and is a less invasive surgical procedure with a more rapid recovery period.

Arthroscopy has provided us a window into the shoulder joint for investigating the pathophysiology of shoulder.

It must be remembered that some disorders of shoulder still require the skills of open shoulder surgery and it must be stressed that shoulder arthroscopy should not be used unless the surgeon has developed the skills of open surgery.