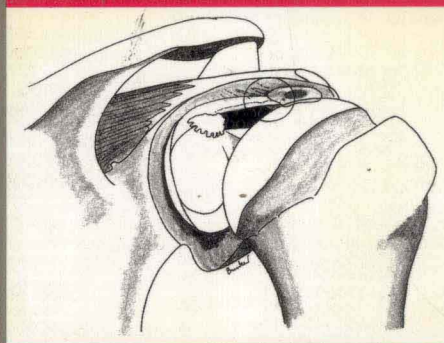
Shoulder Arthroscopy

Timothy D. Bunker
W. Angus Wallace



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TDB

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WAW

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Introduction

The decade of the 1980s has seen a spectacular growth in the area of shoulder arthroscopy and there is no doubt that this trend will continue into the next decade. The reason for this parallels the growth of knee arthroscopy during the late 1960s, the decade of the 1970s and the early part of the 1980s. The initial reason that shoulder arthroscopy took off was that it revolutionized the diagnosis of shoulder disorders, previously a realm that could only be mastered by the elite few who had made shoulder surgery their superspecialty. One such expert was Cyriax who encapsulated the attitude of most physicians thus: 'Many doctors regard disorders of the shoulder as uninteresting, undiagnosable, and incurable, but tending to recover in the end. Nothing could be further from the truth.' The arthroscope gives the surgeon an extremely powerful tool which not only assists in diagnosis, but by a process of feedback hones the surgeon's own clinical diagnostic acumen, giving an ability to diagnose shoulder disorders more accurately than the superspecialists ever could from outside the joint.

This book aims to open up this inner world of the shoulder joint and to stimulate interest in conditions around the shoulder. The book is aimed both at surgeons in training and also those experienced surgeons who are either shoulder surgeons who would like to be able to arthroscope the shoulder, or experienced arthroscopists who would like to develop a special interest in the shoulder.

Indications

Initially shoulder arthroscopy was used for diagnostic purposes alone. Such studies soon showed that clinical diagnosis was often incorrect and that shoulder arthroscopy could diagnose many conditions accurately. Cofield[1] reviewed 74 diagnostic arthroscopies and found that in 32 per cent, arthroscopy was important in making, confirming or modifying the diagnosis or in altering the course of treatment. In a further 45 per cent, it was optional and in only 23 per cent was it unnecessary. In trying to establish which modality gave a firm diagnosis, Cofield found that arthroscopy was twice as accurate as a combination of history, examination and routine radiographs.

The author's experience with the first 50 shoulder arthroscopies[2] was similar. In 27 cases out of 50, the diagnosis was changed or refined. In particular, dual or even triple pathology was found, and unexpected rotator cuff tears and loose bodies were not uncommon findings. Such a high diagnostic score has brought some shoulder surgeons to contemplate the need for shoulder arthroscopy in the majority of patients presenting with significant shoulder disorders. Logistically of course, this is not possible and so we have to consider which particular groups of patient can benefit most by diagnostic shoulder arthroscopy. There are four groups in whom shoulder arthroscopy is most helpful:

- *Patients aged 18–35, with recurrent shoulder discomfort following trauma*: It is becoming clearer that pain following trauma to the shoulder in young people is often due to instability. Rowe and Zarins' classic paper[3] describing transient subluxation and the dead arm syndrome initially brought this to the attention of the general orthopaedist, but this can be a difficult diagnosis to confirm.

Shoulder arthroscopy can be useful in this group, particularly if a Bankart lesion is present.

Damage to the inferior glenohumeral ligament, with or without a Bankart lesion, and damage to the middle glenohumeral ligaments are further pointers. There may be a Hill–Sachs lesion on the humeral head, some of which may be cartilaginous only, and therefore not show up on a Stryker Notch (West Point) radiograph. A loose body in the joint is most commonly associated with a Hill–Sachs lesion following an episode of dislocation, and damage to the anterior glenoid rim may be a further indication of recurrent subluxation.

Just as important as shoulder arthroscopy in this group is the examination under anaesthetic (EUA). This is a load and shift test and is described on page 36. To many surgeons, the EUA is actually more important than arthroscopy in recurrent subluxation. Certainly it should never be omitted. EUA should be performed before the arthroscopy, as it is easier in a fresh joint, before distension has been carried out. The problem with performing the EUA first is that it may cause intra-articular bleeding, but this can be controlled by adequate lavage (Figure A).

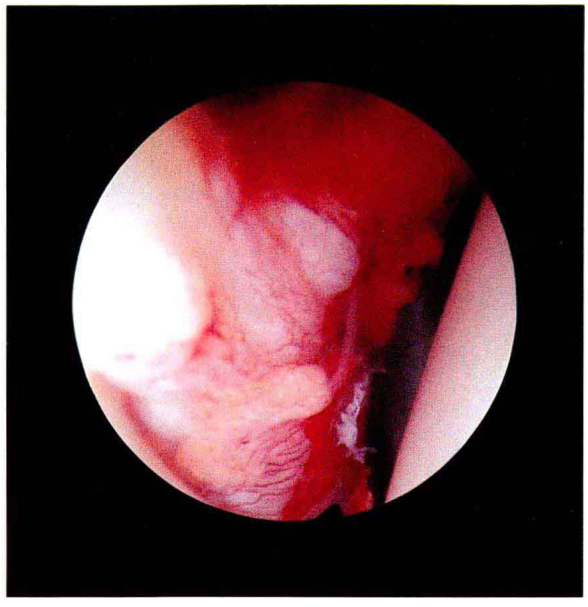

Figure A

Bleeding from a Bankart lesion following examination under anaesthetic can be controlled by lavage.

■ *Patients over 35, with chronic subacromial impingement*: To the shoulder surgeon, the painful arc is one of the most common presentations. Typically, patients complain of a painful arc of movement in the range of 70 to 120 degrees of elevation. If this does not settle within six months, with either physiotherapy or local installation of one injection of steroid, then arthroscopy is indicated (Chapter 8).

In particular, the surgeon will be looking for evidence of a rotator cuff tear (Figures B and C). Arthroscopically, the insertion of both supraspinatus (Figure D) and infraspinatus can be seen at the synovial reflection onto the humeral neck. Supraspinatus inserts onto the greater tuberosity behind the tunnel of the long head of biceps, the tendon being used as a landmark. Infraspinatus inserts onto the bare area of the posterior humeral head (Figure E).

The arthroscopist has the advantage over the radiologist in that the superior surface of the rotator cuff can be visualized as well, by performing a bursal endoscopy. The classic impingement lesion, an area of 'hairy degeneration' of the superior surface of the rotator cuff, may be seen (Figure F), or there may be a partial tear or ruffling up of the cuff. Any abnormality of the cuff can be probed, giving further tactile information. Partial thickness tears, which would not be visualized arthrographically, or areas of inflammation can be seen (Figure G) and probed. Tendinitis of the long head of biceps (Figure H) may be a marker of impingement and cuff tear.

■ *Atypical shoulder pain*: In the past, this had to be managed empirically, for a definite diagnosis could not be made. Under these

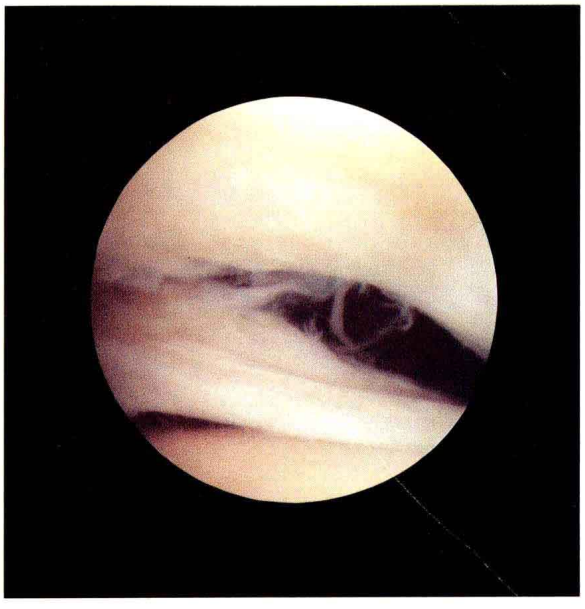

Figure B

A full thickness rotator cuff tear above the humeral head.

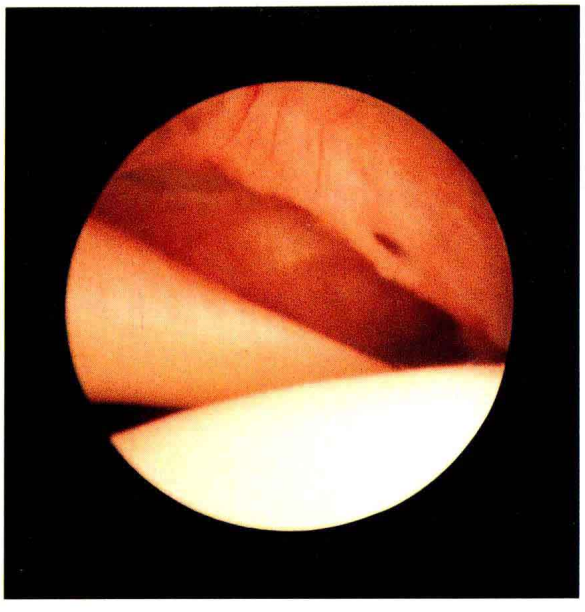

Figure C

The rolled mature edge of a rotator cuff tear next to the long head of the biceps tendon.

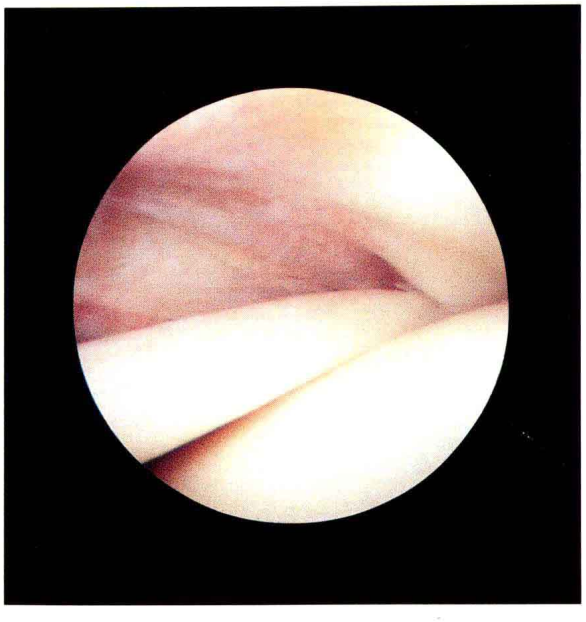

Figure D

The insertion of supraspinatus next to the long head of biceps.

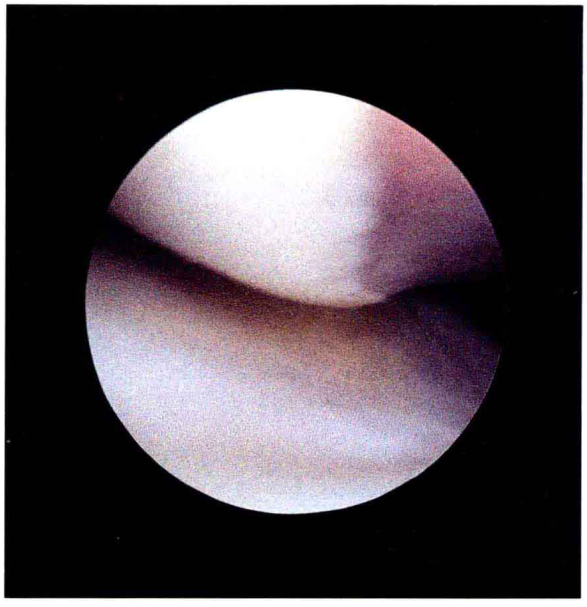

Figure E

The bare area of the humeral head.

Figure F

The impingement lesion, a 'hairy degeneration' of the superior surface of the rotator cuff.

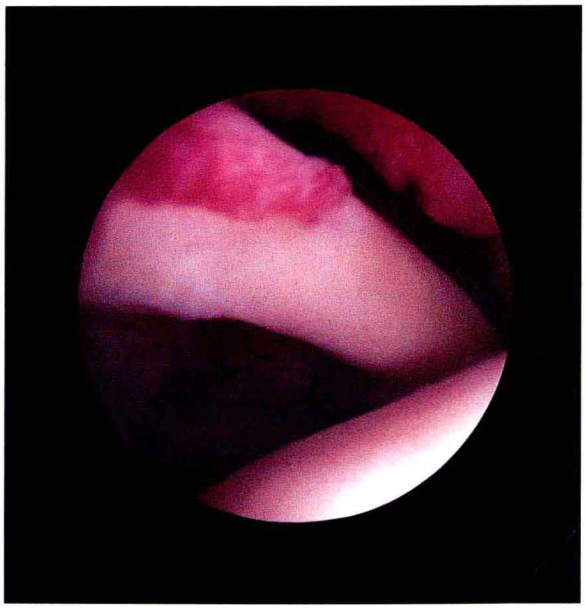

Figure G

Inflammation of a partial thickness rotator cuff tear seen above an equally inflamed biceps tendon.

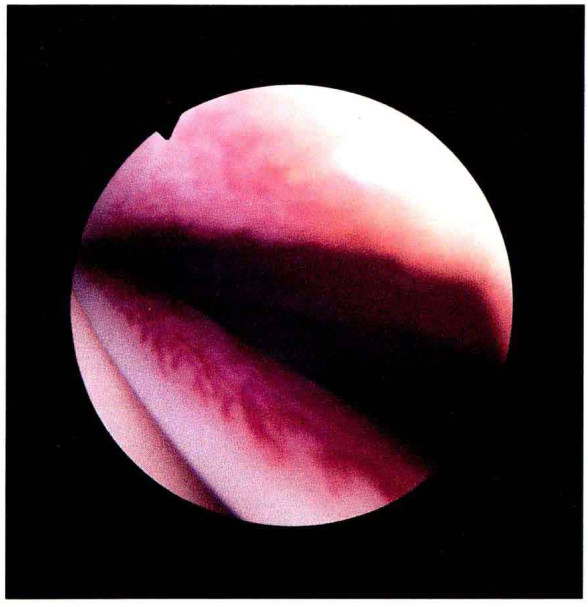

Figure H
Synovitis of the superior half of the biceps tendon.

Figure I
Repairs of the rotator cuff can be difficult to see (and therefore to photograph). Seen here is an Ethibond suture of a rotator cuff repair just above the long head of the biceps tendon.

circumstances, arthroscopy can be of great value. In particular, the following diagnoses can often be missed clinically:

— glenoid labral tears, which may give intermittent shoulder pain or unpredictable locking or catching of the joint
— instability with no good history of initial dislocation
— loose bodies
— early degenerative arthritis.

■ *Failed previous shoulder surgery*: With patients whose symptoms persist after open shoulder surgery, the first factor to be considered is whether the original diagnosis was correct. As discussed, Cofield's work[1] makes clear that clinical diagnosis is an unpredictable art. For this reason, shoulder arthroscopy can be useful. Diagnosis may be changed or confirmed, or a second pathology revealed.

However, assessment of the rotator cuff can be very difficult after previous open surgery. For example, the arthroscopist may be misled when thin scar tissue gives the impression that the cuff is intact, although mechanically the cuff behaves as if it were disrupted. Cuff function is dependent on a good mechanical reconstruction with full thickness cuff material. Furthermore, adhesions may develop in the subacromial bursa, making visualization of the cuff repair difficult (Figure I).

Other areas where symptoms may remain following open surgery are unrecognized loose bodies, labral tears and early degenerative arthritis.

Arthroscopic surgery

During the latter half of the 1980s it became rapidly apparent that arthroscopy could not only be used as a diagnostic aid around the shoulder, but that it could be used therapeutically.

Immediately a philosophical enigma arose, namely that if arthroscopic surgery was more difficult and less successful than open surgery, then how could it be justified? Avoidance of scar tissue and speed of recovery seemed to be given more emphasis than the efficacy of treatment and the long-term outcome. Added to this was the problem that patients started to vote with their feet, for they had seen how successful minimally invasive surgery had been in the knee, and wanted their shoulder surgery performed by what the media labelled 'painless, bloodless surgery'.

We have subdivided the plethora of arthroscopic surgical procedures into five generations of increasing complexity (see page 125). Generally the earlier generations of surgery are technically easier and the results are better. Removal of loose bodies and trimming of labral tears are in generation one. Both of these procedures are relatively easy to carry out and can give significant benefit to the patient, with minimal risk of morbidity.

The best of the second generation procedures is arthroscopic subacromial decompression (ASD) (Chapter 8). The medium-term results of this type of surgery in experienced hands is excellent and its popularity will increase in the next five years. However, it is technically difficult with a long learning curve.

The third and fourth generations of arthroscopic surgery are forms of anterior reconstruction and complex reconstruction of traumatic instabilities (Chapter 9). The five-year results from the pioneering centres are just becoming available and these show 80–90 per cent short-term success rates[4]. Since these results are from the best centres, by the most skilled surgeons using the most up-to-date equipment, in a concentrated practice, then it is unlikely that the occasional arthroscopic shoulder surgeon will be able to achieve anything like such good results. This should be compared with the 90–95 per cent long-term success rates of open repair techniques such as the Bankart repair, and the Magnusson Stack procedure.

Arthroscopic repair, however, has a shorter learning curve than ASD. The arthroscopic views far exceed the view at open surgery and, in many ways, the procedure is 'easier' than the open procedure, which is technically demanding. This is the area of surgery of most rapid change and evolution and it would be wise for the inexperienced to avoid these procedures until further data is recovered from prospective controlled studies. Whether this advice can hold back the tide of patients who will demand this type of surgery, history alone can tell.

The final and fifth generation of arthroscopic surgery includes rotator cuff repair. There is a place for the arthroscopic repair of small rotator cuff tears at present. This can be carried out either with small arthroscopic suturing instruments under vision, or by using arthroscopic staples which are retrieved arthroscopically at six weeks, so as not to cause any damage to the undersurface of the acromion.

Arthroscopic debridement for massive rotator cuff tears is stated to relieve pain, although of course it cannot increase shoulder function. Acceptable results are not presently reproducible, and again this type of surgery should only be performed as part of a prospective controlled series, the patient having undergone informed consent as to the unpredictable nature of the results.

It has to be said that there is increasing concern expressed by all shoulder surgeons about the insertion of metal around the shoulder joint. Metal implants of all types (staples and screws) are known to move frequently from their initial position if placed around the shoulder. Presumably this occurs because of the shoulder's large range of motion and the excessive forces which will occur as a consequence on

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these metal implants. The shoulder also seems to attract metal implants, and once metal enters the shoulder joint it can lead to rapid and devastating loss of the articular surface. In order to circumvent this problem, biodegradable staples are currently being tested.

Naturally, arthroscopic surgery should not be attempted without adequate training. Hopefully this and other books will be a good starting point for surgeons in training, or for surgeons who want to develop the techniques of diagnostic shoulder arthroscopy. The next stage is to attend a shoulder arthroscopy course and then to work with an experienced shoulder arthroscopic surgeon. Only after performing some 50 diagnostic arthroscopies should the aspiring shoulder arthroscopist attempt the more simple 'first generation' techniques. Second generation surgery should only be undertaken after 100 diagnostic arthroscopies have been performed, and presently third generation surgery and upwards should only be performed by skilled shoulder arthroscopists as part of prospective controlled studies.

Finally, it must be remembered, that arthroscopy alone may help the patient but it is not a cure. Most cures for the 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, or develops, the skills of open shoulder surgery. Over the last few years, minimally invasive surgery of the shoulder using the arthroscope has begun to show promise. Just as arthroscopic meniscectomy popularized the use of the arthroscope in the knee, this ability to treat shoulder disorders arthroscopically may well drive shoulder arthroscopy in the coming years. For this reason, we have included three chapters on arthroscopic surgery of the shoulder, while realizing that this is such a rapidly changing field that methods outlined in this book will inevitably be replaced by even better techniques in years to come.

1 Extracapsular anatomy for shoulder arthroscopy

Introduction

The shoulder is the root of the upper limb. Because of this, the anatomy surrounding the joint is much more complex than the knee, and the hazards correspondingly greater for the arthroscopist. The knee is a simple joint to arthroscope as the soft tissue envelope around it is thin, the joint space can easily be felt, and landmarks are simple to distinguish. There are only two hazards: the neurovascular bundle and the lateral popliteal nerve, helpfully located far from the usual portal sites. This should be contrasted with the shoulder which has a thick, soft tissue envelope, where the joint space cannot be felt, landmarks may be difficult to distinguish, particularly in obese or muscular patients, and the joint is surrounded by six major nerves – the axillary artery, and five of its six branches, as well as the cephalic vein. Thus, not only is the anatomy more complex but major nerves are situated only millimetres from the two major portals. The suprascapular nerve passes 1 cm from the posterior joint line, and the musculocutaneous nerve enters the coracobrachialis directly in front of the anterior joint line. Nerve injury to the brachial plexus,[1] the musculocutaneous nerve[2] and the median nerve[3] have all been reported. For these reasons, an intimate knowledge of gross shoulder anatomy is an absolute prerequisite to the aspiring shoulder arthroscopist.

Various dissections of the shoulder may be performed in order to examine the relationship of the nerves and vessels to the normal arthroscopic portals. This chapter is based on such observations.

Posterior portal

Figure 1.1 shows the muscular anatomy of the right shoulder, as seen from behind. The only constant and useful landmark is the posterior angle of the acromion. The posterior portal is placed 2 cm inferior and medial to this constant point (Figures 1.2 and 1.3).[4–7] The first muscle layer that the arthroscope will traverse is the deltoid muscle (Figure 1.4). If the dissection is taken further so that deltoid is detached from the acromion and spine of the scapula, and folded forward (Figure 1.5), the next anatomical layer can be seen.

The first structure to note is the axillary nerve emerging, along with the posterior circumflex humeral vessels, from below teres minor. This neurovascular bundle is only 3 cm below the posterior portal (Figure 1.6), a point of great importance if a second, accessory posterior portal is made in order to perform arthroscopic surgery (for instance, the removal of loose bodies from the infraglenoid recess). The axillary nerve has a singularly inappropriate name,

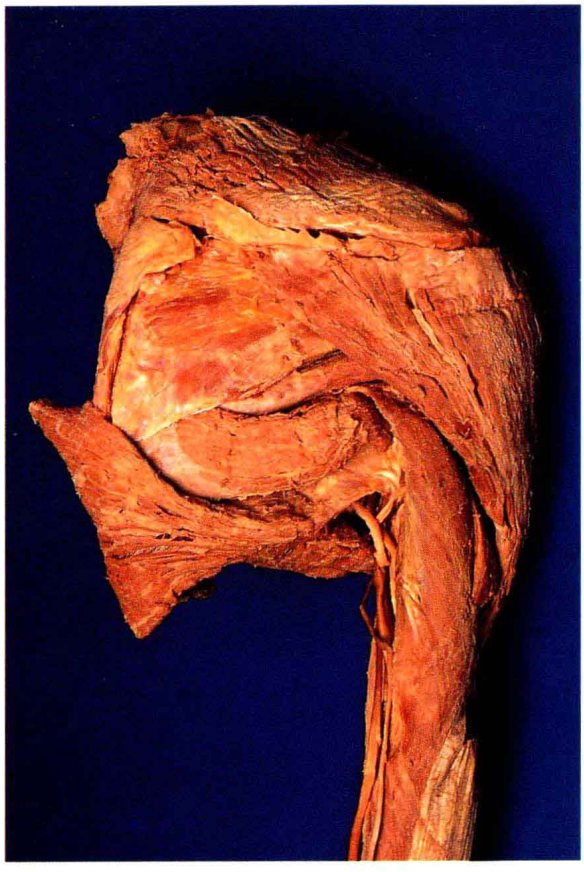

Figure 1.1

Muscular anatomy of the right shoulder seen from behind. The constant landmark is the posterior angle of the acromion, which you can feel on your own shoulder.

Figure 1.2

The posterior portal is situated 2 cm medial to and 2 cm inferior to the posterior angle of the acromion, as marked on this patient.

for the first thing it does on leaving the posterior cord of the brachial plexus is to pass below the inferior recess of the shoulder capsule and leave the axilla through the quadrilateral space. As can be seen, this is more a slit than a space, with teres major below, then the long head of triceps medially, humerus laterally, and finally teres minor above it.

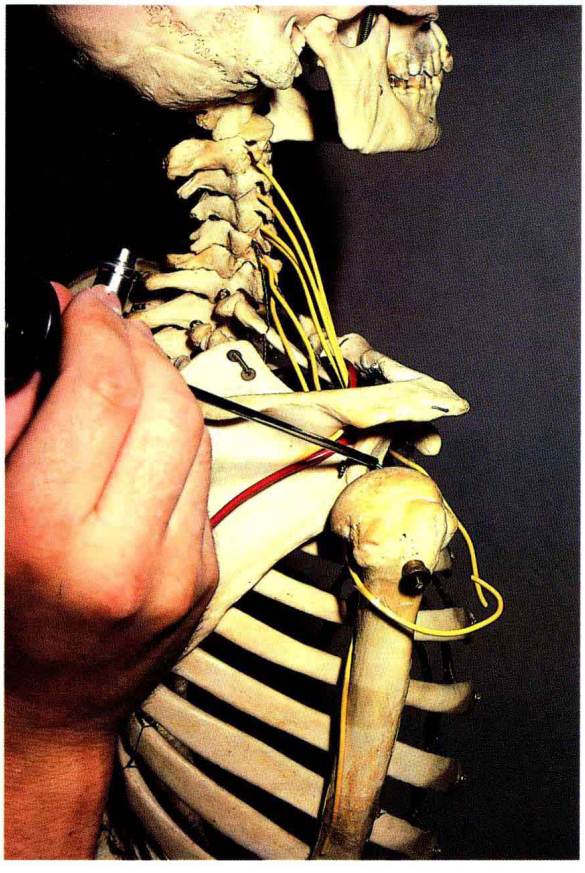

Figure 1.3
The posterior portal on the skeleton and the direction of the arthroscope entering the joint.

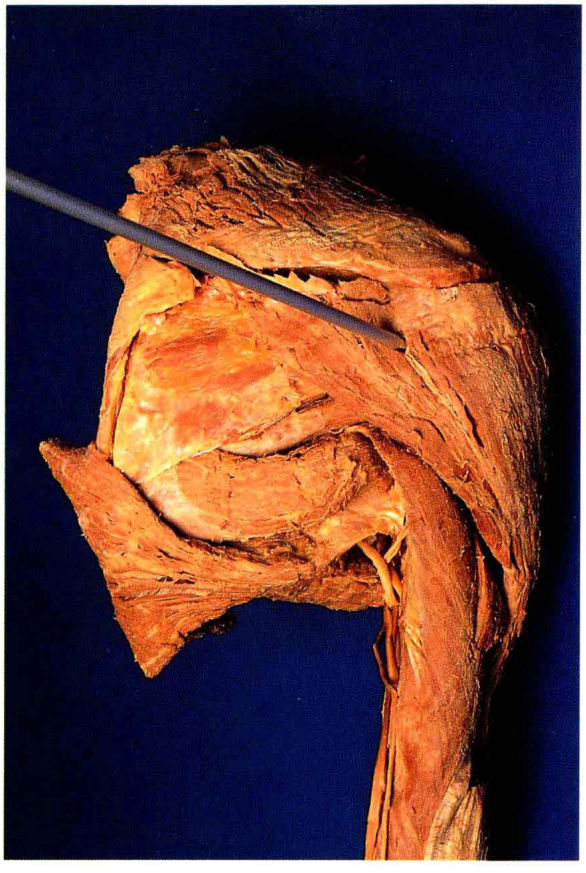

Figure 1.4
The arthroscope first passes through the posterior fibres of deltoid.

As the axillary nerve skirts the inferior border of the shoulder capsule it gives off branches to the joint, and divides into its two terminal branches, the deep and superficial branches. The superficial branch supplies teres minor and then appears behind the posterior border of deltoid to become the upper lateral cutaneous nerve of the arm (not shown on the dissection).

Figure 1.5

Deltoid is now retracted laterally, revealing infraspinatus and teres minor and their insertions into the humerus as the rotator cuff. Note the position of the axillary nerve and the posterior circumflex humeral vessels.

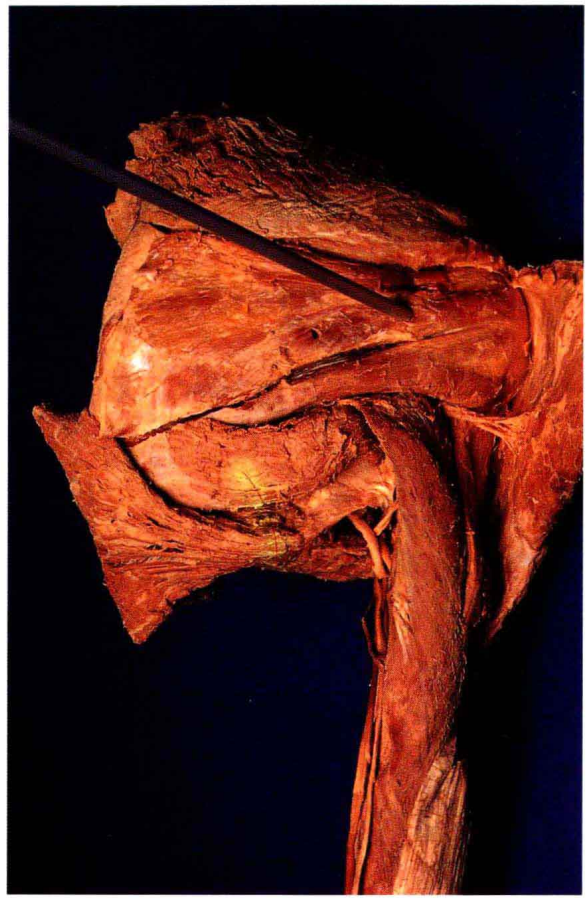

Figure 1.6

Note the distance of the axillary nerve from the arthroscope entering infraspinatus from the posterior portal.

The larger deep branch can be seen to divide and enter the deltoid muscle along with branches of the posterior circumflex humeral artery.

The next muscle layer that the arthroscope passes through is infraspinatus. In the next stage of dissection, infraspinatus has been lifted from its origin on the infraspinous fossa of the scapula, and folded up and outwards so that the track of the arthroscope can be clearly seen as it enters the joint (Figure 1.7), very close to the suprascapular nerve and artery. Branches of the suprascapular artery can be

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