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Arthroscopic surgery of the hip: current status

F. H. Norman-Taylor, R. N. Villar

Department of Orthopaedic and Trauma Surgery, Addenbrooke's NHS Trust, Cambridge, England, UK

Abstract. Arthroscopy of the hip is now recognised as a valuable diagnostic and therapeutic procedure [23]. It is still relatively new and remains largely in the hands of a few specialist centres, but orthopaedic surgeons are increasingly willing to provide it as part of their own service. This article outlines its background and details its clinical and technical application.

Key words: Hip joint – Arthroscopy – Diagnosis – Operative surgery

History

The hip has long been neglected by the arthroscopist. This may be bacause of its apparent inaccessibility or a perceived paucity of indications. In 1931 Michael Burman reported: "We have not been able to separate the apposing surface of the hip joint, and a separation does not seem likely after studying the anatomical structure of the joint" [2]. With the improvements in instrumentation that occurred in the 1970s, however, reports of hip arthroscopy began to re-emerge. These included its use in children [12] [13] the removal of prosthetic debris [21] and synovial biopsy [13]. Improved access to the hip was achieved in the 1980s with the use of specialist traction devices and the instillation of air and saline into the joint to overcome its intrinsic vacuum [9] [5]. In the last 10 years the number of indications and therapeutic options has rapidly expanded.

Materials and methods

Equipment

Hip arthroscopy can be performed using standard arthroscopy, traction and X-ray equipment. Special hip arthroscopy instruments are available, however, and the correct application of traction is most readily achieved using specialist equipment.

Hip distraction

A specially-designed traction apparatus, such as the Arthronix Hip Distractor (Fig. 1, Arthronix Corporation, 510 Route 304, New City, NY, 10956, USA) applies traction in the line of the femoral neck. This is achieved by simultaneous longitudinal traction via a traction boot and lateral displacement by a perineal bar. A tensiometer measures the force applied. Excellent access to the joint is achieved and this is the method of choice for the majority of procedures. It allows 1.5 to 4.0 cm of distraction with less than 25 kg of traction. One of the disadvantages of this type of distraction is the need for the patient to lie in the lateral decubitus position, limiting the use of the anterior approach. In addition, at present such devices are expensive due to the low demand for them, and surgeons performing only occasional hip arthroscopy may prefer to use a standard orthopaedic traction table. In this case the patient is supine, allowing the use of the anterior approach as well as the lateral approach. It has the disadvantage, however, of limited distraction.

Correspondence to: F. H. Norman-Taylor, FRCS, Orthopaedic Registrar, Clinic 1, Box 37, Addenbrooke's NHS Trust, Hills Road, Cambridge, CB2 2QQ England, UK

Arthroscope

The hip joint is deep-seated. Its shape and its sturdy surrounding structures require a 4.5 mm minimum diameter arthroscope. Standard length arthroscopes are usually adequate, except in obese patients for whom specially lengthened arthroscopes can be used. A viewing angle of 70 degrees is the most useful, but a 30 degree arthroscope and a range of further viewing angles should be available. A camera system is essential in order not to compromise sterility. Video recordings and still photographs can be obtained in the normal way.

Irrigation

Standard irrigation techniques are used. Sterile normal saline can be delivered directly from a suspended bag or a high pressure pump system can be used, particularly when powered instruments are creating much debris or when bleeding is profuse. In-flow is via a cardiac needle and outflow is via the arthroscope in order to maximise articular distension.

Operating instruments

Manual instruments may be employed, but powered tools are preferred. Those used for knee arthroscopy are generally adequate, but specially-designed instruments are helpful for awkward angles and where extra depth is required. Powered synovectomy and chondroplasty tools are the most useful. The use of laser in the hip is at present undergoing evaluation and has several possible advantages. It can potentially work at any angle, produces less debris and, once in place, requires few further manoeuvres (Fig. 2).

Portals of entry

There are three potential portals of entry: lateral, anterior and posterior. The posterior approach has only been described as an open procedure [10]. A closed posterior approach risks damage to the sciatic nerve and cannot be recommended. The anterior portal was favoured by early

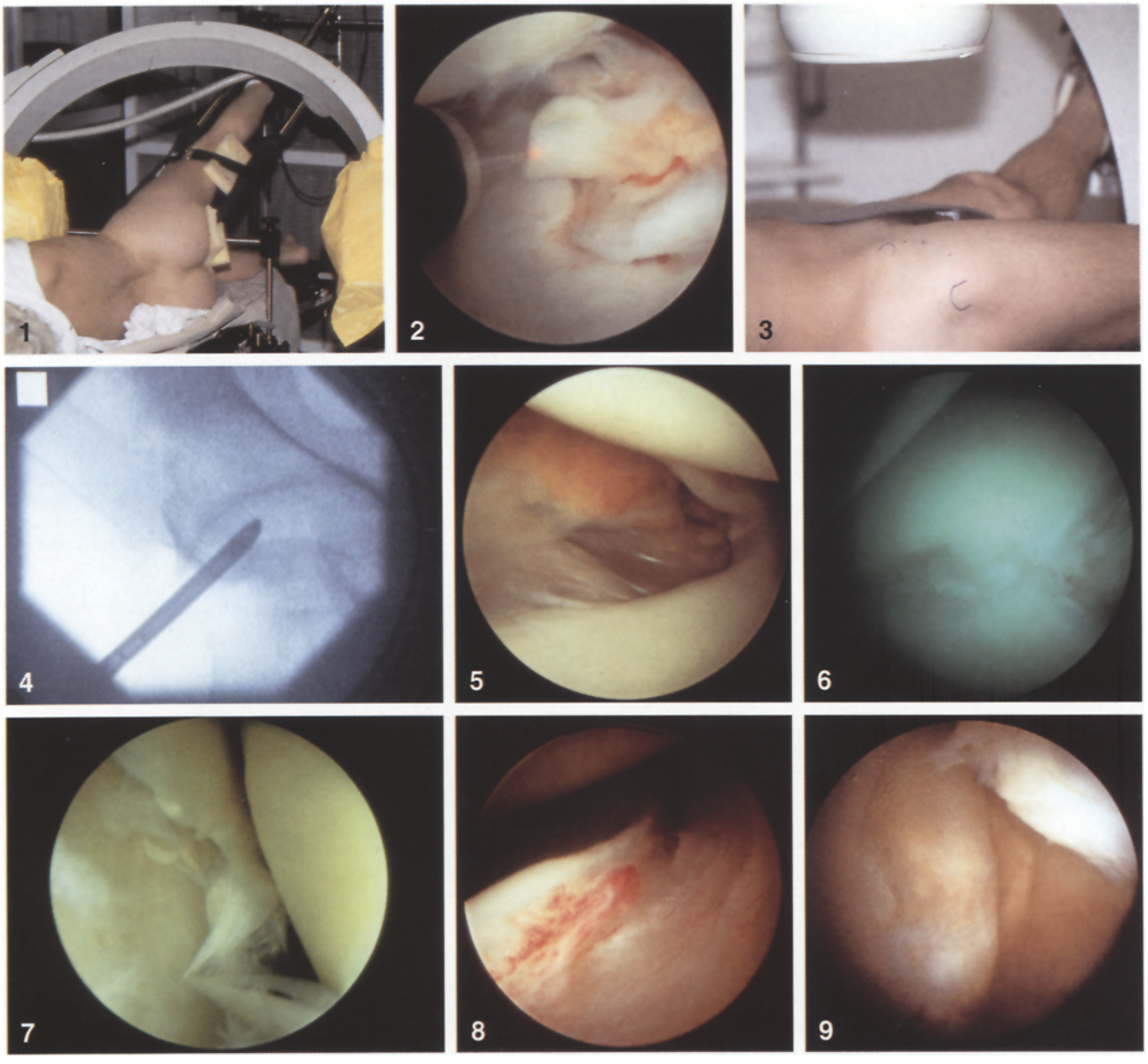

Fig. 1. A specialised hip distractor

Fig. 2. Laser delivery system at work within the hip

Fig. 3. The anterior portal – formed at the junction of two lines. One line extends medially from the tip of the greater trochanter, the other inferiorly from the anterior superior iliac spine

Fig. 4. Image intensifier view of the lateral (supratrochanteric) portal, the arthroscope passing immediately beneath the lateral acetabular margin

Fig. 5. The acetabulum and soft tissue contents of its cotyloid fossa

Fig. 6. The stellate crease. This has been mistaken for an osteochondral defect

Fig. 7. A torn acetabular labrum

Fig. 8. A normal labrum, demonstrating the perilabral sulcus

Fig. 9. An osteochondral defect of the femoral head

hip arthroscopists [1] [19]. However the lateral cutaneous nerve of the thigh and the femoral nerve and vessels are at risk, and many surgeons now prefer the lateral portal [9] [16]. The lateral portal provides access to the weight-bearing surfaces of the joint. With either approach, muscles are traversed, and bleeding may occur.

Anterior portal. The entry point for the anterior portal is at the intersection of a transverse line at the level of the greater trochanter and a longitudinal line running distally from the anterior superior iliac spine. This is normally about 4 cm lateral to the femoral artery (Fig. 3). This approach provides access to the inferior recess, the anterior aspect of the femoral head, acetabulum and the ligamentum teres. Views of the medial part of the joint are difficult, but at least one-third of the femoral head and one-quarter of the acetabulum should be seen [13].

Lateral (supratrochanteric) portal. The instruments are passed just proximal to the tip of the greater trochanter and under the superolateral margin of the acetabulum (Fig. 4). Excellent views of at least the upper two thirds of the hip joint can be obtained. With adequate distraction, 90% of the acetabulum and 50% of the femoral head can be seen. It is possible to vary the exact entry point of the portal peroperatively in order to improve access or visualisation. Adjusting the position of the femur improves the exposure only a little. Additional entry points 2 or 3 cm anterior or posterior to tip of the greater trochanter allow the passage of instruments and irrigation cannulae.

Arthroscopic anatomy

The hemispherical femoral cartilage is seen as a crescent through the arthroscope. The ligamentum teres inserts into the anteromedial bare area. The acetabular cartilage is recognised by its concavity. Its cupped horseshoe shape can be readily appreciated, and the acetabular fossa lies medially between its two limbs (Fig. 5). The open end is bridged by the transverse ligament. The hyaline cartilage extends from the labrum peripherally to the acetabular fossa centrally, where it has a rounded edge. A silvery stellate crease is often seen in the articular surface at the apex of the fossa (Fig. 6). This is an area deficient in hyaline cartilage and may be mistaken for early degenerative change. The acetabular fossa contains dense fibrous tissue superiorly. Its inferior two-thirds are filled with loose, vascular adipose tissue, which may become pedunculated. Synovial tissue extends into the fossa from the inferior recess. The ligamentum teres arises in the fossa near the posteroinferior insertion of the transverse ligament. It has a similar arthroscopic appearance to the anterior cruciate ligament of the knee, and may be totally ensheathed in synovium. The labrum is attached around the periphery of the acetabulum and is separated from the acetabular cartilage by a distinct groove. The labrum is usually triangular in cross-section and is usually thicker laterally than medially. It is most commonly inverted, but may be everted, in which case it is difficult to see. It may be mobile or torn (Fig. 7) and may or may not be continuous with the transverse ligament. A perilabral sulcus separates the labrum from the synovium (Fig. 8) and may be responsible for the incorrect diagnosis of a labral tear on arthrography or MRI. A normal labrum has no vascular features, but when torn, it often has a haemorrhagic appearance. A capsular condensation, embracing the femoral head, called the zona orbicularis may be mistaken for the labrum. The capsule is lined with a pink, vascular synovium, which may be fronded or pedunculated. A haemorrhagic appearance in the synovium, if not pathological, may be due to distraction. Synovial gutters are found on the anterior and posterior sides of the femoral neck [16].

Indications and results

Diagnostic

Hip arthroscopy has an important role in the management of unresolved hip pain. It will provide a diagnosis in 40% of patients in whom all other investigations have been inconclusive [8]. Non-invasive investigations include isotope scans, CT and MRI. Arthroscopy is more reliable than MRI for the identification of chondral softening, fibrillation, chondral defects and labral tears [3]. It also provides an opportunity for biopsy and therapeutic surgery.

Therapeutic

Therapeutic indications include the following:

1) The excision of torn acetabular labra. A torn acetabular labrum can be readily identified and excised arthroscopically, with significant relief of symptoms [14] [20].
2) The removal of loose bodies. Over one hundred loose bodies may be retrieved from a single hip in synovial osteochondromatosis. More commonly, they are seen in osteoarthritis and following trauma [17]. Loose bodies are often difficult to grasp, but many are small enough to be washed out with the irrigation fluid.
3) The symptomatic relief of osteo-arthritis [22]. A 60% improvement in the Harris hip score has been demonstrated following saline lavage and arthroscopic debridement. The response is greatest in young patients with mild to moderate disease and is maintained for up to two years.
4) The treatment of septic arthritis [4] with arthroscopic drainage and lavage.
5) Synovectomy for rheumatoid arthritis and synovial osteochondromatosis has proved highly beneficial [11]. It has also proved useful for the treatment of pigmented villonodular synovitis [15].
6) The assessment and treatment of osteochondritis dissecans [19]. This is often seen on the more accessible anterolateral aspect of the femoral head (Fig. 9) allowing easy inspection and treatment.
7) Pain relief following Perthes' disease and chondrolysis [12].
8) The extraction of loose debris from total hip replacements [18].
9) The beneficial resection of a plica has been reported in two patients [6].
10) Even the retrieval of a bullet from the hip joint has been reported [10].

Operative technique

General or regional anaesthesia may be used, but full muscle relaxation is not essential. Whichever portal is used, three principles apply: Firstly, adequate patient positioning is essential and can take as long as the arthroscopy itself. Secondly, irrigation must be thorough. Bleeding is often profuse and can obscure visualisation. Two in-flow cannulae may be necessary. Thirdly, the manoeuvrability of instruments inside the joint is limited to rotation and a few degrees of angulation only. Rotation of a 70 degree arthroscope provides excellent visualisation without angular forces being applied and this is the instrument of choice.

Technique using the specialised hip distractor

The patient is placed in the true lateral position and secured to the traction device via a well-padded boot with the hip abducted 30 degrees. The surgeon and scrub nurse stand

behind the patient. The monitors, other equipment and radiographer stand on the opposite side. An oblique anteroposterior X-Ray is taken and the image is stored on the screen. Lateral displacement is applied via a padded horizontal bar placed against the patient's upper, inner thigh. Longitudinal traction of 20–25 kg can then be applied. Distraction of more than 1 mm on the X-Ray monitor implies that access will be possible. A 22 gauge spinal needle is inserted via the lateral portal to break the vacuum within the joint and to instil 10 ml of normal saline. It is then exchanged for a 14 gauge cardiac needle. Up to 50 ml of saline will allow up to 40 mm of distraction.

The cardiac needle is used to insert a guide-wire, over which sharp and then blunt cannulated arthroscopy trocars can be passed in order to introduce the arthroscope. An irrigation cannula is then inserted about 2 cm anterior to the arthroscope, and an instrumentation portal is established 2–3 cm posterior to the arthroscope. This portal is maintained using a plastic sleeve inserted with the trocar. More than one such portal may be created. To provide more room, the irrigation cannula can be moved to an anterior portal.

At the end of the procedure, the hip is thoroughly irrigated and residual saline drawn off. This is replaced with 0.5% bupivacaine before the traction is completely released.

Post-operative care

It is normal for the portals to leak for a few hours. Patients should remain non-weight-bearing for at least five days, while they pursue a diligent physiotherapy programme. There are otherwise no restrictions and hip arthroscopy is a suitable day-case procedure. Post-operative pain is usually slight, and tends to settle after a week. Persistent pain should respond to continued non-weight-bearing and physiotherapy.

Complications

Complications are rare. Articular cartilage scuffing and traction neurapraxia are reported to be the most frequent [7] [22]. Damage to the articular cartilage is most likely to occur on insertion of the cardiac needle or the sharp trocar. The needle should be passed with the bevel towards the convexity of the femoral head. The sharp trocar is best inserted with a gentle twisting action. There is a distinctive give as the capsule is breached and the trocar should be advanced no further. X-Ray control should be used throughout.

During prolonged procedures, there is a risk of skin pressure necrosis. The traction boot and perineal bar should be therefore well-padded, and the traction released while the surgeon scrubs. After about 30 minutes of traction, the force may be reduced to only 16–17 kg. The irrigation fluid pressure should be then adequate to maintain distraction.

The additional potential problems common to all forms of traction and arthroscopy also apply. Infection has not been reported, and antibiotics are not routinely given.

Summary

Hip arthroscopy has developed significantly in recent years, and a considerable wealth of experience has now been established. Its true potential, however, will not be realised until it is available to all patients as a logical step in the investigation and treatment of hip disorders. The ability to perform a hip arthroscopy is not an indication to do so, but its diagnostic and therapeutic value cannot be disputed.

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