Focus On
Hip arthroscopy

Introduction
The famous quote from Burman (1931) that it was “manifestly impossible to insert a needle between the head of the femur and the acetabulum” may well have been interpreted as a challenge to the early pioneers of hip arthroscopy. The technique did not gain much acceptance until the late 1970s. Even in the late 1980s hip arthroscopy was considered by many to be a technically demanding operation looking for a true indication rather than a procedure for which there were specific indications. Today, a greater understanding of hip pathology particularly impingement, advances in techniques, specifically designed instruments and appropriate training have rapidly popularised this procedure.

Pre-operative planning and diagnosis
As with any intervention pre-operative planning and careful patient selection are imperative. A careful history should be taken followed by a thorough hip examination. Common findings, particularly in impingement, include a reduced range of internal rotation and pain on internal rotation at 90° of flexion (the impingement sign). Any provisional diagnosis should be confirmed by imaging; however, many imaging modalities such as plain radiographs, CT and bone scanning have a low specificity for diagnosing intra-articular disorders. MRI has proven to be extremely useful in this regard but still has limitations. Labral pathology is best diagnosed by MRI arthrogram. Imaging is also essential for planning impingement surgery; anteroposterior (AP) pelvis and frog-leg lateral radiographs are commonly supplemented with 3D CT reconstructions in order to visualise the extent of any cam or pincer lesion.

Surgical details
The procedure itself can be undertaken with the patient either supine or lateral. Specialist distraction devices are available for both approaches but the fundamentals of the approach are identical. A wide perineal post and a well-padded boot on the foot are essential to reduce the risk of traction injury. Image intensification is used throughout the procedure to confirm the position of instruments. Initial hip distraction is confirmed by the presence of the ‘halo sign’ - visualisation of a vacuum forming in the joint. A long needle is passed into the joint followed by a guide wire. Cannulated instruments are then passed over the wire to dilate the thick joint capsule. After insertion of a 70° arthroscope subsequent portals are placed under direct vision via the same technique. Common portals include anterolateral, anterior and posterolateral. A fluid management system is used at a pressure of 50-60 mmHg, however values up to 100 mmHg can be used with safety. A diagnostic round of the central (intra-articular and intra-capsular) compartment is undertaken and any pathology treated. Subsequently the traction is released, the hip flexed and the peripheral (extra-articular and intra-capsular) compartment entered. This is where treatment of any cam impingement lesion can be undertaken.

Indications
Hip arthroscopy has both diagnostic and therapeutic indications the latter of which are many, varied and ever expanding. The principal indications include:

- Acetabular labral injuries. The labrum is a triangular fibrocartilaginous structure deficient inferiorly where it is completed by the transverse acetabular ligament. Its primary function may well be to act as a fluid seal improving joint lubrication. Labral tears are associated with acetabular dysplasia, slipped capital femoral epiphysis (SCFE), Perthes’ disease, trauma, femoroacetabular impingement and chondral lesions.

- Femoroacetabular impingement. Two distinct types of impingement, cam and pincer, have been described although many patients have a mixed picture with both morphologies occurring simultaneously. Pincer impingement is a result of anterior overcoverage or retroversion of the acetabulum while cam impingement is secondary to abnormal morphology of the femoral head/neck junction. It has been hypothesised that cam impingement is secondary to a previously missed or subclinical SCFE although several other associations have been documented. Both types result in repetitive microtrauma to the acetabular labrum and acetabular articular cartilage. This process of damage accrues with time leading to unstable delamination of the cartilage (wave, or carpet sign), chondral tearing and eventually osteoarthritis.
Open surgical dislocation techniques have been described for the treatment of such lesions, but arthroscopy provides an attractive alternative, as it is less invasive with a lower risk of complications. The principal aim of arthroscopic treatment is to improve clearance for hip flexion. For cam lesions this involves excising the prominent bone over the anterior aspect of the femoral neck and creating an adequate head/neck offset with an arthroscopic burr. Treatment of pincer impingement involves excising the prominent bone over the anterior aspect of the acetabular rim and subsequent reattachment of the labrum. Intra-operative assessment of the adequacy of resection can be achieved with a dynamic impingement test under direct vision.

However, no long-term results are available for this treatment, but short-term results appear encouraging with good symptom relief and return to sport in active individuals. It remains to be seen whether the development of osteoarthritis can be prevented in the long-term.

**Chondral lesions.** Chondral lesions may be difficult to diagnose using imaging techniques including MR arthrography, especially if less than 1 cm in diameter. They have a close association with impingement and often occur in the anterior aspect of the acetabulum. Other associations include traumatic hip dislocation, lateral hip impact injury, SCFE, Perthes’ disease and osteonecrosis.

Arthroscopic evaluation offers excellent views of such lesions and provides important diagnostic and therapeutic options. Debridement back to a stable margin in order to halt further migration of the lesion has been shown to be successful in terms of symptom resolution. In certain circumstances such lesions may even be suitable for employing microfracture techniques to promote cartilage regeneration. Additionally, recent developments have been made in the field of autologous chondrocyte implantation, a technique which has been shown to provide improved short-term results when compared with simple debridement. The major prognostic factors for chondral lesions are the extent of the flaps themselves and the timing of their diagnosis.

**Less common indications.** Other proven indications include the diagnosis and treatment of synovial conditions such as rheumatoid arthritis and synovial chondromatosis where arthroscopy can be used diagnostically for biopsy as well as therapeutically by synovectomy. Loose bodies secondary to chondromatosis, trauma and osteochondritis dissecans can also be removed using this technique.

Additionally arthroscopy can also be used in the treatment of hip instability by permitting capsular shrinkage similar to that in the shoulder as well as repairs and debridement of tears to the ligamentum teres. As with the knee, hip arthroscopy has a role in the treatment of septic arthritis where it permits adequate lavage and debridement as well as synovial biopsy in cases where cultures are inconclusive.

Recent significant advances in extra-capsular arthroscopy have also been made and several procedures, including debridement of the trochanteric bursa as well as suture repair of tears of the gluteus medius/minimus tendons have been described.

**Contraindications**

As with most procedures contraindications to hip arthroscopy exist. Advanced osteoarthritis, ankylosis, osteomyelitis of the femoral head or acetabulum, heterotopic ossification and protrusio preventing access to the central compartment despite distraction, are all contraindications. The presence of skin ulceration or pressure sores within the operative field also prevents surgery. Debate exists as to whether osteonecrosis of the hip is a contraindication, with some authors advocating that it can play an important role in the treatment of this pathology. Relative contraindications are similar to other lower limb operations and include significant medical comorbidities, as well as obesity, which adds to the technical difficulty of the procedure.

**Complications**

Hip arthroscopy is a safe procedure. The overall complication rate is of the order of 1.4%. Prolonged traction can risk palsies of the sciatic nerve, lateral cutaneous nerve of the thigh, femoral, perineal and pudendal nerves. These neuropaxias are all documented as transient in nature. Less common complications include pressure sores, vaginal tears, scrotal ischaemia, instrument breakage and fluid extravasation. Failure to gain access to the central compartment should be considered a complication, ultimately preventing a thorough arthroscopic examination of the hip. Infection, portal wound bleeding and haematoma are also rare but recognised complications. Three exceptionally rare complications have all been reported in individual cases, namely femoral neck fracture after osteochondroplasty, osteonecrosis of the femoral head and iatrogenic hip dislocation.

**Future developments**

Few would argue that arthroscopy was not the principal catalyst in revolutionising our understanding of soft tissue knee pathology and biomechanics, and it is hoped that it will provide the same for the hip. The speed of therapeutic development in recent years has directly corresponded to the rate of identification of hip pathologies. Current techniques in early use include autologous chondrocyte implantation, arthroscopically-assisted partial resurfacing, computer-navigated impingement surgery, labral grafting and ligamentum teres reconstruction. There is no doubt that technological advances in the fields of imaging, optics, computer-aided surgery and tissue engineering will play a vital role in the development of hip arthroscopy in the future.

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