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Hip Arthroscopy

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The hip joint has traditionally eluded endoscopic intervention for a combination of reasons. The hip joint is situated deep within extensive muscular and capsular layers and is less accessible than other joints. The femoral head itself is deeply recessed within the acetabulum and cannot be visualized without traction. The surrounding neuromuscular structures are at risk of injury by inaccurate placement of portals. Furthermore, equipment specifically designed for this procedure has been limited. However, hip arthroscopy has evolved considerably in recent years and offers the opportunity of treatment of many intraarticular abnormalities.

Evaluating Patients With Internal Derangement Of The Hip Joint

1. Clinical : Provocative tests have been described of late to identify patients with hip internal derangement, especially with regards acetabular labral tears :

- **Hip impingement test :** the impingement sign is elicited by flexing, adducting and internally rotating the hip which, if positive, provokes pain [Fig. 1].
- **McCarthy sign :** is elicited by fully flexing both hips and then extending the affected hip, first in external and then in internal rotation. A positive sign is indicated by pain being reproduced on extension.

Fig. 1: Hip impingement test for anterior labral tears and anterior rim lesions - the impingement sign is elicited by flexing, adducting and internally rotating the hip which, if positive, provokes pain.

2. Radiological : Structural bony abnormalities associated with 'cam' and 'pincer' type of femoroacetabular impingement have been recognized and can be identified on radiographs. Besides, MRI with gadolinium arthrography has increased the sensitivity of imaging to 94%.

Despite these clinicoradiological advances in patient assessment, arthroscopy remains the most specific and sensitive tool for the diagnosis and management of intra-articular hip pathology.

Positioning and Instrumentation

Hip arthroscopy may be performed in either the supine or lateral position. The supine position allows the use of a standard fracture table and simplicity of positioning, thereby avoiding the need for specialized distraction devices, as well as allowing familiar orientation and optimal access to the direct anterior portal. The lateral position has the advantage of providing reproducible bony landmarks for orientation, allowing peritrochanteric approaches to the hip and also facilitating access to most of the hip. In both positions initially traction is applied to access the central compartment, following which traction is released and the hip flexed up to 90°, for access to the peripheral compartment.

Hip arthroscopy is essentially performed using a long 70 degree arthroscope and extra-long instruments designed to take account of the dense soft-tissue envelope which surrounds the joint. The cannulae used for hip arthroscopy are flexible and are also available in a slotted format to allow the use of curved instruments. The burrs and the shaver blades are modified to provide extra length with both curved and straight options available. Specialised, rigid and flexible radiofrequency probes have been designed for resection of labral and chondral lesions. The flexible radiofrequency probes can be deflected up to 100° allowing access to areas inaccessible to conventional instruments. Recent advances include access systems to facilitate rapid creation of portals and the passage and exchange of instruments An arthropump for fluid management is crucial to obtain a good view of the hip, and pressures as high as 100 mm Hg are required to obtain a good view of the central compartment.

Portals

The significant neurovascular structures that surround the hip, including the femoral nerve and artery anteriorly, the lateral femoral cutaneous nerve anterolaterally, and the sciatic nerve and gluteal vessels posteriorly, make accurate portal placement imperative.

Anterior Paratrochanteric Portal : This portal is located 2 cm anterior and 1 cm proximal to the greater trochanter. Puncture of the joint capsule occurs close to the intertrochanteric line. This approach allows visualization of the anterior femoral neck and head as well as the intrinsic capsular folds. Synovial foalds beneath the zona orbicularis and the raised lip of the labrum are well seen. However, because of the high degree of obliquity of the approach and the thickness of the capsule, the arthroscope can be directed too far anteriorly and can potentially damage the femoral neurovascular bundle.

Proximal Trochanteric Portal : This portal is relatively safe. The entry point is just proximal to the tip of the greater trochanter, and the arthroscope is advanced medially and slightly superiorly, directed toward the center of the hip joint. The acetabu labrum, the femoral head, and the fovea can be w visualized through this portal.

Anterior (Anterolateral) Portal : The en point for the arthroscope is at the junction o horizontal line directed medially from the tip of t greater trochanter and a vertical line direct inferiorly from the anterior superior iliac spine. 18-gauge spinal needle is advanced toward t femoral head along a line 45 degrees medial and degrees proximal to this point. The arthrosco passes close to the lateral femoral cutaneous ner and a neuropraxia can occur. Deeper, the ascendi branch of the lateral femoral circumflex artery is risk. This approach allows visualization of the anter femoral neck and superior retinacular fold and t ligamentum teres. A 70-degree arthroscope necessary for visualization of pathologic chang along the anterior labrum or acetabulum.

Posterior Paratrochanteric Portal : T approach is made 2 cm posterior to the tip of t greater trochanter at a level that corresponds to t anterior paratrochanteric portal. The hip should n be externally rotated because the sciatic nerve, whi is nearby, is brought into danger with this maneuv This offers one of the best views of the ligament Weitbrecht and is also valuable for visualizing t posterior capsule and the inferior edge of t ischiofemoral ligament, which is seen as a thickening of the capsule.

Operative Procedure

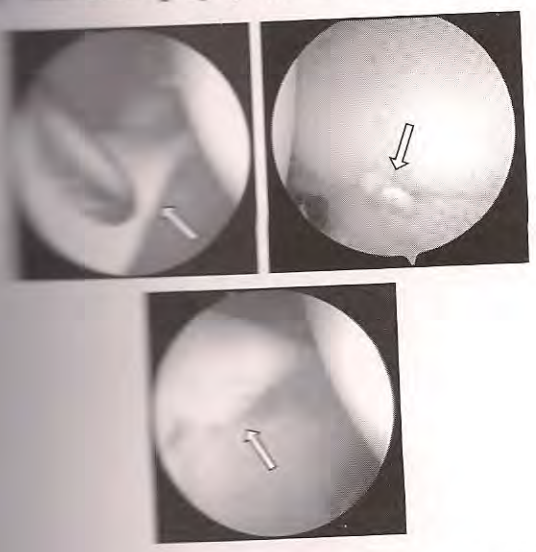
1. Under fluoroscopic control, using flexible guide wires and a cannulated 5 mm arthroscopy trocar and cannula, the lateral paratrochanteric portal Is developed. A long 4 mm. 70-degree arthroscope is then inserted. Fluid inflow is through the arthroscope cannula whereas the outflow is via a 15-gauge needle placed through the anterolateral portal.

2. While performing therapeutic hip arthroscopy a 3-portal technique is often employed with an anterior / anterolateral / posterolateral instrument portal. Through a 8.25 mm plastic cannula curved, incisor shaver blades, arthroscopic

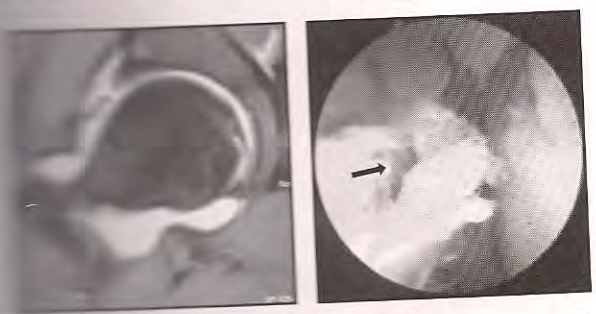
and forceps are introduced into the

Applications of Arthroscopy

Labral Tears : The acetabular labrum is a fibrocartilaginous structure attached at its to the periphery of the acetabulum [Fig. 2]. It functions to enhance stability, preserve congruity and prevent disruption of the sealing mechanism of joint. Labral tears typically present with groin catching, clicking or locking. They frequently in the avascular zone and in the anterosuperior of the acetabulum. Most tears are traumatic and are usually caused by a sudden pivoting action. Labral tears may also be with congenital or structural hip such as Perthes' disease, slipped capital and developmental dysplasia of the MR arthrography has a 92% accuracy in identifying labral tears [Fig. 3]. Most tears fail to heal with conservative treatment and require arthroscopic evaluation and management. Resecting labral tears back to a stable rim using arthroscopic shavers or radiofrequency probes has been the conventional technique of treatment, however repair of labral tears has gained importance in recent years. In patients without arthritic changes, partial labral tear resection results in symptomatic relief in 80% of patients. Along with treatment of the labral tear itself, it is also extremely important to address associated abnormalities such as paralabral cysts [Fig. 4] which are amenable to arthroscopic decompression and other factors responsible for the labral tears in order to avoid recurrence or progression of the disease process.



The acetabular labrum. (a) normal anterior labrum. (b) posterior labrum with calcific nodule, anterior labral tear with rim lesion.



MR arthrography has a 92% accuracy in identifying labral tears.

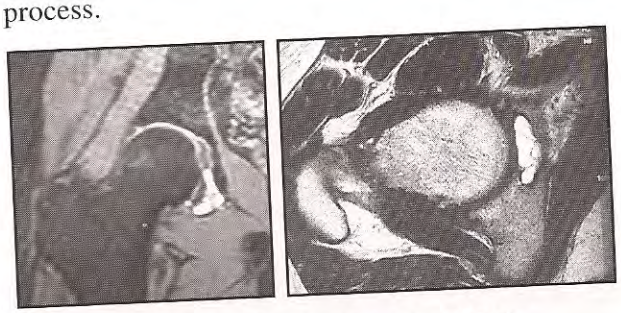


Fig. 4 : Paralabral cyst associated with acetabular labral tear.

Chondral Lesions : Articular cartilage lesions of the the femoral head and acetabulum are often elusive sources of pain in the hip [Fig. 5]. They are frequently associated with labral tears, dislocation of the hip, traumatic lateral impact injury, osteonecrosis,

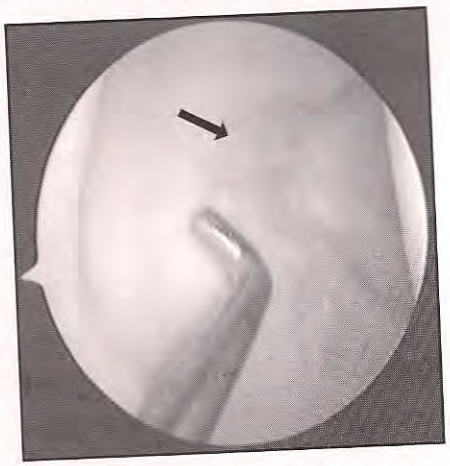


Fig. 5 : Articular cartilage lesions of the the femoral head and acetabulum are often elusive sources of pain in the hip.

slipped capital femoral epiphysis, dysplasia and degenerative arthritis. Arthroscopic treatment includes excision of loose unstable chondral flaps, debridement, and in certain cases the use of a microfracture technique.

Synovial Conditions : Inflammatory synovitis of the hip may be difficult to diagnose [Fig. 6]. Arthroscopy allows both the diagnosis and treatment of conditions affecting the synovium such as pigmented villonodular synovitis, synovial chondromatosis, rheumatoid arthritis and crystalline arthropathies. Biopsy specimens can be obtained for both histologic and microbiologic examinations. The extent of the synovitis and the state of the articular surfaces can be determined. Synovectomy performed with use of arthroscopic techniques may also be useful; however, a total synovectomy is not possible. Because open synovectomy of the hip joint requires dislocation of the femoral head, there has been reluctance to use it in early cases of inflammatory synovitis of the hip joint.

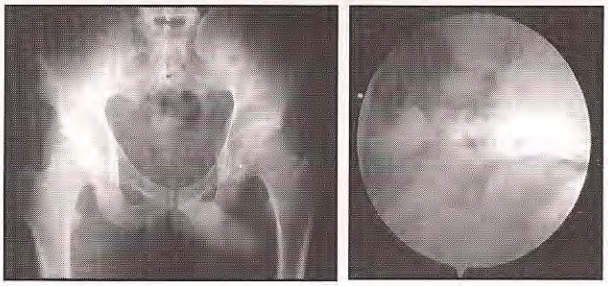


Fig. 6 : Hip arthroscopic biopsy with synovectomy enables accurate diagnosis and appropriate treatment in monoarticular synovitis of unknown aetiology (inflammatory synovitis versus tuberculosis of the hip).

Loose Bodies : Loose bodies can present a major problem in the hip and the patient may present with symptoms of painful locking or catching of the joint [Fig. 7]. The usual conditions which lead to the production of loose bodies include synovial chondromatosis [Fig. 8], Perthes' disease, osteochondritis dissecans and, occasionally, trauma. Arthroscopy is the least invasive method available for the removal of loose or foreign bodies and avoids dislocation of the joint during arthrotomy. Posttraumatic osteochondral fragments, foreign bodies, including wire and cement debris associated with a dislocated hip prosthesis, have also been identified and, and removed arthroscopically.

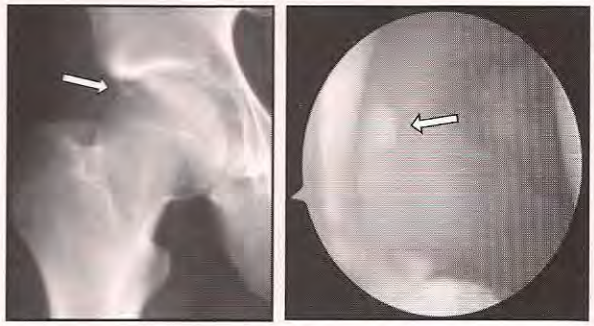


Fig. 7 : Loose bodies can present a major problem in the hip and the patient may present with symptoms of painful locking or catching of the joint.

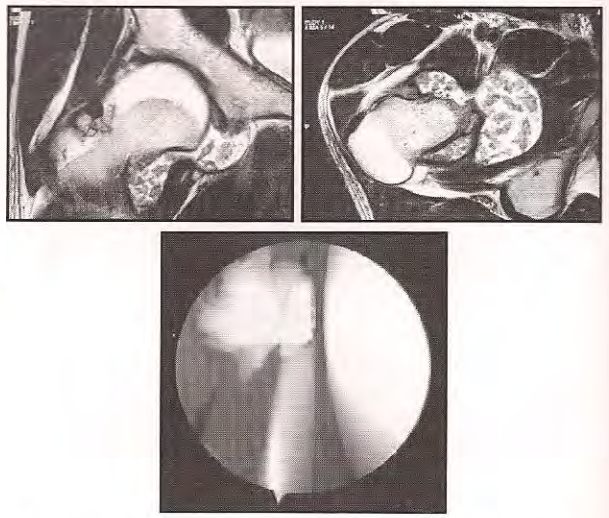


Fig. 8 : Synovial osteochondromatosis of the hip.

Ruptured Ligamentum Teres : The ligamentum teres is an important stabilizer of the hip joint and a ruptured ligamentum can be a source of pain and, occasionally, of locking [Fig. 9]. Tears can be either traumatic (following hip dislocation) dislocation or degenerative (secondary to an ongoing disease process). Arthroscopy allows visualisation of

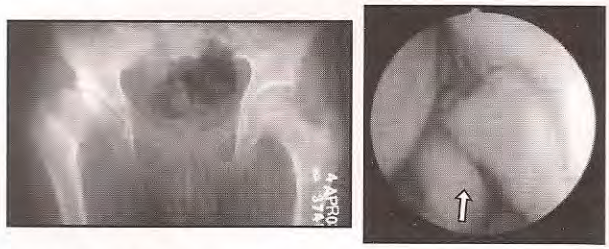


Fig. 9 : Dysplastic hip with ruptured ligamentum teres causing pain and locking.

debridement to abolish pain and

Osteonecrosis : The role of hip arthroscopy and management of osteonecrosis is [Fig. 10]. However, the procedure disease and management of chondral flap lesions. It also enables patients with mechanical symptoms such giving way or clicking secondary to an head, a chondral lesion or a loose

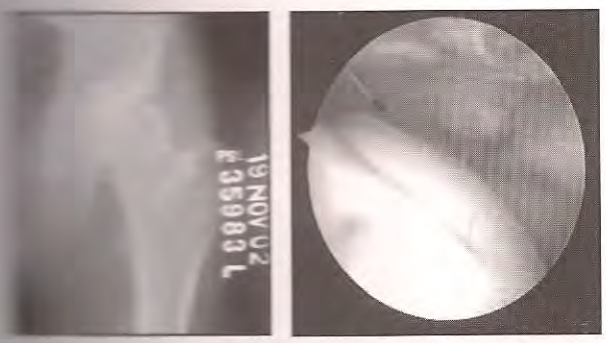


Fig. 10 : Avascular necrosis of the femoral head.

Hip instability : In the presence of hyperlaxity with recurrent instability in the presence of an intact ligamentum teres (e.g. syndrome), capsular plication along with thermal capsular shrinkage has also been described with good short term results.

Septic Arthritis : Hip arthroscopy offers the advantage of a thorough debridement, lavage and in septic arthritis [Fig. 11] without the potential morbidity associated with an arthrotomy. The procedure also allows a minimally invasive opportunity to obtain a synovial biopsy in cases in which the culture is indeterminate.

Fig. 11 : Septic arthritis of the hip.

Osteoarthritis : Hip arthroscopy is a useful tool to identify cases of hip arthritis with early or sectoral chondral loss. The response of the osteoarthritic hip to arthroscopic debridement is however, variable, with less success after debridement of larger lesions. However, for the younger patient, arthroscopic debridement is of value to decrease symptoms for a variable period. The arthroscopic procedure consists of an osteophytectomy, microfracture, removal of loose bodies and debridement of the head-neck junction and the rim.

Femoroacetabular Impingement (FAI) : FAI is the anterior abutment of the proximal femur on the acetabular rim. Recognized recently as a distinct pathological entity and a likely precursor to osteoarthritis, three types have been described.

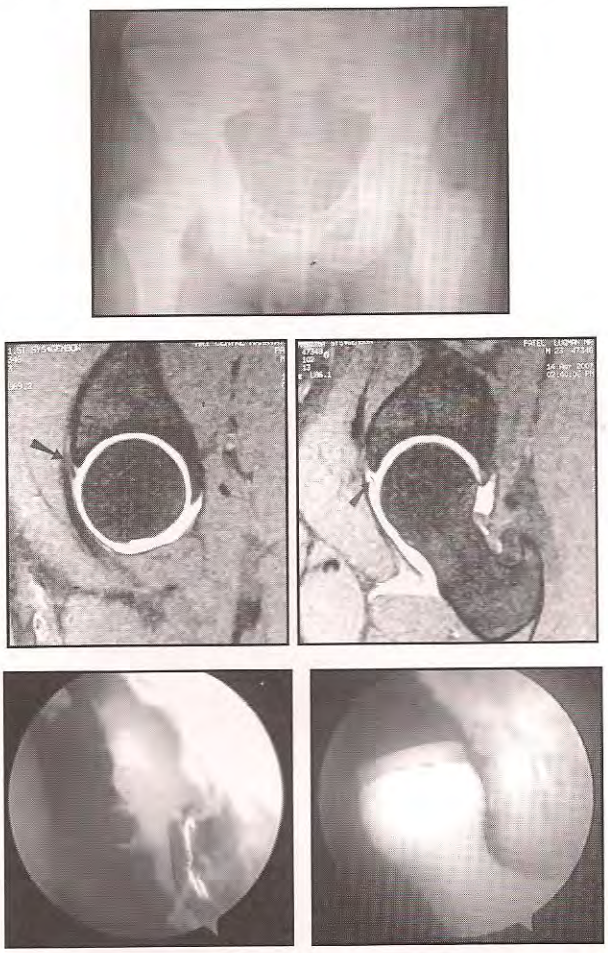


Fig. 12 : Cam-type femoroacetabular impingement in which the head of the femur has an abnormal shape which leads to labral damage on full flexion and internal rotation. Note the 'bony bump lesion' at the anterior head-neck junction on MRI (solid black arrow).

- Cam-type impingement in which the head of the femur has an abnormal shape which leads to labral damage on full flexion and internal rotation [Fig. 12].
- Pincer type impingement in which the acetabulum is retroverted leading to compression of the labrum in full flexion.
- Mixed type impingement in which both factors play a role.

Impingement usually affects young active adults and presents with groin pain, typically when the hip is being fully flexed. Clinical examination reveals a positive impingement sign. Non-operative treatment is usually unsuccessful and the aim of surgical intervention is to address associated labral damage and improve the clearance for hip movement by alleviating the abutment of the proximal femur against the acetabular rim. The cam type of impingement is tackled by excision of the prominent area on the anterior aspect of the junction of the head and neck of the femur with the help of radiofrequency probes and burrs in the peripheral compartment. If the lesion is a pincer type, acetabular recession is achieved by detaching the labrum, resecting the acetabular rim and then re-attaching the labrum. In the mixed form of impingement, both acetabular recession and excision of the 'bump' may be necessary.

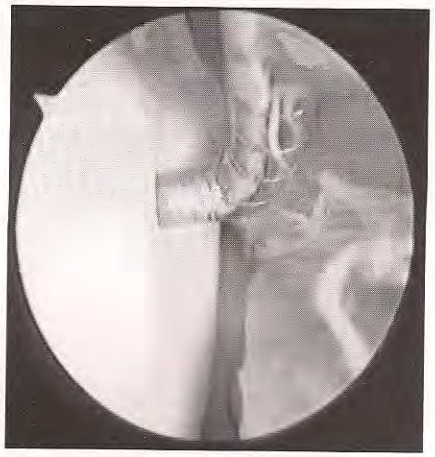


Fig. 13 : When hip pain persists despite normal findings on radiographs, CT, and MRI, arthroscopy can lead to a definitive diagnosis as in this case of paediatric chondromalacia coxae.

Intractable hip pain. When hip pain persists despite normal findings on radiographs, CT, and MRI, arthroscopy can lead to a definitive diagnosis in as many as 40% of cases. Unexpected degenerative arthritis, chondromalacia coxae [Fig. 13], chondral defects, nonossified loose bodies, synovitis, labral lesions, and synovial chondromatosis have all been diagnosed in these circumstances.

Pediatric Indications : Indications for arthroscopy of the hip in children include developmental dysplasia of the hip, Legg-Calvé-Perthes disease, and septic arthritis. In patients suffering from the late sequelae of Legg-Calvé-Perthes disease, arthroscopy has been found to be of value in the treatment of loose bodies and chondral flaps [Fig. 14].

Fig. 14 : Sequelae of Legg-Calvé-Perthes disease- osteochondritis dissecans.

Complications

Complications of hip arthroscopy are unusual, but many vital neurologic and vascular structures at risk. Most of these are caused by direct trauma to cutaneous nerves or by traction injuries. Transient neuropraxia to both the pudendal and the sciatic

[illegible] has been documented. Pressure necrosis of the foot, scrotum, or perineum is another potential complication. Avoidance of these complications is possible if close attention is paid to the force and duration of traction. Intermittent release of the traction is important, and the use of a well-padded perineal post is essential. Complications related to the intra-articular manipulation of instruments include scuffing of the articular surfaces and breakage of instruments.

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