INTRODUCTION

Hip arthroscopy was introduced at first time by Burman in (1931), it wasn't a popular treatment option for hip pathology until (1977), when Gross published his experience with arthroscopic treatment of congenitally dislocating hips. The arthroscopic technique for the hip in the next 25 years has been much slower than comparable techniques for the knee and shoulder. This is thought to be due to two major factors. First, most hip injuries currently treated with arthroscopy have in the past been unrecognized and untreated by most of doctors. Second, limited arthroscopic access to the hip joint has hindered the development of hip arthroscopy, when compared with the knee and shoulder(1).

Arthroscopy of the hip has become a well-established procedure for minimally invasive surgery of hip disorders. Previous studies have shown that non-invasive investigations such as radiography, computed tomography and magnetic resonance imaging provide limited help. Non-operative treatment is likely to result in persistent symptoms, and surgical options for intra-articular hip problems involve open arthrotomy of the hip joint, which carries potential risks associated with joint dislocation.

Arthroscopy of the hip joint, therefore, seems to be an attractive option. It was once thought that introduction of a straight arthroscope into the ball-and-socket hip joint was almost impossible. Many of hip problems especially in athletes and young patients were previously unrecognized and thus left untreated, resulting in premature ends to the patients' competitive careers[2].

Patient Selection is an important issue for a potentially successful outcome. General parameters include younger patients, mechanical Joint symptoms, partial joint space preservation, adequate rotational motion, failure of conservative treatment, and reasonable expectations from the patient[3].

Conditions that limit the potential for hip distraction may preclude arthroscopy. These include joint ankylosis, dense heterotopic bone formation, considerable protrusion and morbid obesity, not only because of distraction limitations but also because of the requisite length of instruments necessary to access and manoeuvre within the deeply receded joint. In addition, sepsis with accompanying osteomyelitis or abscess formation requires open surgery[4].

The most common diagnoses that can be treated by hip arthroscopy are labral tears, chondral damage, injury to the ligamentum teres, capsular laxity, avascular necrosis of hip and loose bodies[5].

Hip arthroscopy may be performed with the patient in either the supine or lateral position. Specialized long and flexible instruments are used to traverse the thick soft tissues surrounding the hip and to access all joint regions. Several portal locations have been described including: anterior, anterolateral, distal lateral accessory, and posterolateral portals.

Immediate postoperative ambulation is allowed. Patients are instructed to bear weight as tolerated, using crutches to limit the load on the hip. Pain serves as an indicator that the patient is overdoing it. Activity or weight bearing should be decreased if there is pain in the hip(6).

Majority of the complications associated with this surgical procedure are related to traction and fluid management. A prospective study reported that hip arthroscopy is a low-risk procedure. Their complication rate from a review of 1,054 patients was 1.4%. Most of complications are localized complications as chondral, labral injury, broken instruments, neurapraxia, and reflex sympathetic dystrophy(7).

AIM OF THE WORK

The aim of this work is to discuss the indications, techniques, complications and postoperative plan of the hip arthroscopy as a minimally invasive procedure for management of several hip disorders.

ARTHROSCOPIC STRUCTURE AND FUNCTION OF THE HIP

The soft tissue in and around the hip joint consists of the capsulo-ligamentous structures, labrum, ligamentum teres, transverse acetabular ligament, and pulvinar. In addition, the intra-articular anatomy consists of the chondral surfaces of the femoral head and acetabulum as well as the fovea capitus.

Finally, the peripheral compartment defines the region of the anterior femoral neck. All of these areas are easily visualized with hip arthroscopy.

The thick, fibrous hip capsule has 3 discrete thickenings that form the main capsular ligaments: the iliofemoral (Y Ligament of Bigelow), the pubofemoral, and the ischiofemoral.

These ligaments originate from the 3 named bones of the pelvis and insert on the intertrochanteric line, resulting in more than 95% of the femoral neck being intracapsular.

The posterior portion of the neck, specifically the basicervical portion and intertrochanteric crest, are extracapsular.

The iliofemoral ligament covers the anteriosuperior portion of the joint. It is the thickest and strongest of the 3 ligaments and prevents anterior translation of the hip in the positions of extension and external rotation. When contracted, it causes the hip to fall into flexion and internal rotation. It along with the pubofemoral ligament provides anterior support. The ischiofemoral ligament is a posterior structure. Gaps in the capsule exist anteriorly between the iliofemoral and pubofemoral ligaments.

The anterior triangle represents the intra-articular portion of the lateral and medial limbs of the iliofemoral ligament.

The zona orbicularis is the named terminal fibers of the iliofemoral ligament that form a deep circular orientation surrounding the femoral neck in a leash-like fashion.

These spiral fibers tighten during extension but unwind or loosen during hip flexion.

The spiral orientation of the capsular ligaments provides a “screw home” effect in full extension. With maximal extension, the ligaments tighten or coil making this position of maximal soft tissue stability. Interestingly, the position of maximal articular congruency is not with the hip in an extended position but in a flexed position[8].

The position of optimal articular contact, (FABER-flexion, abduction, external rotation) is actually a position of soft tissue laxity with the ligaments uncoiled. Thus, the position of maximal instability, from both a soft tissue and osseous perspective, is flexion and adduction.

Unlike capsular tissue, labral tissue is made predominantly of fibrocartilage. The labrum runs circumferentially around the acetabular perimeter to the base of the fovea and becomes attached to the transverse acetabular ligament posteriorly and anteriorly[9].

Arthroscopic visualization of injured labral tissue has demonstrated more extensive penetration of the vascular tissue throughout the entire substance of the labrum, suggesting an improved healing potential than has been previously believed.

The labrum has vessels that penetrate it at the outermost layer of the capsular surface leaving the central articular margins less vascular. Like the meniscus, the labrum may have the greatest healing potential at the peripheral capsulo-labral junction[10].

In addition; the labrum has free nerve endings with both proprioceptors and nociceptors, which may explain the decreased proprioception and pain in an athlete with a torn acetabular Labrum.

The labrum helps to contain the femoral head in extremes of range of motion, especially flexion. The labrum and capsule also act as load-bearing structures during flexion causing a hip with a deficient labrum to be subject to instability if capsular laxity is present[8].

The labrum may enhance stability by maintaining negative intra-articular pressure in the hip joint.

It also may act as a tension band to limit expansion during motion between the anterior and posterior columns during loading in the gait cycle[9].

The intact labrum appears to have an important sealing function in the hip joint by limiting fluid expression from the joint space and thus protect the cartilage layers of the hip.

Ferguson and coworkers have found that the absence of the labrum significantly increased cartilage surface consolidation as well as contact pressure of the femoral head against the acetabulum.

Ferguson and coworkers have further identified a stabilizing role of the labrum using a poroelastic finite element model to demonstrate that the labrum provides some structural resistance to lateral and vertical motion of the femoral head within the acetabulum[11].

Because the labrum appears to enhance joint stability and preserve joint congruity, there is a significant concern about the potential for rotational instability or hypermobility of a labral deficient hip. This instability may result in redundant capsular tissue, and create a potential abnormal load distribution due to a transient incongruous joint resulting from subtle subluxation[9].

The ligamentum teres runs from the fovea capitus to the acetabular fossa. It may have a secondary stabilizing effect on the hip joint especially in the presence of a deficient labrum or a dysplastic hip[12].

Arthroscopic examination of the ligamentum teres demonstrates that is composed of an anterior and posterior bundle. The anterior bundle tightens in external rotation of the hip.

The ligament originates from the fovea capitus, which is a small depressed bare spot located at the medial aspect of the femoral head, and inserts adjacent to the transverse acetabular ligament in the acetabular fossa.

The pulvinar or fat pad fills the remainder of the acetabular fossa, which lies in the inferomedial portion of the acetabulum and probably plays a role in joint lubrication.

The transverse acetabular ligament runs from the base of anterior and posterior labrum and act as a conduit to the obturator foramen.

The inferior portion of capsule inserts on both its anterior and posterior aspect. The psoas tendon and bursa cross the front of the anteriormedial aspect of the hip joint. It is intra-articular in approximately 20% of people and other times only the bursa communicates with the hip joint.

The location of the tendon can be predictably located medial to an indentation in the anterior labrum known as the “Psoas U”. The psoas tendon helps to protect the anterior intermediate portion of the capsule, and by virtue of its anatomic location can be subjected to increased load in athletic activities; such loads may be increased in athletes with further intra-articular pathology.

The anatomy of the hip joint itself is intrinsically stable except in situations where there is variation in the acetabular depth and femoral head geometry, which results in more reliance on the surrounding soft tissue. Version and inclination of the weight-bearing surface affect the joint capsule and ligaments of the hip, the labrum, the ligamentum teres, as well as the suction effect of the hip(13).

The femoral head normally forms two-thirds of a sphere and it is flattened in the area where the acetabulum applies its greatest load. In the neutral, anatomic position, the anterior part of the femoral head is not engaged in the acetabulum and the labrum augments the femoral head coverage by its extension from the bony acetabulum.

The peripheral compartment is a term to describe the arthroscopic anatomic location along the anterior femoral neck. After completing the inspection of the interior hip joint (central compartment), the hip is flexed to relax the anterior capsule and the camera, which is placed in a medial position in the anterior portal, is gradually repositioned and slipped distally into the peripheral compartment. Here the zona orbicularis is easily identified as well as a medial synovial fold or vincula, which is a capsular reflection roughly at the six-o'clock position of the head (Fig. 1).

The peripheral compartment is a common place for loose bodies, and with an accessory portal, a bony impingement lesion can be débrided under direct visualization[8].

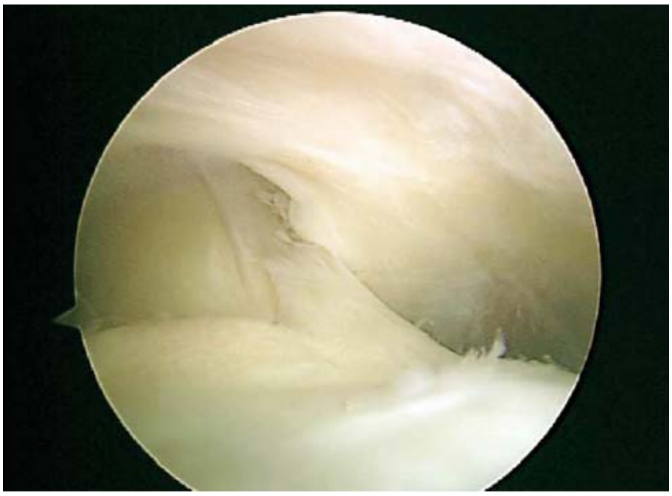

Figure (1): View of the anterior femoral neck and associated vincula[8].

Normal Anatomic Variants

The acetabular labrum has numerous anatomic variants, primarily in anterior and lateral portions. At times, it may appear thin, poorly developed, and hypoplastic.

A hypoplastic labrum lacks an adequate suction seal from their incompetent labrum, resulting in excessive loading on the capsular ligaments and the development of hip pain. At other times the labrum may be enlarged, especially in the setting of acetabular dysplasia, where the lateral labrum is hypertrophied to act as weight-bearing and supportive structure to compensate for deficiency in the bony acetabulum. Occasionally, there is a labral cleft separating the margin of the acetabular articular surface from the labrum. This is a normal variant without evidence of trauma or healing tissue[14].

Occasionally, misinterpreted as a fracture line, a physeal scar maybe present just anterior or posterior to the acetabular fossa. This is a remnant of the triradiate cartilage. It is an area devoid of cartilage extending in a linear fashion along the medial wall of acetabulum. More commonly, a stellate crease or star-like appearing articular lesion may be found just superior to the acetabular fossa. It appears that this is a normal variant and not a pathological process. It is unlikely it is a cause of pain but its long-term prognostic significance is still unclear. It must be differentiated from traumatic articular defects which may occur near this area from a direct lateral blow to the hip impacting the femoral head on superiormedial wall of the acetabulum[8].

INDICATIONS OF HIP ARTHROSCOPY

1- Labral injuries

Epidemiology and Diagnosis

Injuries to the labrum are the most common source of hip pain identified at the time of arthroscopy. In a review of 300 consecutive cases; labral tears were present in 90% of the cases. Reports vary on location, Mc-Carthy and coworkers found 98% of labral tears were anterior, where Suzuki and coworkers found them to be posterior.

The diagnosis of a labral tear remains largely clinical and is analogous to those patients who present with meniscal pathology. These patients often present with mechanical symptoms (catching and painful clicking) as well as restricted range of motion. Sometimes their presentation is more subtle, with symptoms of dull, activity-induced, positional pain that fails to improve with rest. Patients who have persistent hip pain for greater than 4 weeks, clinical signs, and radiographic findings consistent with a labral tear are candidates for hip arthroscopy[15].

Etiology and Classification

To effectively treat patients with labral tears, the underlying cause of the labral injury must be identified. It was found that 4 causes of labral tears: (1) trauma, (2) laxity/ hypermobility, (3) bony impingement, and (4) dysplasia.

Traumatic labral tears usually have specific preceding events such as twisting, falling, or other lower-extremity impact before the onset of any symptoms. Isolated traumatic labral tears were less common overall (14%), although they were the most common type of tears seen in high-level athletes. Femoroacetabular impingement is the most common cause for labral injury and was the underlying cause in 55% of a series of 300 consecutive cases(16).

Femoroacetabular impingement produces unique labral tears that are commonly associated with acetabular rim cartilage wear adjacent to the tear. The characteristics of these associated pathologies are clearly captured in the phrase “acetabular labrum articular disruption” (ALAD)

Varying degrees of associated cartilage wear can be seen, ranging from softening of the adjacent cartilage (ALAD 1) to early peel back of the cartilage (ALAD 2), to a large flap of cartilage (ALAD 3), and to complete loss of cartilage (ALAD 4).

These types of lesions are oftentimes related to decrease offset at the femoral head neck junction resulting in impingement of the femur against the anterior superior rim of the acetabulum(15).