Role of Hip Arthroscopy in management of chronic hip pain

Thesis
Submitted for fulfillment of M.D degree in Orthopaedic surgery
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دور منظار الفخذ الضوئي الجراحي في علاج آلام مفصل الفخذ

رسالة
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<td>ALP</td>
<td>Anterolateral Portal</td>
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<tr>
<td>AP</td>
<td>Anterior portal</td>
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<tr>
<td>ASIS</td>
<td>Antero-superior iliac spine</td>
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<tr>
<td>CPM</td>
<td>Continuous passive motion</td>
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<td>CPPD</td>
<td>Calcium Pyrophosphate Deposition</td>
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<td>FAI</td>
<td>Femoracetabular impingement</td>
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<td>GT</td>
<td>Greater trochanter</td>
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<td>HA</td>
<td>Hip arthroscopy</td>
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<td>LT</td>
<td>Ligamentum Teres</td>
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<td>MAP</td>
<td>Mid anterolateral Portal</td>
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<td>mHHS</td>
<td>Modified harris hip score</td>
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<tr>
<td>MSF</td>
<td>Medial synovial fold</td>
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<td>NAHS</td>
<td>Non arthritic hip score</td>
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<tr>
<td>NSAID</td>
<td>Nonsteroidal anti-inflammatory drugs</td>
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<td>OCD</td>
<td>Osteochondritis dissecans</td>
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<td>PLP</td>
<td>Posterolateral portal</td>
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<td>PVNS</td>
<td>Pigmented villonodular synovitis Disease</td>
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<td>PSP</td>
<td>Peritrochanteric Space Portal</td>
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<td>RF</td>
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<td>SCFE</td>
<td>Slipped capital femoral epiphysis</td>
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<td>SLR</td>
<td>Straight leg raising</td>
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<td>THR</td>
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<td>ZO</td>
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Introduction

Diagnosis and treatment of intra-articular hip problems in young patients present a challenge. Historically, there have been limited diagnostic and treatment options available for diseases that affect the cartilage, bone or synovium in the young hip joint.

While provocative maneuvers to diagnose a hip problem are unreliable due to extreme apprehension, non-invasive investigations provide limited help with the diagnosis of these conditions. Radiographs have been traditionally poor at detecting early lesions in the hip. Other imaging studies have not been very reliable either, as a negative imaging study does not exclude important intra-articular pathology.

Diagnostic hip blocks are useful to distinguish between intra and extra-articular lesions, but they provide information on the generality of intra-articular problems rather than specific lesions within the ball and socket joint.

Although open surgeries of the hip joint are performed more routinely and successfully, they are not without potential risks associated with joint dislocation, infection, deep vein thrombosis, avascular necrosis, major nerve or vessel injury, heterotopic bone, and muscle weakness. Non-operative treatment is most likely to result in persistent symptoms. Keyhole surgery of the hip joint, therefore, appears to be an attractive option.
It was once thought that introduction of an arthroscope into a hip joint was almost impossible. In 1931, a researcher called Burman stated that "It is manifestly impossible to insert a needle between the head of the femur and the acetabulum". Hip arthroscopy has seen several advances since then. The speed at which it developed in the recent years directly corresponded to the rate at which the conditions affecting the hip joint were identified.

The advent of hip arthroscopy has facilitated comprehensive access to an evolving series of conditions that affect the hip joint, many of which were previously unrecognised and, thus, left untreated. Today, arthroscopy of the hip joint is has led to a greater understanding of the nature of adolescent and adult hip pathologies of acetabular labrum, acetabularchondral surfaces, fovea, ligamentumteres, femoral head, and adjacent synovium and their management particularly, in hip injuries in athletes.¹

Current indications for hip arthroscopy include the presence of symptomatic acetabularlabral tears, femoroacetabular impingement, chondral lesions, osteochondritisdissecans, ligamentumteres injuries, snapping hip syndrome, iliopsoas bursitis, and loose bodies. Less common indications include management of osteonecrosis of the femoral head, synovial abnormalities, crystalline hip arthropathy (gout and pseudogout), infection, and post-traumatic intra-articular debris. The difficulty in diagnosing all the above lesions with traditional methods as well as in determining their effect on outcome provides a substantial rationale for hip arthroscopy.¹
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. Arthroscopic evaluation may also be considered when joint symptoms are unremitting, and no diagnosis has been made. ¹

Hip arthroscopy is technically demanding due to both anatomic and technical constraints and involves a steep learning curve.

Conditions that limit the potential for hip distraction may preclude arthroscopy. These include joint ankylosis, dense heterotopic bone formation, significant protrusion and morbid obesity, not only because of distraction limitations but also because of the requisite length of instruments necessary to access and maneuver within the deeply receded joint. In addition, sepsis with accompanying osteomyelitis or abscess formation requires open surgery. ¹

Complications are most often related to transient neuropraxia due to distraction of the joint. Injuries to the sciatic nerve (posterior portal), lateral femoral cutaneous nerve (anterolateral portal), and pudendal nerves have been reported. However, the effects of traction on the integrity of the joint capsule, the ligamentumteres and the acetabular labrum, remain unknown. ¹
AIM OF THE WORK

This study is designed to evaluate the role of hip arthroscopy in the management of various causes of hip pain after failure of conservative measures
Overview and History of Hip Arthroscopy

The first recorded attempt at arthroscopic visualization of the hip is attributed to Michael S. Burman in 1931 (Fig. 1). For his purposes, an arthroscope was constructed by Reinhold Wappler with a diameter of 4 mm, not dissimilar to the dimensions of our current arthroscopes (Fig. 2). Burman used fluid distension for visualization, examining the interior of more than 90 various joints in cadaver specimens, correlating the arthroscopic anatomy with the gross anatomy on subsequent dissection. Twenty of these were hip joints.²

Burman made several pertinent and prudent observations that still hold true today, more than over 60 years later.²

His examination of the hip did not use distraction, and the structures that he successfully visualized correspond with the structures that currently are discernible via arthroscopy without distraction (Fig. 3).²
These aspects include much of the articular surface of the femoral head, seen by placing the hip through range of motion, and the intracapsular portion of the femoral neck. With this approach, the acetabulum, fossa, and ligamentum teres could not be visualized.²

Burman stated: “We experimented with a number of punctures and the anterior paratrochanteric puncture proved the best. . . . The anterior paratrochanteric puncture is undoubtedly the best and is made slightly anterior to the greater trochanter along the course of the neck of the femur. . . . “. The anterior paratrochanteric portal is clearly the workhorse portal for modern arthroscopy.

Although there is some variation of the other portals described by numerous authors, this is the one position common to all and, according to an anatomic study, it is the safest.²

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**Fig. 2.** Photograph illustrates the arthroscopic instruments devised by Reinhold Wappler and used by Dr. Burman in his investigative studies. The upper portion is the telescope (measuring 3 mm in diameter); the lower portion is the trochar sheath (measuring 4 mm in diameter.)²
The first clinical application of the arthroscope in the hip of a patient was reported by Takagi in 1939. This report consisted of four hips, including two cases of Charcot joints, one tuberculous arthritis, and one suppurative arthritis.

However, following Takagi’s report in 1939, the clinical applications of arthroscopy about the hip went unmentioned until the 1970s with Aignan’s report of attempted diagnostic arthroscopy and biopsy of 51 hips. This study was presented at the 1975 meeting of the International Arthroscopy Association in Copenhagen.

Richard Gross was the first to report about hip arthroscopy in the North American literature in 1977. Subsequently, it was James Glick and his partner, Thomas Sampson, who pioneered hip arthroscopy in North America and who modified the surgical technique by positioning the patient in the lateral decubitus position rather than the supine position.
Further key technical refinements took place during the mid-1980s and are attributed to Ejnar Eriksson and colleagues, who estimated the distraction forces needed, and to Lanny Johnson, who described anatomic landmarks and techniques of needle placement. ²

In the mid-1980s, Richard Villar from Cambridge, England, envisioned several useful roles for arthroscopy of the hip, subsequently pioneered the technique in England, he has reported in detail his extensive experience with arthroscopic anatomy and operative arthroscopy.

In the United States, little attention has been given to the prospect of performing hip arthroscopy without distraction. However, Henri Dorfmann and Thierry Boyer, a pair of rheumatologists from Paris, France, have accumulated a large number of cases performed by this method.

In Nashville, the Thomas Byrd has redefined the application of the supine position and has gained increasing experience in the use of this approach in operative hip arthroscopy. Minor modifications to a standard fracture table facilitate many of the advantages attributed to the lateral position.

The progression and application of arthroscopic techniques for the hip have lagged behind those for other joints because of the unique challenges imposed by its anatomy. Although slower, the evolution of hip arthroscopy has paralleled that of other joints.

Arthroscopic investigation of the joint has subsequently expanded our knowledge of hip disease and injury. This investigative phase has been followed with a clearer understanding of the indications and technique. ¹
Anatomy

**Gross Anatomy of the hip**

The hip is a synovial, diarthrodial, ball-and-socket joint that is comprised of the bony articulation between the proximal femur and the acetabulum. The acetabulum is formed at the cartilaginous confluence of the three bones of the pelvis: the ilium, the ischium, and the pubis. It is covered by a large soft-tissue envelope and a complex array of neurovascular and musculo-tendinous structures.\(^3\)

Osseous acetabular coverage over the femoral head is estimated at nearly half or almost 40% of a complete sphere, providing 170 degrees of hemispherical coverage. This coverage is increased by the labrum, Inferiorly, the labrum merges with the transverse acetabular ligament to provide a complete and full seal.

The intact labrum is in continuity with the bony acetabulum and creates a suction cup effect by resisting fluid flow from between the femoral head and acetabulum, thereby increasing intra-articular hydrostatic fluid pressure. The labrum may also function as a seal, separating the central compartment (the area within the confines of the labrum/acetabulum) from the peripheral compartment (the intracapsular area outside the acetabulum/along the femoral neck). The labrum may help maintain the negative intra-articular pressure that exists within the hip, as in other joints.\(^4\)

The labrum and the capsule help to contain the femoral head in extreme ranges of motion, and they act as load-bearing structures during flexion. Recent studies have shown that the labrum contains neural structures of both proprioceptive and nociceptive function. In addition, it has been shown that the majority of these mechanoreceptors and sensory nerve endings are most highly concentrated anteriorly, which is where the majority of symptomatic hip pathology is seen.\(^3\)
The capsuloligamentous complex is composed of circular and longitudinal fibers. The circular fibers, or zona orbicularis, are more substantive posterior and inferior and then blend into the deep iliofemoral ligament. The longitudinal fibers are ample anteriorly and reinforced by distinct bands, which are the named ligaments and include the iliofemoral, pubofemoral, and ischiofemoral ligaments (fig. 4).

The capsule inserts proximal to the labrum by a few millimeters, creating a recess. In contrast, the capsule attaches proximal to the intertrochanteric line posteriorly, but at the more distal intertrochanteric line anteriorly. The anterosuperior capsule is thick and taut; inferoposteriorly it is thinner and more capacious.  

The iliofemoral ligament (i.e., the Y ligament of Bigelow) arises from the AIIS and spreads obliquely and inferolaterally to insert into the intertrochanteric line on the anterior femoral head. This is the strongest ligament in the human body, and it prevents anterior translation of the hip in positions of extension and external rotation, especially when the pelvis is posteriorly tilted. The intra-articular medial and lateral limbs of the iliofemoral ligament form an anterior triangle. The terminal fibers of the ligament form the zona orbicularis; this is a circular leash around the femoral neck that tightens during extension and loosens during flexion.

The thickest part of this ligament lies anteriorly and coincides with the location of the majority of hip pathology that is amenable to arthroscopic intervention. Even after the portals are established, the capsule limits the maneuverability of the instrumentation and the arthroscope within the central compartment. Therefore, a limited capsulotomy is recommended to enhance mobility. This allows the surgeon to access the femoroacetabular articular cartilage, the labrum, and the contents of the cotyloid fossa without significant challenge.
VASCULAR SUPPLY OF THE HIP

The common iliac arteries provide the primary blood supply to the lower limbs. Each artery divides into the external and internal iliac arteries. These vessels run parallel with their venous counterparts, the internal and external iliac veins, which join to form the inferior vena cava.

The common femoral artery is the first branch of the external iliac artery, and it traverses just anteromedial to the hip capsule as it travels distally. It is at high risk for damage during both arthroscopic and open anterior approaches to the hip. In fact, the traditional anterior arthroscopic portal is approximately 3.5 cm from the femoral neurovascular bundle.

The profundus femoris artery, which is also known as the deep femoral artery, is the first branch of the common femoral artery. It penetrates posteriorly between the pectineus, the adductor longus, and the adductor brevis, lying behind the femoral artery and vein on the medial side of the femur. The profundus femoris artery gives rise to the lateral circumflex femoral artery 90% of the time and the medial circumflex femoral artery only 30% of the time.

The superior gluteal vessels are branches of the internal iliac artery (i.e., the posterior branches). The vessels, along with the gluteal nerve, traverse the posterior column of the acetabulum as they exit through the sciatic notch.

Four sets of arteries are responsible for the arterial blood supply to the femoral head (Fig.5): 1) the medial circumflex artery; 2) the lateral circumflex artery; 3) the medullary artery from the shaft of the femur; and 4) the artery of the ligamentum teres.

The last one provides minimal if any contribution to the vascular integrity to the femoral head, although the vessel remains patent in approximately 20% of the
adult population. The exact contribution of the medullary artery to the femoral head is unknown, but it is believed that this also plays a relatively minor role in vascularization.

Therefore, the vessel that supplies the majority of the arterial supply to the head is the medial circumflex femoral artery, with varying contributions from the lateral circumflex femoral artery. These vessels branch off at the base of the femoral neck and then ascend toward the femoral head via the posterolateral and posteroinferior synovial retinacular folds (fig.5)

It is believed that disruption at this level (e.g., by a femoral neck fracture) poses the greatest risk for avascular necrosis

The lateral synovial folds, which contain the terminal branches of the medial circumflex femoral artery, can also be injured as a result of aggressive arthroscopic dissection or open approaches. Therefore, they should be routinely identified and protected during peripheral compartment arthroscopy and during open joint-preserving hip surgery.³

**Neural Supply of the Hip**

The sciatic nerve is the largest nerve in the body, and it is the main branch of the sacral plexus. It contains nerve branches primarily from L4 to S3. It consists of two main peripheral nerves contained within a single sheath: the tibial nerve (anterior common nerve) and the fibular or peroneal division).
These branches enter the gluteal region just inferior to the piriformis via the greater sciatic foramen. The sciatic nerve then descends in the plane between the superficial and deep group of gluteal region muscles, crossing the posterior surfaces first of the obturator internus and associated gemellus muscles and then of the quadratus femoris muscle. It lies just deep to the gluteus maximus at the midpoint between the ischial tuberosity and the greater trochanter. At the lower margin of the quadratus femoris muscle, the sciatic nerve enters the posterior thigh.

The femoral nerve (L2 to L4) arises from the lumbar plexus and descends between the psoas and the iliacus. It enters the thigh posterior to the inguinal ligament, lateral to the femoral artery, and outside of the femoral sheath. The
femoral nerve supplies muscles in the anterior thigh compartment, including the iliacus, psoas major, pectineus, and quadriceps muscles. In addition, it has several cutaneous branches that supply the skin over the medial and anterior thigh. The distal branches supply sections of skin that overlie the knee, leg, and foot. The lateral femoral cutaneous nerve (LFCN), however, provides the lateral cutaneous innervation of the thigh and knee.

Prolonged distraction time of the operative limb during arthroscopy is associated with sciatic nerve & femoral nerve injury. It is recommended that traction on the operative limb be let down within 2 hours in an effort to further reduce the risk of neurovascular distress.

The pudendal nerve, which supplies structures within the perineum, and the nerve to the obturator internus, which supplies the obturator internus muscle on its pelvic surface, are branches of the sacral plexus. They leave the pelvis via the greater sciatic foramen and below the piriformis before crossing the ischial spine and entering the pelvis via the lesser sciatic foramen.

Neuropraxia of the pudendal nerve and its branches (including the perineal nerve) is a more common complication of hip arthroscopy. This is usually a compression phenomenon seen during limb traction and caused by the direct abutment of the perineal post on the groin. These traction injuries manifest as a loss of cutaneous sensation around the labia or scrotum and the inner thigh; they are minimized intraoperatively by abundantly padding the perineal post.  

Finally, the superior gluteal nerve is also of particular importance to the hip arthroscopist. It leaves the pelvis through the greater sciatic foramen and above the piriformis to supply the gluteus medius, the gluteus minimus, and the TFL.  

3
Surface Anatomy

An accurate understanding of the surface anatomy is crucial for anatomic orientation and initial trocar insertion. Typically, the outlines of the greater trochanter and the ASIS are drawn, followed by the intersecting horizontal and vertical lines from each point, respectively. With the use of these basic landmarks, the three most commonly used portals as described by Thomas Byrd—the anterior, anterolateral, and posterolateral portals (Fig.6) can be accurately placed.  

Fig.6: Surface anatomy of the anterior, anterolateral, and posterolateral portals. A, Preoperative planning. The superficial location of the anterior portal (AP) lies at the intersection of a vertical line drawn from the anterosuperior iliac spine (ASIS) and a horizontal line drawn from the superior aspect of the greater trochanter (GT). The anterolateral portal (AL) and the posterolateral portal (PL) are made anterior and posterior to the superolateral aspect of the greater trochanter. Peritrochanteric Space Portal (PSP). B, Neurovascular structures that are in close proximity to the three arthroscopic hip portals.  

3
ARTHROSCOPIC ANATOMY OF THE HIP

Hip arthroscopists divide the femoroacetabular joint and its surrounding areas into three compartments (Fig.7). The central compartment refers to the confines of the hip joint proper; the peripheral compartment provides access to the femoral neck and the outer acetabular rim and the peritrochanteric compartment, which lies between the iliotibial band and the proximal femur. Each compartment can be accessed by a number of arthroscopic portals and has pathologies that are individual to the specific area.

Fig.7. The three arthroscopic compartments of the hip joint.
Central Compartment

Femoral Head

The head forms approximately two-thirds of a sphere and is covered throughout with articular cartilage, except at the fovea. Anteriorly, the articular surface extends to the neck. It faces antero superomedially and geometrically resembles part of the surface of an ovoid.

Normal hyaline cartilage, as in other joints, has a shining white appearance on direct inspection (Fig. 8), maximal thickness of the articular cartilage on the anterolateral portion of the femoral head.

![Fig. 8: The normal femoral head](image)

When using the 70-degree arthroscope, it is possible to visualize approximately 80% of the articular surface. This view is simplified by rotating the leg during the procedure. Anteriorly, the cartilage extends on the femoral neck for a short distance. The spherical shape of the head of the femur does not ease the orientation within the joint.
Acetabulum

The name *acetabulum* comes from the Latin and means *vinegar cup* from the similarity in shape with this article from ancient Rome. To the arthroscopic surgeon it appears horseshoe shaped, encircling the acetabular fossa, the lunate surface. It can be divided into a superior part, an anterior column, and a posterior column.

The horseshoe shape of the acetabulum is a fixed landmark and allows easy orientation within the joint (Fig. 11). Peripheral margins of the acetabulum are overlaid by the perimeter of the labrum and cannot always be seen. The inner borders of the articular surface of the acetabulum have a rounded cartilage edge; these form the margins of the acetabular fossa or cotyloid fossa.

![The horseshoe-shaped view of the acetabulum](image)

**Fig. 11:** The horseshoe-shaped view of the acetabulum

The normal surface appears white, smooth, and glistening. The thickness of the articular cartilage is reported to be maximal on the anterosuperior quadrant.

Sometimes a central osteophyte can be seen in this area (Fig. 12); it is more often located on the inner margin of the anterior column, although a posterior central osteophyte is also possible.
Adjacent to anterior or posterior apex of the acetabular fossa, within its lunate surface, a silvery stellate crease (Fig. 13) is frequently seen. The inexperienced surgeon must be aware of its existence so as not to confuse it with early degenerative changes.

Fig 12: Acetabular central osteophyte

Fig 13: The stellate crease

**Acetabular Fossa**

When good distension of the joint is obtained, this portion of the acetabulum can be safely seen. However, often a *fat pad* lies within the fossa and can expand into the cavity and obscure the view (Fig. 14).
Usually, the fossa has a flattened superior margin and anterior and posterior borders. From the posteroinferior part of the fossa arises the ligamentum teres.

Superiorly, the fossa is lined by dense fibroconnective tissue, lacking a synovial lining. The lower part of the fossa is occupied by adipose tissue; this appears well vascularized and is usually mobile when suction on the outflow is applied. Sometimes the adipose tissue can behave like a pedunculated structure within the joint. It is said to contain numerous proprioceptive nerve endings. When it becomes compressed, it partially extrudes from the acetabular fossa beneath the transverse ligament.

A thickened band of fibrous tissue, the transverse ligament (Fig. 15), closes the lowest portion of the acetabular fossa. This structure bridges the open end of the horseshoe-shaped acetabulum and can occasionally be probed with a hook. It divides the acetabular fossa from the inferior recess. The inferior recess is a frequent hiding place for loose bodies, although it is unlikely they cause any great harm in such a position.
Ligamentum teres

The ligamentum teres (Fig 16) is a highly variable structure, but it is generally described as a thin, flat ligament with a triangular cross section that originates from the fovea capitus on the femoral head. It is shrouded by synovium throughout its entirety, and it is often obscured by the prolific fat pad of the cotyloid fossa. \(^3\)
The ligament is between 30 mm and 35 mm in length, and it consists structurally of two main bundles (i.e., anterior and posterior) that insert medially into the base of the cotyloid fossa adjacent to the transverse acetabular ligament.\textsuperscript{3}

**The Labrum**

The acetabular labrum is made predominantly of fibrocartilage supported by a collagen scaffold. It runs circumferentially around the acetabular rim and the fovea (Fig 17). This scaffold is oriented in both a longitudinal and radial direction, which confers stability to the femoroacetabular articulation.

The labrum attaches to the transverse acetabular ligament anteriorly and posteriorly; it has a vascular peripheral capsular surface (Fig. 18) with a less-vascular central articular margin.

Fig. 17: Photograph demonstrating anatomy of labrum with respect to hip joint\textsuperscript{6}
Histologic studies have shown that the blood supply to the labrum is analogous to that of the knee menisci. 

The obturator artery, with contributions from the inferior and superior gluteal vessels, provides the blood supply to the labrum.

The majority of the microvascular supply proliferates the capsulolabral junction with a relative paucity of vascularization to the innermost aspect of the labrum. Therefore, like the meniscus, the labrum may have the greatest healing potential at the peripheral capsulolabral junction. (Fig.19) 

Fig 18: Perilabral sulcus between the labrum and capsule

Fig.19: An arthroscopic view of the capsulolabral junction and the vascularization of the labrum. FH, Femoral head; L, labrum
The Capsule

The hip capsule consists of three discrete ligaments: the ischiofemoral (posterior) ligament; the iliofemoral (anterior) ligament; and the pubofemoral (anterior) ligament. These form a thick and fibrous wrap around the femoroacetabular joint, and they result in more than 95% of the femoral neck being intracapsular. ³

The 3 main hip capsular ligaments cannot be seen arthroscopically from within the joint. However, hip capsular ligament anatomy from the perspective of the arthroscope has recently been described in a cadaveric study by Shu & Safran, and the margins defined by the portals and arthroscopic landmarks. Using the clock face system, with lateral/superior being 12 o’clock, anterior being 3 o’clock, posterior 9 o’clock and inferior being 6 o’clock for all hips (Fig 20) ⁴

Psoas Bursa, a circular aperture between the pubofemoral and iliofemoral ligaments sometimes joins the articular cavity with the subtendinous psoas (iliac) bursa. This structure separates the capsule from the iliopsoas muscle and is lined with synovium. ⁵

Retinacula of Weibrecht, This is a flattened band reflecting from the fibrous capsule of the hip joint to the head and neck of the femur, present in 94.8% of male and 92.5% of female subjects. Nutrient arteries for the femoral head run through the retinacula ⁵
Synovial Membrane

The inner surface of the capsule is extensively lined with a highly vascularized pink layer of synovial membrane. This tissue also covers part of the neck contained within the joint, both surfaces of the acetabular labrum, the ligamentum teres, and the fat within the acetabular fossa. At the femoral attachment of the joint capsule, the synovial membrane is reflected up toward the head as far as the articular margin. 5

Peripheral Compartment

The peripheral compartment is an area of the hip that is considered to be extra-articular yet intra-capsular; it lies along the anterior femoral neck. Loose bodies commonly collect here, and cam-type bony lesions are largely localized to this compartment.

The peripheral compartment of the hip can be divided routinely into the following areas: anterior neck area, medial neck area, medial head area, anterior head area, lateral head area, lateral neck area, and posterior area (Fig. 21) 8

Anterior Neck Area

Entering the peripheral compartment from the anterolateral portal, the scope is lying on the anterior surface of the femoral neck. The first view allows inspection of the anterior and medial neck area with the anterior and medial synovial folds, the anteromedial surface of the femoral neck, the anteromedial part of the zona orbicularis, and the ligamentum iliofemorale (y-shaped ligament of Bigelow)
With the 30° lens of the arthroscope directed medially, a medial synovial fold “iliopectineal fold” can be found very constantly. It is usually not adherent to the femoral neck and passes proximally from the medial border of the femoral head distally to the lesser trochanter. This structure is a very helpful landmark, especially if visibility within the peripheral compartment is limited by synovial disease.

The anterior synovial fold is adherent to the neck and only recognizable by its single fibers covering the bone of the neck.

By rotating the arthroscopic lens cranially, the anterior margin of the femoral head, the anterior recess with the anterior capsule, and the zona orbicularis can be inspected. Caudally, a complete view to the inferior reflection of the articular capsule at the intertrochanteric crest can be achieved with the 70° lens. Here, the articular cavity should be scanned for loose bodies.

**Medial Neck Area**

Moving the scope medially over the medial synovial fold, the medial neck area can be examined. By rotating the 25-degree lens, the medial margin of the femoral head, the medial wall of the capsule with the zona orbicularis and the medial recess can be inspected.

Rotating the lens downward, the zona orbicularis vanishes posterior to the femoral neck. By external rotation of the hip joint, a larger area of the posteromedial surface of the neck and head can be inspected.

**Medial Head Area**
If the patient is not obese, the standard scope can be moved medially into the medial head area. Otherwise, longer scopes must be used. At the medial corner of the joint, inspection of the anterior horn of the labrum and the anteromedial part of the transverse ligament is possible. The labrum is close to the chondral surface of the femoral head. A small gap or synovium can be seen between the femoral head and the transverse ligament, which connects the base of both horns and both edges of the lunate cartilage.

**Anterior Head Area**

By gentle rotation, sliding tangentially over the cartilage of the femoral head and withdrawing the arthroscope, the labrum and anterior cartilage of the femoral head can be inspected from the medial to the anterior and lateral head area. The more the hip is flexed, the more the labrum is lifted from the head, which allows a partial inspection of the central compartment.

**Lateral Head Area**

Moving the arthroscope laterally to the lateral head area can be hindered by a tight zona orbicularis. Flexion of the hip up to 45 degrees, with 20 to 40 degrees of abduction and slight external rotation of the hip, may ease passing of the arthroscope, thus allowing inspection of the lateral part of the labrum and cartilage of the head. Alternatively, the scope can be withdrawn distally to the neck for inspection of the lateral neck area first. Then the scope is moved forward to the lateral head area.

**Lateral Neck Area**

From an anterolateral portal, sweeping directly along the lateral side of the femoral head down into the posterior area is hindered by the zona orbicularis. Consequently, the scope is withdrawn distally to the circular fibers of the capsule.
and the lateral neck area is inspected first. Here, the zona orbicularis can be seen running posteriorly around the neck.

A lateral synovial fold can be seen quite consistently. This fold runs from the greater trochanter upward along the lateral side of the neck to the lateral margin of the head. It is often posteriorly adherent to the neck and forms a small pouch. Thus, the lateral fold is not as prominent as the medial one. Anatomic dissections have revealed that the lateral fold contains small arteries of larger diameter (mean, 0.28 mm²) than the anterior and medial fold.⁸

**Posterior Area**

Access to the posterior area can be achieved by moving the scope straight posteriorly between the zona orbicularis and the lateral synovial fold. After insertion of the 70-degree lens, the posterolateral and lateral part of the labrum, head, and neck and the posterior synovium can be inspected. The lateral and the posterior areas are more difficult to inspect compared with the anterior and medial areas.⁸
Fig 21: Diagnostic round trip of the peripheral compartment. A, Anteromedial neck area: medial synovial fold (msf), femoral head (fh), femoral neck (fn), and anteromedial capsule with the zona orbicularis (zo). B, Upward view to the junction between the anterior neck and head area: anterior cartilage surface of the femoral head (fh), anterior part of the zona orbicularis (zo), anterior capsule (ac), free edge (fe) of the zona orbicularis. C, Anterior neck area: downward view with the anterior synovial fold (asf) and reflexion of the capsule at the intertrochanteric crest (ic). D, Medial head area: articular surface (as) and cartilage-free surface (cfs) of the medial femoral head, anterior horn of the labrum (l), perilabral sulcus (pls) and transverse ligament (tl). E, Anterior head area: cartilage of the femoral head (fh), free edge of the labrum (fe) and base of the labrum (b), and perilabral sulcus (pls). F, Lateral head area: cartilage of the femoral head (fh), lateral portion of the labrum (l), and perilabral sulcus (pls). G, Lateral neck area: lateral margin of the femoral neck (fn) and head (fh), lateral synovial fold (lsf) building a small subplicial pouch (p) and zona orbicularis (zo). H, Posterior area: posterior surface of the femoral head (fh), posterior labrum (pl), perilabral sulcus (pls) and thin posterior capsule (pc).
Diagnosis and treatment of intra-articular hip problems in young patients present a challenge to hip surgeons. Previous studies have demonstrated that non-invasive investigations such as radiographs, computer tomography (CT) and magnetic resonance imaging (MRI) provide limited help. Non-operative treatment is most likely to result in persistent symptoms and surgical options for hip intra-articular problems involve open arthrotomy of the hip joint, which carries potential risks associated with joint dislocation. Arthroscopy of the hip joint, therefore, appears to be an attractive option.¹

The indications for hip arthroscopy have emerged over the last two decades alongside the understanding of pathological processes. The recognition of hip pathologies is still advancing; therefore, there is no clear classification system for the wide spectrum of hip pathologies.⁹

Current indications for hip arthroscopy include the presence of symptomatic acetabular labral tears, femoroacetabular impingement, loose bodies, chondral lesions, osteochondritis dissecans, ligamentum teres injuries.

Less common indications include management of osteonecrosis of the femoral head, synovial abnormalities, crystalline hip arthropathy (gout and pseudogout), infection, and post-traumatic intra-articular debris, arthroscopic osteosynthesis.

In addition to use of hip arthroscopy to assess status post total hip arthroplasty, arthroscopy of the hip for paediatric and adolescent disorders and Extra-articular (Peri-articular) hip endoscopy for snapping hip syndrome, and iliopsoas bursitis.¹¹
In rare cases, hip arthroscopy can be used to temporise the symptoms of mild-to-moderate hip osteoarthritis with associated mechanical symptom.¹

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. Arthroscopic evaluation may also be considered when joint symptoms are unremitting, and no diagnosis has been made. If the symptoms have been present for more than six months, one can expect an arthroscopy facilitated diagnosis in approximately 40% of these patients.¹

**Indications for hip arthroscopy**

**Femoroacetabular Impingement**

Femoroacetabular impingement is characterized by an abnormal morphology of the hip leading to abutment of the proximal femur against the acetabulum during joint motion (flexion and internal rotation in particular). This repeated pathologic contact eventually leads to the development of symptomatic FAI, a precursor to osteoarthritis.²²

**Types:**

Depending on clinical and radiographic findings, types of impingement are (Fig. 22):

- Pincer impingement is the acetabular cause of femoroacetabular impingement and is characterized by focal or general overcoverage of the femoral head.
- Cam impingement is the femoral cause of femoroacetabular impingement and is due to an aspherical portion of the femoral head–neck junction.

- Most patients (86%) have a combination of both forms of impingement, which is called “mixed pincer and cam impingement,” with only a minority (14%) having the pure femoroacetabular impingement forms of either cam or pincer impingement.¹³

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**Fig. 22:** Flowchart shows classification of types of femoroacetabular impingement.¹³
Causes of femoro-acetabular impingement

Cam impingement:  
Idiopathic  
Developmental  
• Non-spherical femoral head  
• Coxa vara  
Traumatic:  
• Malunited femoral neck fracture  
• Post-traumatic retro-torsion of femoral head  
Childhood disease:  
• Perthes’ disease  
• Slipped capital femoral epiphysis  
Iatrogenic

Pincer impingement:  
Idiopathic  
Developmental  
• Retroverted acetabulum  
• Coxa profunda  
• Coxa vara  
• Os acetabuli  
• Protrusio acetabuli  
• Chronic residual dysplasia of acetabulum  
Traumatic  
• Post-traumatic deformity  
Iatrogenic  
• Over-correction for retroversion in dysplastic

Mechanism Leading to Osteoarthritis

The proposed mechanism by which FAI leads to arthritis of the hip is thought to be as follows (Fig.23). The morphologic abnormalities of the femoral head and/or acetabulum result in abnormal contact between the femoral neck/head and the acetabular margin. This leads to tearing of the labrum and avulsion of the underlying cartilage region. The continued abnormal contact results in further deterioration and wear of the cartilage, with eventual onset of arthritis. ¹⁴
Patients with femoroacetabular impingement are usually young, in their (20s–40s). The estimated prevalence is 10–15%.

Patients present with groin pain during or after sports activities that can irradiate distally and medially toward the knee. Pain is sharp when turning or...
pivoting, especially toward the affected side. It can worsen with prolonged sitting, rising from a seat, getting into or out of a car, or leaning forward. Pain is usually gradual and progressive.

They often cup the anterolateral hip with the thumb and forefinger in the shape of a “C,” termed the C-sign (Fig. 24) \(^{32}\)

Occasionally, the impingement is accompanied by locking or catching with a sharp pain that starts in the groin. Some patients describe trochanteric pain irradiating from the lateral thigh. Typically, they are aware of their limited pear.

**Fig. 24: C – sign \(^{32}\)**

**Clinical Examination and Findings**

On clinical examination, patients with femoroacetabular impingement may demonstrate a restricted range of motion, particularly internal rotation in flexion.
Occasionally, unavoidable passive external rotation of the hip while performing a hip flexion is present. This has been described previously and is termed a positive “Drehmann’s” sign.

The impingement test: is almost always positive. This test is done with the patient supine; the hip is rotated internally as it is flexed passively to approximately 90° and adducted. Flexion and adduction leads to the approximation of the femoral neck to the acetabular rim (Fig. 25). 

Occasionally, posterior impingement can also occur. In this situation, the pain can be produced by external rotation of the flexed hip if the impinging area is posterosuperior.

Another provocative test to elicit posterior impingement is done by having the patient lie supine on the edge of the bed with the legs hanging free from the end of the bed to create extension. External rotation in extension giving rise to posterior pain, often perceived in the buttock, is indicative of posteroinferior impingement.

Apprehension test: With the patient lying supine, the symptomatic leg is placed in extension. The test is positive when application of gentle external rotation elicits moderate pain. Although not specified, a positive apprehension test is related to an injury in the acetabular labrum in cases of mild acetabular dysplasia (Fig. 26).
Radiography

X-ray examination is in most circumstances the easiest available diagnostic technique to assess osseous pathologies of the hip joint. It allows identification of the pathomorphological characteristics of FAI as well as of other important causes of hip pain such as osteoarthritis, hip dysplasia, or avascular necrosis of the femoral head. 16

Imaging Technique

Anteroposterior Pelvic View (Fig. 30).

The patient is placed in the supine position with 15° of internal rotation of both legs to compensate for femoral antetorsion and to provide better visualization of the contour of the lateral femoral head–neck junction. The central beam points to the midpoint between a line connecting both anterosuperior iliac spines and the superior border of the symphysis (Fig. 31).

Axial Cross Table View (Fig. 32).

The cross-table view is taken with the affected leg internally rotated and the contralateral leg elevated. The central beam points to the inguinal fold

Frog-Leg Lateral View (Fig. 33).

The patient should be positioned supine on the x-ray table with the affected limb flexed at the knee approximately 30° to 40° and the hip abducted 45°. The heel of the affected limb should rest against the medial aspect of the contralateral knee, The cross-hairs of the beam are then directed at a point midway between the anterior superior iliac spine and the pubic symphysis.
**False Profile view** (Fig. 34).

It is obtained with the patient standing and the pelvis rotated 65° relative to the film. The axis of the foot is parallel to the table. This view is technically appropriate when the distance between the two femoral heads is approximately the size of one femoral head.  

**Radiographic Signs of FAI**

There are several distinct morphological features in cam- and pincer-type FAI which can be identified on conventional radiographs.  

**Cam Type FAI**

**Pistol-Grip Deformity**

A pistol-grip deformity is characterized on radiographs by a flattening of the usually concave surface of the lateral aspect of the femoral head (Fig. 35) due
to an abnormal extension of the more horizontally oriented femoral epiphysis.

*SSeveral methods of quantifying this deformity exist*

**Alpha Angle**

The α angle is the angle between the femoral neck axis and a line connecting the head center with the point where the asphericity of the head–neck contour begins (Fig. 36). It can be measured on axial and AP radiographs. On axial radiographs an α angle exceeding 50° is an indicator of an abnormally shaped femoral head–neck contour. 37

**Femoral Head–Neck Offset, Offset Ratio**

Another parameter for quantification of cam impingement is anterior offset, which is defined as the difference in radius between the anterior femoral head and the anterior femoral neck on a cross-table axial view of the proximal femur. (Fig. 37)

In asymptomatic hips, the anterior offset is 11.6 ± 0.7 mm; hips with cam impingement have a decreased anterior offset of 7.2 ± 0.7 mm. As a general rule for clinical practice, an anterior offset less than 10 mm is a strong indicator for cam impingement.

In addition, the so-called offset ratio can be calculated, which is defined as the ratio between the anterior offset and the diameter of the head. The offset ratio is 0.21 ± 0.03 in asymptomatic patients and 0.13 ± 0.05 in hips with cam impingement. 37
Pincer-Type FAI

Coxa Profunda, Protrusio Acetabuli

A normal hip appears on an anteroposterior pelvic radiograph with the acetabular fossa line lying laterally to the ilioischial line. A coxa profunda is defined when the floor of the acetabular fossa touches or overlaps the ilioischial line medially. Protrusio acetabuli is defined when even the femoral head overlaps the ilioischial line medially (Fig. 38)
Lateral Center-Edge Angle, Acetabular Index

Generally, a deep acetabulum is associated with excessive acetabular coverage that can be quantified on an anteroposterior pelvic view with the lateral center edge angle or a particularly low or negative acetabular index.

The lateral center-edge angle (Fig. 39) is the angle formed by a vertical line and a line connecting the femoral head center with the lateral edge of the acetabulum. A “normal” lateral center edge angle has been described to range between $25^\circ$ and $39^\circ$.

The acetabular index (acetabular roof angle) (Fig. 40) is the angle formed by a horizontal line and a line connecting the medial point of the sclerotic zone with the lateral center of the acetabulum. In hips with coxa profunda or protrusio acetabuli, the acetabular index is typically $0^\circ$ or even negative\textsuperscript{17}

![Fig.39: lateral center-edge angle\textsuperscript{17}](image-url)
Signs of Acetabular Retroversion

Retroversion of the acetabulum has been described as a posteriorly orientated acetabular opening with reference to the sagittal plane. Acetabular retroversion represents anterosuperior femoral head overcoverage that renders the hip prone to anterosuperior pincer-type impingement. It can be identified on technically correct anteroposterior pelvic views by three signs:

Cross-Over Sign

A cross-over sign is caused by the anterior acetabular rim line being lateral to the posterior rim in the cranial part of the acetabulum and crossing the latter in its distal part (figure-of-eight) configuration, (Fig. 41)

Posterior Wall Sign

The posterior wall sign is positive when the posterior wall descends medially to the center point of the femoral head indicating deficient posterior coverage. In normal hips, the posterior wall runs through the center of the femur

Ischial Spine Sign

A retroverted acetabulum can also be suspected if the projection of the ischial spine is visible within the pelvic inlet (Fig. 42).
**Fig. 41**: Schematic (left) and radiographic (right) presentations of focal anterior overcoverage of hip in 29-year-old woman. Acetabular retroversion is defined as anterior wall (AW) being more lateral than posterior wall (PW), whereas in normal hip anterior wall lies more medially. This cranial acetabular retroversion can also be described by figure-8 configuration.\(^{13}\)

**Fig. 42**: Ischial spine sign: the ischial spine is visible with the pelvic cavity.\(^{27}\)
MRI & MRA

It is not always necessary to obtain MRI investigation of patients with impingement, but MRI is useful in attempting to differentiate between a simple labral tear and one due to impingement.

The triad of abnormal findings demonstrated in MR arthrography include abnormal head-neck morphology, antero-superior cartilage abnormality, and antero-superior labral abnormality. (Fig. 43)

Contrast enhanced MR arthrograms are useful to detect labral tears, impingement cysts, and periarticular lesions. \(^{29}\)

It will also show any alteration of labral substance and confirm the state of the articular cartilage, but may not show labral detachment or undetached chondral separation.

3-dimensional CT scanning has recently been found useful in assessing femoral offset and may have advantage over MR arthrography as it is non-invasive and gives better resolution and smaller slice thickness. \(^{20}\)

Direct MRA involves fluoroscopic guided injection of the hip before MR imaging and should not be confused with indirect MRA, which relies on intravenous injection of gadolinium contrast with synovial uptake and diffusion into the joint, for which supportive wide spread literature does not exist. \(^{21}\)
**Labral tear:**

Labral tears can be classified by their etiology, locations and morphology.

The etiology for labral tears can be from traumatic and degenerative causes, structural abnormalities from femoroacetabular impingement (cam and pincer type lesions), developmental abnormalities from dysplasia, old slip epiphysis and Perthes disease, and hip instability.

Traumatic tears can occur from an isolated event, or more commonly from repetitive trauma. Traumatic hip dislocations are also susceptible to labral tears. Acetabular fractures that occurred from football injuries have also been associated with labral tears.

Degenerative labral tears (Fig 51) in the athletic population can be the result of wear-and-tear injuries, and may be associated with degenerative changes of the hip joint. These types of tears can cause mechanical symptoms during athletic participation.

With respect to location, tears are classified as anterior (Fig.52), posterior, or superior / lateral.

Labral tears can be classified morphologically as: radial flap, radial fibrillated, longitudinal peripheral, and unstable (Fig.53).

Radial flap tears and radial fibrillated tears involve the free margins of the labrum and are the most commonly encountered Longitudinal peripheral tears of
various lengths are seen at the acetabulum–labrum junction, whereas unstable tears follow no real pattern but cause mechanical symptoms.

**Clinical presentation**

Labral tears are a frequent cause of anterior hip and groin pain, patients with a labral tear also report a variety of mechanical symptoms, including clicking, locking or catching, or giving way. Of these symptoms, clicking appears to be the most consistent clinical symptom.

The onset of symptoms is described as insidious in 61% of patients. Many patients with labral tears describe a constant dull pain with intermittent episodes of sharp pain that worsens with activity. Walking, pivoting, prolonged sitting, and impact activities, such as running, often aggravate symptoms.

The most consistent physical exam finding in patients with acetabular labral tears is a positive anterior hip impingement test. This is performed with the patient supine with the hip and knee at 90 degrees of flexion. The hip is internally rotated while an abduction force is applied. A positive test results in pain provocation in the anterolateral hip or groin.

Another test used is the posterior hip impingement test, in which the patient lies prone with hip and knee extended and the examiner passively extends, adducts, and externally rotates hip. A positive test reproduces anterior hip or posterior pelvic pain. These tests are also used for diagnosis of FAI.

Other, less specific tests used include the Patrick/Faber test, Resisted straight leg raise test Log-roll test, and the Apprehension test.
**Investigations:**

Diagnostic imaging usually begins with a radiographic evaluation with special attention to subtle structural abnormalities of the hip and pelvis. Screening radiographs help detect obvious sources of disease, such as advanced arthritis, tumor, DDH, or FAI.

A complete evaluation includes an anteroposterior view of the pelvis, a cross-table lateral view with or without a frog lateral view and a false profile view.

Computed tomography scans are unable to reliably detect labral, and MRI alone is also inadequate for visualizing the acetabular labrum. Standard MRI produces both false-positive results and an underestimation of labral pathology and has only 30% sensitivity and 36% accuracy.

MRA produces better results, as the intraarticular or systemic infusion of gadolinium is required to obtain the detail necessary to study the labrum. Criteria for tears on an MRA include contrast extending into the labrum or acetabular/ labral interface, blunted appearance, and displacement/ detachment from underlying bone (Fig 54,55).

MRA has its limitations in regard to sensitivity for diagnosis of acetabular labral and articular cartilage abnormalities. Studies have compared MRA with surgical findings and have shown a range of sensitivity from 60% to 100% and that of specificity from 44% to 100% for acetabular labral pathology as compared to direct surgical visualization.
Diagnostic-image–guided intraarticular hip injections can also be helpful in the diagnosis of labral tears. Arthroscopy, which is considered the gold standard, can be a diagnostic and therapeutic medium.  

**Management of labral tears:**

In managing labral tears, the surgeon should focus on preserving healthy labral tissue in order to maintain its role as a secondary joint stabilizer and to minimize potential arthrosis. An assessment of viable versus nonviable labral pathology will determine whether or not any portion of the labrum can be refixed. Degenerative or injured labral tissue is debrided of all nonviable tissue using extra-long arthroscopic shaver instrumentation.
Bony resection should not accompany the labral resection unless it has been dynamically proven at the time of surgery that bony collision is the source of the labral injury, which is done at the time of surgery by releasing the traction (Fig. 56).

The hip is then flexed and rotated under the arthroscopic vision of the peripheral compartment. Most bony impingement labral lesions occur superolaterally, whereas isolated labral lesions occur anteromedially.

**Fig 56**: Arthroscopic management of labral tear
(A) Viewing from the anterolateral portal; a macerated tear of the anterior labrum is probed along with articular delamination at its junction with the labrum.
(B) Excision of the damaged labrum reveals impingement from the overhanging bony lip of the acetabulum (arrows).
(C) Acetabuloplasty is performed, resecting the impinging anterior portion of the acetabulum.
The decision to perform a labral repair is still a process in its infancy. The current indications include tears that are symptomatic and that have either obvious vascularity within their substance or are repairable to the acetabular bony wall or the adjacent capsule.

In general, a tear that is less than 1 cm in length does not require repair because there is minimal associated instability and mechanical symptomatology, when the labral tear involves a detachment from the acetabulum either as a result of trauma or attritional tearing, a suture anchor is required for the stabilization of the tear.
Loose bodies

Removal of symptomatic loose bodies represents the clearest indication for hip arthroscopy for three reasons:

1. The diagnosis is usually easy to determine. Radiodense loose bodies may be apparent on plain radiographs and can be substantiated by computerized tomography (CT). Radiolucent cartilaginous loose bodies can be better visualized by gadolinium arthrography with magnetic resonance imaging (MRA) or iodinated contrast with CT (Arthro-CT).

2. The importance of loose body removal from the hip has been well documented in the literature, largely based on the poor prognosis associated with retained intraarticular fragments. In fact, without the alternative of the arthroscopic approach, arthrotomy with dislocation of the hip for adequate debridement would be required.

3. Compared with an arthrotomy, arthroscopy is significantly less invasive and offers numerous advantages. These benefits include fewer and less serious surgical complications, lower associated morbidity, no hospitalization, less postoperative pain, and quicker recovery with return to normal activities.

Aetiology:

The most common source of loose bodies in the hip is probably posttraumatic intraarticular fragments. (Fig. 58)
Synovial chondromatosis is another source that has been variously reported. The hip is the third most common site of involvement of this disease, and the diagnosis can be elusive. (Fig. 59)

**Fig.58**: Posttraumatic intraarticular fragments (A) Anteroposterior (AP) radiograph shows evidence of posttraumatic degenerative changes with mild deformation of the femoral head. (B) A double-contrast iodinated contrast with computed tomography (Arthro-CT) scan confirms the presence of multiple loose bodies represented by the numerous filling defects (arrows) posteriorly on this image through the joint. (C) Arthroscopic view reveals several of the representative loose bodies between the femoral head and acetabulum.

**Fig.59**: Arthroscopic view of the left hip showing myriad loose bodies in a patient with synovial chondromatosis.
Fragments may occur in association with Legg–Calvé–Perthes disease due to accompanying osteochondritis dissecans (Fig. 60), and excision of these loose articular or osteoarticular fragments may result in remarkable improvement, even in the presence of a severely misshapen femoral head.\(^9\)

**Fig.60**: Preoperative Dunn view of the right hip of a 24-year-old patient showing a large osteochondritis dissecans (OCD) lesion as a sequela of Legg-Calve-Perthes disease as a child (arrow) \(^{32}\)

Loose bodies can lead to secondary degenerative arthritis, but sometimes loose bodies simply occur secondary to degenerative disease. In either case, the extent of degeneration may be the limiting factor in the response to arthroscopy and, with advanced deterioration, removing the loose bodies may not be of any benefit \(^9\)

There have been several reports about removal of bullets from the hip joint using arthroscopic devices
Chondral lesions

Chondral lesions may be localized (posttraumatic and osteochondritis dissecans) or part of a generalized joint disease such as osteoarthritis.

*Post traumatic:*

Acute articular fragmentation is increasingly recognized as a cause of hip pain following trauma. A common mechanism for acute articular fragmentation is a direct blow to the greater trochanter, such as that sustained from a fall landing on the lateral aspect of the hip. This trauma is especially seen in athletic young adult men participating in contact and collision activities in which this type of mechanism is common.

This trauma results in either a full thickness articular fragment from the medial aspect of the femoral head (Fig.62), due to the shear forces, or chondrocyte cell death and focal chondromalacia in the superomedial acetabulum as a result of the impact.

*Osteochondritis dissecans:*

Osteochondritis dissecans of the hip tends to affect the femoral head. Although often on the weightbearing area, the site is variable.

Symptoms are extremely variable, and radiographs are often normal or reveal only slight irregularity. In the classic case, as in other joints, there is a well-demarcated fragment of bone and overlying cartilage, which may be separated from the underlying surface. Associated loose bodies are common, either lying in the defect or free. Arthroscopy is extremely useful for diagnosis, assessment, and treatment.
Several treatment options are available for the repair of chondral defects, such as debridement, microfracture, and autologous chondrocyte implantation (ACI).

Partial thickness defects are generally treated with chondroplasty, involving debridement of the defect to remove any damaged cartilage and create a smooth surface.

For full-thickness chondral defects, microfracture is the current standard of care. Microfracture involves penetration of the subchondral bone to release blood and bone marrow into the defect, initiating cartilage repair. (Fig.63)

Degenerative Joint Disease (Fig.65)

Degenerative disease is the most common finding at hip arthroscopy.

The earliest site on the femoral head is usually anterior, matching the common site of degenerative change seen in the acetabulum. Initially, the cartilage loses its glisten and assumes a yellowish matte appearance before fissuring, fragmentation, and eburnation occurs. At an early stage, cartilage degeneration is localized but later become more widespread and severe, involving both sides of the joint.

Arthroscopic surgery for generalized degenerative disease is unpredictable. In general, manual or powered debridement of unstable osteochondral flaps may be useful.

Osteophytes may form at the peripheral margins of the head, particularly
posteriorly. These may cause impingement and impede instrument access. If localized and associated with otherwise reasonably healthy articular cartilage, it is worthwhile removing osteophytes. Range of motion can sometimes be improved dramatically.

**Avascular Necrosis**

The arthroscopic appearance of avascular necrosis is variable. The spectrum is from complete normality, to cartilage softening with loss of support, to fragmentation (Fig.66) and osteochondral flaps or loose bodies.

The role of arthroscopy in the management of AVN is controversial. It is primarily used to establish whether or not any articular cartilage collapse is evident. Articular collapse in its early stages is not always seen by magnetic resonance scan. If present, it is believed that the chances of revascularization being effective are reduced.

Diagnostic arthroscopy may help surgeons to identify those patients who might not benefit from core decompression, thus preventing patients from undergoing a procedure with a low chance of success.

Hip arthroscopy and core track endoscopy may add relevant theoretic advantages to core decompression: better patient selection, more precise targeting, and more complete debridement of necrotic tissue. Only randomized clinical trials of large samples—unavailable so far—might show any true positive clinical effects.
UNRESOLVED HIP PAIN

Arthroscopy has defined many elusive and often treatable causes of hip pain. This success has done much to stimulate advancements among noninvasive investigative studies. As various imaging methods continue to improve, the role of diagnostic arthroscopy should diminish.

Under appropriate circumstances, the literature still supports the role of diagnostic arthroscopy. In the study by Baber et al., arthroscopy altered the diagnosis in more than half of 328 patients undergoing the procedure.56

CONTRAINDICATIONS

Many contraindications exist for hip arthroscopy for reasons other than the hip itself. Medical illness or disease may preclude the patient from being an adequate risk for surgery; an active focus of infection contraindicates this relatively elective procedure. However, these contraindications are not unique to hip arthroscopy.

The clearest contraindication to hip arthroscopy is ankylosis of the joint characterized by a fixed position on attempted range of motion. Lesser degrees of arthrofibrosis or capsular constriction may, similarly, preclude arthroscopy when the joint cannot be adequately distracted or distended for introduction of the instruments. Marked limitation of rotational motion is often a harbinger of this type of process.

Acetabular protrusio may also be a radiographic indicator of limited
distractability of the joint, which can make it difficult to safely place the instruments.

Open wounds, ulcerative lesions, and superficial infections contraindicate the passage of arthroscopic instruments into the joint due to risk of secondarily creating a pyarthrosis. Similarly, other sources of soft tissue compromise may contraindicate instrumentation of the joint when there may be a concern regarding potential wound healing. Heterotopic ossification within the surrounding soft tissues may also create difficulties for access.

Appreciation of the bony architecture and neurovascular anatomy about the hip is critical to safe arthroscopy and, thus, any significant alteration in the normal anatomy of the bones or soft tissues, whether from previous trauma or surgery, may contraindicate arthroscopy.

One must also keep in mind potential stress risers in the bone, whether from disease, trauma, or previous surgery. A significant stress riser that could propagate a fracture may contraindicate the use of distraction forces often necessary for arthroscopy.

Severe obesity may be a relative contraindication to hip arthroscopy, more than arthroscopy for any other joint. Extra-length instruments are routinely needed, even for moderate-sized patients, and extremely dense soft tissues may overcome the effective operating length of currently available instruments.

Advanced disease states with destruction of the hip joint are also a contraindication to arthroscopy. This reflects poor patient selection and emphasizes the importance of proper indications.
Equipment

Most standard fracture tables can accommodate the few specific needs of hip arthroscopy. A tensiometer is a helpful tool that can be incorporated into the footplate and is especially useful for monitoring the intraoperative ability to maintain adequate distraction (Fig. 91). A large-sized perineal post with generous padding more safely distributes the pressure on the perineum and facilitates lateralization of the operative hip.

Fig. 91: (A) Modifications to this standard fracture table facilitate safe and effective hip arthroscopy. (B) The tensiometer (arrow) is built into the footplate applied to the operative extremity. (C) The digital display is mounted on the arthroscopy cart, allowing constant intraoperative monitoring of the traction force. (D) The oversized perineal post is lateralized (arrow) toward the operative side on the table. The profile of the underlying pelvic support has been reduced.
An image intensifier is important for ensuring precise portal placement. Simply accessing the joint is often not difficult. More important are care and precision in portal placement to minimize the risk of iatrogenic damage.

Both the 30- and 70-degree video-articulated arthroscopes are routinely used to optimize visualization. Interchanging the two scopes allows excellent visualization despite the limited maneuverability caused by the bony architecture of the joint and its dense soft tissue envelope. The 30-degree scope provides the best view of the central portion of the acetabulum and femoral head and the superior portion of the acetabular fossa, whereas the 70-degree scope is best for visualizing the periphery of the joint, the acetabular labrum, and the inferior portion of the fossa.

A fluid pump provides significant advantages in the hip. A high-flow system can provide optimal flow without having to use excessive pressure. This is important for visualization and safety. Adequate flow is essential for good visualization necessary to perform the procedure effectively and in an expedient manner.

Flow cannot be as precisely modulated with a gravity system, creating difficulties both with visualization and extravasation. However, the surgeon must always be cognizant that the pump is functioning properly.

Extra-length cannulas (Fig.92) are specifically designed to accommodate the dense soft tissue envelope that surrounds the hip. The extra length has been accomplished by shortening the accompanying bridge, which allows these cannulas to be used with a standard arthroscope.\textsuperscript{57}
Specially designed hand instruments must be longer, but also of sturdy construction to minimize the risk of instrument breakage.

Thermal ablation devices demonstrate specific advantages in the hip. The small diameter allows access to recesses within the joint difficult to access with mechanical blades. Also, because of the limits on maneuverability, it can be difficult for the shaver to excise damaged articular cartilage or labrum and create a stable edge. Thermal devices are often much more effective at creating a smooth transition zone, preserving more healthy tissue.  

The Oratec® (Fig. 99) uses RF (radiofrequency) energy to create a thermal effect on tissues. It delivers controlled thermal energy for cutting and coagulation with precise temperature control. The Oratec® probe is most commonly set at a temperature of 67°C at the probe tip. Basic science studies have shown that this temperature results in alteration of collagen proteins with resultant shortening of the fibers. At higher temperatures it also can be used to cut and coagulate.  

Fig. 99: The Oratec® probes use RF (radiofrequency) energy to create a thermal effect on tissues.
Bipolar cautery is another tool for controlled delivery of heat to the tissue. The 30-degree tip is end-cutting and is particularly useful in ablating tissue in hard-to-reach areas.

The Holmium laser has also been applied to hip arthroscopy. It appears to be falling out of favor simply due to the ease of use of these other thermal products at a significantly lower cost. In an environment where lasers are readily available, the surgeon may consider its use in the hip as an ablator of soft tissues. Specialized laser tips have been developed for use in the hip

**Assisted Anterior Portal Technique**

Freehand insertion of the needle for anterior portal placement can endanger the lateral femorocutaneous nerve. This leads to the development of an aiming device for anterior portal placement. The aiming device consists of 3 parts: an articular probe, an aiming arch, and a sliding bullet for spinal needle introduction (Fig. 100)

With the PL as the viewing portal, the articular probe is introduced through the slotted cannula in the AL, the aiming tip is directed to the anterior capsule under the labrum using direct arthroscopic vision. At the outside, the aiming arch is assembled and the sliding bullet is placed at the crossing of the lines from the ASIS and the greater trochanter. A skin mark is made at the bullet’s entering site and a skin portal is made followed by deep blunt dissection with the sliding bullet until it locks against the thigh fascia, therefore protecting the lateral femorocutaneous nerve. The long arthroscopy needle is then inserted into the
joint using the sliding bullet that directs it to the articular aiming probe at the anterior hip capsule (Fig. 101)\textsuperscript{60}

**Fig. 100**: The hip director guide\textsuperscript{61}.

**Fig. 101**: The hip director guide has its aiming arch inserted through the anterolateral portal and the sliding bullet inserted at the anterior portal. The arthroscope is inserted at the posterolateral portal (inside the joint, the aiming tip of the guide is visualized resting against the anterior hip capsule under the labrum). An arthroscopy needle is seen in position through the bullet. The handle shows the angle at which the needle was inserted\textsuperscript{58}. 

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Patient Positioning

Patient positioning is the first step to success in hip arthroscopy. Poor patient positioning will result in inadequate distraction with poor access to the central compartment or inadequate hip mobilization limiting access to the hip periphery.

In general, there are two different positioning methods for hip arthroscopy: supine and lateral. There is slight variation between authors regarding these two methods. Modern hip arthroscopy requires dynamic patient positioning. The surgeon must be capable of applying and releasing traction intraoperatively and mobilizing the hip joint to different degrees of flexion and rotation.

The Supine Position (Fig. 102)

Even though dedicated distractors for hip arthroscopy in the supine position exist, fracture tables are more popular because they are within the reach of most hospitals.

In the case of the supine position, both feet are fixed to holding devices to avoid pelvic tilt when traction is applied to the operative side. An oversized extrapadded perineal post (minimum 10 cm in diameter) is vertically attached to the fracture table and rests against the groin of the operative side providing a lateralizing vector to the traction force.

The resulting direction of the traction is not applied following the femur shaft but closer to the direction of the femoral neck. The image intensifier is placed between the legs, with the C-arm in a vertical position aiming at the operative side, thereby providing an anteroposterior view of the hip.
Fig. 102: A) Schematic representation of the setup for supine hip arthroscopy. B) Typical setup for supine approach for hip arthroscopy. Note that the perineal post is lateralized toward the affected side. The nonoperative leg is abducted, and mild traction is applied to help with lateralization and countertraction. The operative leg is in slight abduction, neutral rotation, and neutral flexion–extension.\textsuperscript{62}
The Lateral Position (Fig. 103)

The main difference with the supine position is that the patient is positioned in lateral decubitus on the operating table with the operative side upward. Only the foot of the operative side is fixed to the traction device, and pelvic tilt is avoided by the patient’s body weight, the length of the nonoperative side leg lying freely on the operating table.

A horizontal extra-padded oversized perineal post is positioned on the operative side groin. The post provides lateralization of the tensile forces, which results in traction that is more in line with the femoral neck, as is the case with the supine position. The C-arm is positioned horizontally under the operating table to provide an anteroposterior view of the hip (operative side).

More recently dedicated distractors for lateral approach hip arthroscopy have been developed (McCarthy-type distractor, Inomed, GA; Smith and Nephew lateral distractor, Smith and Nephew Endoscopy, Andover, MA).

These may contribute to making the lateral position more accessible to surgeons especially to those working in OR set-up in the classical way.

The choice of the surgical position depends on the surgeon’s preference and experience.59
Fig. 103: A) Schematic representation of the setup for lateral hip arthroscopy. B) This photograph demonstrates the lateral decubitus position for hip arthroscopy on a fracture table. The right hip is the operative side. The patient is lying on her left side; only the right foot is fixed to the traction device. IIT, image intensifier.
DISTRACTION

Preparing and Draping the Patient for Hip Arthroscopy

The hip is brought back to the starting position without traction (flexion 20°, abduction 0°, neutral rotations) and the surgical area prepared for surgery.

When applying sterile drapes, we first start by covering both ends of the C-arm using sterile bags. Then waterproof adhesive sterile drapes are placed in a standard fashion. The surgeon should be careful not to cover portal sites with the drapes. The medial drape should be slightly medial to the anterior superior iliac spine. posterior drape should be behind the posterior edge of the greater trochanter. The superior drape should be level with the anterior superior iliac spine, and the distal drape should be 10–15 cm below the tip of the greater trochanter.

After drapes are in position, a sterile gauze is placed over the area where the portals will be established and an adhesive transparent surgical drape is placed over the surgical area (including the gauze)

The gauze is removed with the adhesive tape on it leaving the area of the portals uncovered by the adhesive drape. This will prevent adhesive material from being brought into the portals by needles and instruments creating a waterproof seal preventing fluid from leaking through the drapes to the patient when the procedure starts

After cables and tubes for arthroscopy are ready, traction is applied (traction starting time should be recorded to monitor its duration). With the traction established, landmarks are identified and marked on the skin with a skin marker
(we prefer to mark the skin after traction is applied to avoid migration of the marks). 59

The most popular technique to access the hip joint arthroscopically is to start by establishing traction and entering the central compartment first. Michael Dienst described an alternative method whereby the hip periphery is accessed first without traction. 68

The Arthroscopic Portals

A keen appreciation of hip anatomy in combination with proper positioning and distraction is fundamental to safe and successful portal placement (Fig. 105). Portals should be established in zones that minimize the risk of soft-tissue damage and that maximize arthroscope maneuverability and the visualization of anatomic structures. This is of particular importance in the hip joint, because it is deeply recessed and enveloped by the thick, fibrous capsule.

Anterolateral portal

The anterolateral portal is the workhorse of all of the arthroscopic portals around the hip. It is considered to be the safest portal, and it is therefore established first and “blindly” (i.e., with the assistance of fluoroscopy alone). It is useful for the visualization of the central, peripheral, and peritrochanteric compartments.

To create an anterolateral portal, an initial superficial incision no deeper than the subcutaneous adipose tissue is made over the anterosuperior tip of the greater trochanter. A fascial band just posterior to the skin incision is commonly encountered, and it can be used as a reference mark. A sheathed blunt trocar or
snap is used to pass through the adipose tissue, fascia, and muscle tissue to the hip capsule. The superior gluteal nerve lays approximately 4.5 cm superiorly to this portal (Fig. 106,107). 69

Anterior portal:

After the anterolateral portal is established, the anterior portal is typically the second and most difficult portal to establish. It allows for the observation of the anterior femoral neck, the superior retinacular fold, the lateral acetabular labrum, portions of the transverse acetabular ligament, and the ligamentum teres.

Traditionally, this portal is placed directly at the intersection of the lines drawn vertically from the ASIS and horizontally from the greater trochanter. However, this approach involves the direct penetration of the origin of the rectus femoris tendon.

It has been suggested that a resultant tendinopathy causes increased soreness in the anterior groin region. Therefore, a recent trend has emerged with the anterior portal placed just distal and lateral to the traditional portal site: the mid-anterior portal.

To establish any anterior portal, one must be careful to superficially avoid the LFCN and its branches (Fig. 108,109). On deeper exploration, the surgeon should be familiar with the ascending branch of the lateral circumflex femoral artery (Fig. 110), which can be only 1.9 cm away; a small terminal branch of this artery can be as close as 1 cm away. As stated previously, one must also be aware of the femoral neurovascular bundle (Fig. 111), which is located approximately 3.5 cm to 4 cm medially.
**Posterolateral portal**

The final central compartment portal is the posterolateral portal. It is placed under direct arthroscopic visualization, and it is considered the easiest to establish because of a relative “soft spot” in the posterior soft-tissue envelope. The hip capsule is thinnest in this zone. The portal is placed on the same transverse line as the anterolateral portal but just posterior to the greater trochanter. It traverses the gluteus medius and the gluteus minimus before entering the posterior capsule (Fig.112).

The most obvious extra-articular structure at risk is the sciatic nerve (Fig.113), which is approximately 2.9 cm away. Fortunately, sciatic nerve injury is extremely rare.

Most surgeons do not routinely make use of the posterolateral portal, because the majority of intra-articular pathology is localized to the anterolateral zones. Instead, the main purpose of this portal is to provide access for observation of the posterior aspect of the hip.

Caution should be employed when attempting portal placement out of the relative “safe zone,” which is considered to lie within approximately 4 cm superior and 6 cm to 8 cm inferior to the anterior and anterolateral portals. This is especially important when attempting to establish access posterior to the posterolateral portal or medial to the anterior portal. ⁶⁹
Portal Placement

The anterolateral portal lies most centrally in the safe zone for arthroscopy and thus is the portal placed first. Subsequent portal placements are assisted by direct arthroscopic visualization.

This initial portal is placed by fluoroscopic inspection in the antero-posterior (AP) plane (Fig. 115). However, orientation in the lateral plane is equally important. With the leg in neutral rotation, femoral anteversion leaves the center of the joint just anterior to the center of the greater trochanter. Thus, the entry site for the anterolateral portal at the anterior margin of the greater trochanter corresponds with entry of the joint just anterior to its midportion.

This correct entry site of the joint is achieved by keeping the instrumentation parallel to the floor during portal placement.

When distracting the hip, a vacuum phenomenon usually is present. Prepositioning for the anterolateral portal is performed with a 6-inch, 17-gauge spinal needle under fluoroscopic control. The joint is then distended with approximately 40 ml fluid and the intracapsular position of the needle confirmed by backflow of fluid; distension of the joint enhances distraction.

It is important to note that the needle may inadvertently penetrate the lateral acetabular labrum during initial placement into the joint. This puncture can be felt because pushing the needle through the labrum results in greater resistance than when just penetrating the capsule. If the needle pierces the labrum, once the joint has been distended, it is a simple process to back the
needle up and reenter the capsule below the level of the labrum. Failure to recognize this can result in avoidable violation of the labrum by the cannula.⁵⁷

A stab wound is made through the skin at the needle. The guidewire is placed through the needle and the needle is removed (Fig 116). The cannulated obturator with the 5.0-mm arthroscopy cannula is passed over the wire into the joint.

When establishing the portal, the cannula/obturator assembly should pass close to the superior tip of the greater trochanter and then directly above the convex surface of the femoral head. It is important to keep the assembly off the femoral head to avoid inadvertent articular surface scuffing.⁵⁷

Fig.115: Anteroposterior (AP) fluoroscopic view of a right hip. (A) A vacuum effect is apparent because of the negative intracapsular pressure created by distraction of the joint (arrows). (B) A spinal needle is used in prepositioning for the anterolateral portal. The needle courses above the superior tip of the trochanter and then passes under the lateral lip of the acetabulum entering the hip joint. (C) Distension of the joint disrupts the vacuum and facilitates adequate distraction. (D) The cannula/obturator assembly is being passed over the Nitanol wire that had been placed through the spinal needle.⁵⁷
Once the arthroscope has been introduced, the anterior portal is placed next. Positioning is now facilitated by visualization from the arthroscope as well as fluoroscopy. The 70-degree scope works best for directly viewing where the instrumentation penetrates the capsule. Pre-positioning is again performed with the 17-gauge spinal needle, entering the joint directly underneath the free edge of the anterior labrum. As the cannula/obturator assembly is introduced, it is lifted up to stay off the articular surface of the femoral head while passing underneath the acetabular labrum.

If proper attention is given to the topographic anatomy in positioning the anterior portal, the femoral nerve lies well medial to the approach. However, the lateral femoral cutaneous nerve lies quite close to this portal. It is best avoided by using proper technique in portal placement. The nerve is most vulnerable to laceration by a skin incision placed too deeply.

Last, the posterolateral portal is introduced. The fluoroscopic guidelines are similar to the anterolateral portal. Rotating the lens of the arthroscope posteriorly brings the entry site underneath the posterior labrum into view. Placement under arthroscopic control ensures that the instrumentation does not stray posteriorly, potentially placing the sciatic nerve at risk.

The hip remains in neutral rotation during placement of the posterolateral portal. External rotation of the hip would move the greater trochanter more posteriorly and, because this is the main topographic landmark, the sciatic nerve might be at greater risk for injury. ⁵⁷
Using the three-portal technique (anterior, anterolateral, and posterolateral), inspection begins from the anterolateral portal. This is the first portal established because it lies most centrally in the safe zone for arthroscopy.

Inspection begins with the 70-degree scope as this provides the best view of the outer margins of the joint and is used for allowing direct arthroscopic visualization of where the other two portals are placed. The anterolateral portal provides the best view of the anterior portion of the joint (Fig.117).

Next, the arthroscope is placed in the anterior portal. Viewing laterally, the relationship of the lateral two portals underneath the lateral labrum is seen (Fig.118). The surgeon should be especially cognizant to critique the entry site of the anterolateral portal because this is the one portal that is placed only under fluoroscopic guidance without benefit of arthroscopic visualization of where the portal enters the joint.

Viewing medially from the anterior portal, the surgeon can see the most inferior limit of the anterior labrum (Fig.119).

The arthroscope is then placed in the posterolateral portal, which provides the best view of the posterior regions of the joint, especially the posterior labrum (Fig.120). The posterior labrum is the portion that is least often damaged and has the most consistent morphological appearance. Thus, viewing this area is often used as a reference in assessing variations of the anterior or lateral labrum and accompanying pathology.57

This position brings into view structures that cannot be seen from inside the joint and also provides a different peripheral perspective on some of the intraarticular structures. The medial synovial fold is consistently visualized
adjacent to the anteromedial neck of the femur (Fig.123,124).

**Fig.122**: AP fluoroscopic view of the flexed hip. (A) From the anterolateral entry site, the 17-gauge spinal needle has been repositioned on the anterior neck of the femur. The spinal needle can be felt perforating the capsule before contacting the bone. (B) The guidewire is placed through the spinal needle. It should pass freely to the medial capsule as illustrated. (C) The cannula/obturator assembly is
Complications

1- Traction-related injuries

During arthroscopy of the hip, mechanical traction is necessary to separate the femoral head from the acetabulum and thereby provide space for the introduction of the arthroscope and instruments. This can lead to soft-tissue injuries associated with the traction itself (distraction-type) or with the perineal post used to provide countertraction (compression type).

The perineal post should be ≥ 9 cm in diameter, positioned against the medial thigh rather than the groin crease, the extremity should be positioned in slight abduction.

Undue pressure on the ipsilateral foot, ankle and leg, usually when a boot is used, may also be considered a form of compression-type injury. The foot is prone to inadvertent compression when placed tightly in a boot, particularly in thin patients. Diminished sensation in the distribution of the superficial peroneal nerve has been reported, as well as vascular obstruction of all three major arteries at the ankle level. The foot should be well-padded, especially around the bony prominences of the malleoli.

2- Portal-related complications

With the exception of the LFCN, direct neurovascular injury is very rare, although great care is needed to avoid a potentially devastating injury to any of these structures.
- **Nerve injuries.**

  The structure most at risk for direct injury is the LFCN, which lies very close to the anterior portal in line with the anterior superior iliac spine.

  Any patient complaining of diminished sensation or numbness over the anterolateral thigh following hip arthroscopy should be considered to be suffering from LFCN injury until proven otherwise. Its incidence is difficult to define, as it is not always clear if reported cases are due to traction neurapraxia or direct laceration.

  Neutral rotation of the limb during portal placement is recommended to ensure the anatomy is not distorted and bony landmarks such as the anterior superior iliac spine and borders of the greater trochanter should always be identified and marked.

  The skin incision should not extend into the subcutaneous fat because of the superficial course of the LFCN.  

- **Vascular injuries.**

  Minor bleeding is common during hip arthroscopy, but is easily controlled either with a transient increase in fluid-pump pressure or with coagulation at the source using the radiofrequency (RF) ablation probe (Fig.130).
4- Fluid extravasation

Leakage of the irrigation fluid into anatomical spaces adjacent to the joint is a dangerous complication of hip arthroscopy. In intra-capsular hip arthroscopy, the fluid escapes through capsular incisions, although most reported cases involve extra-capsular endoscopic procedures (typically release of the psoas tendon) or the presence of a fresh acetabular fracture.

Fluid volumes between 2 and 3 litres in the retroperitoneum and abdomen have been reported in symptomatic patients. The tell-tale clinical sign is abdominal distension, sometimes with subcutaneous oedema of the thigh and hypothermia.

If surgery is performed under regional anaesthesia, abdominal pain may develop intra-operatively and lead to early termination of surgery. In cases performed under general anaesthesia, continued accumulation of abdominal fluid may lead to compartment syndrome, necessitating emergent laparotomy.

Surgical time should be kept to a minimum and capsulotomies used sparingly
& Inflow fluid pressure should below (40 to 50 mmHg) and fluid balance monitored.
5- Instrument breakage

The thick soft-tissue envelope around the hip makes manipulation of the arthroscope and instruments difficult, even in the presence of distraction. The curvature of the articular surfaces poses further problems and also predisposes to instrument bending or breakage, demanding careful and gentle handling.

6- Femoral neck fracture

Over-aggressive resection of the cam deformity has two potential adverse consequences: the loss of the sealing effect of the labrum in flexion and predisposition to iatrogenic femoral neck fracture.\(^\text{72}\)

\textit{(Mardones et al., 2005)} in a cadaver study, suggested that 30% of the femoral neck diameter could be resected safely, although such resection decreased the energy required for a fracture.\(^\text{76}\)

The burr should be handled gently during femoral osteochondroplasty to avoid creating bony indentations that may act as stress risers. Post-operative instructions should include partial weight-bearing (50%) for six weeks.\(^\text{72}\)

7- Avascular necrosis of the femoral head

Avascular necrosis (AVN) following hip arthroscopy is more a theoretical concern than a true clinical problem. The same holds true for the progression of already established AVN, which has been described once after hip arthroscopy. Although the hip might have been already at risk due to the original injury, the distraction and partial capsulectomy may have further contributed to the event.
In the peripheral compartment, the lateral synovial fold is a reliable landmark used in hip arthroscopy for identifying the branches of medial circumflex artery that lie behind it; the lateral extent of femoral osteochondroplasty should terminate just before this fold. 72

**Infection**

Hip arthroscopy lasts for approximately two hours and can involve fairly extensive soft-tissue dissection, bony reshaping and the use of foreign materials (e.g., implants for labral fixation, sutures for capsular plication).

Routine administration of broad-spectrum antibiotics pre-operatively is advised to prevent this exceedingly rare but serious complication. 72

**Heterotopic ossification**

The incidence of this complication appears to have increased as a result of arthroscopic techniques developed for treatment of FAI. It is theorised that surgical trauma to the gluteal muscles and the bone debris generated during osteoplasty might trigger the formation of new bone.

The joint should be washed out at the end of procedures that generate bony debris. In these cases, pharmacological prophylaxis (indomethacin (74 mg daily for four days) followed by naproxen (500 mg twice daily for 30 days)) should be administered, unless contraindicated. 72
Rehabilitation

Although rehabilitation guidelines following hip arthroscopy continue to evolve, the overall goal remains to return the patient to a preinjury level of activity. This involves restoration of normal range of motion, gait, and strength to allow return to functional activity.

Repaired tissue must be properly protected to allow healing and to prevent excessive stress on tissue. However, prolonged immobilization is not desired because of the numerous deleterious effects, including muscle atrophy, articular cartilage degeneration, ligament strength loss, and excessive adverse collagen formation.

Rehabilitation protocols need to follow several basic principles:

1. Consideration of soft tissue healing constraints
2. Control of swelling and pain
3. Early range of motion (ROM),
4. Limitations on weight bearing,
5. Early initiation of muscle activity and neuromuscular control,
6. Progressive lower extremity strengthening and proprioceptive retraining,
7. Cardiovascular training,
8. Sport specific training.

The rehabilitative treatment plan after arthroscopic hip surgery depends on the pathology recognized and the arthroscopic methods used.
Labral repair

Specific rehabilitation guidelines following labral repair must take into consideration the location and size of the repair. Because the majority of labral tears occurring in the anterior superior region of the labrum, the following rehabilitation guidelines are specific to these repairs.

Intraoperative analysis reveals that the following ranges of motion do not stress the anterior superior labrum are; 0° to 90° flexion, 0° to 25° abduction, and 0° to 25° external rotation.

Postoperatively, patients are instructed to limit ROM as follows: 25° of abduction for 3 weeks, gentle external rotation and extension for 3 weeks, and 90° of flexion for 10 days.

Swelling and pain are controlled through the use of ice and nonsteroidal anti-inflammatory drugs (NSAIDS).

Early ROM is initiated to restore joint motion and prevent tissue scarring in the joint. ROM is started the day of surgery using a continuous passive motion (CPM) machine, passive ROM exercises, and stationary bicycling.

The CPM is used 8 to 12 hours per day for 4 weeks. Passive ROM should focus on restoring internal rotation, flexion, and progressive stretching of the piriformis. Stretching of the iliopsoas is initiated at the start of week 2 (day 8).

Stationary bicycling with minimal resistance is done for 20 minutes daily starting the day of surgery.
Weight bearing is limited to foot flat weight bearing (20 lb) for 2 weeks. Aquatic walking with the use waterproof dressings in chest deep water can be initiated on postoperative day 1. Early ambulation in the pool allows patients to work on gait symmetry in an unweighted environment.

Initial strengthening needs to focus on the gluteus medius and core stabilizers while avoiding labral stress. Isometric strengthening of the glutei, quadriceps, hamstrings, and transverse abdominals is initiated on the day of surgery.

Quadruped rocking (Fig.134), active internal rotation (Fig.135), and hip isometrics are initiated at week 2. Side lying clams, bridging (Fig.136), 3-way leg raises, and short lever hip flexion (Fig.137) are initiated at week 3. Straight leg raises, one-third knee bends (Fig.138), are initiated at week 4.

Advanced strengthening and proprioceptive exercise should be progressed once the patient is full weight bearing. Rotational and lateral movements should be emphasized throughout this stage. Advanced bridging (Fig.139), side bridging, single-leg cord rotations (Fig.140), Single leg stance on a Dyna Disc (Fig.141), sidestepping with resistance (Fig.142), skaters on Pilates reformer, and single knee bends are initiated at week 5., and lateral agility exercises (Fig.143), Single leg windmills (Fig.144) are added at 6th week.

Cardiovascular fitness is achieved through the use of a stationary bike with resistance at week 3; the elliptical machine and stair climber are added at week 5. Sport-specific training is initiated between weeks 7 and 10. Return to competition is contingent on assessment of ROM, strength, power, and agility.
Osteoplasty

The focus of rehabilitation after chondroplasty or osteoplasty is to avoid impingement of the hip while restoring full ROM. In cases that involve significant shaving of the femoral neck, caution must also be taken to limit impact activities that may increase risk of femoral neck fracture during the first 8 weeks.

Postoperatively, flexion is limited to 90° for 10 days to protect the joint from impingement. A brace is used for 10 days to limit hip flexion and for protection in the case of a fall. Swelling and pain are controlled through the use of ice and NSAIDs.

Early ROM is initiated the day of surgery using the same methods as mentioned for a labral repair. As with labral repairs, weight bearing is limited to foot flat weight bearing for 4 weeks, and aquatic walking can be initiated on postoperative day 1. Initial strengthening is very similar to guidelines described for labral repairs. Strengthening should focus on the gluteus medius and core stabilizers while avoiding FAI.
Advanced strengthening and proprioceptive exercise are progressed gradually from weeks 6 to 12. Emphasis is placed on rotational and lateral movements throughout this stage. Extra care should be taken to avoid impingement of the joint and inflammation of the iliopsoas.

Cardiovascular fitness is achieved through use of a stationary bike with resistance at week 5; the elliptical machine and stair climber are added at week 7. Sport specific training is initiated between weeks 13 and 17. Any deficits in ROM, strength, power, and agility should be addressed before returning to competition.

Microfracture

The rehabilitation program after microfracture for treatment of chondral defects is crucial to optimal recovery after surgery.

Rehabilitation is designed to promote the ideal physical environment in which newly recruited mesenchymal stem cells from the marrow can differentiate into the appropriate articular cartilage-like cell lines.

Postoperatively, flexion ROM is limited to 90° to protect the joint from postoperative impingement for 10 days. Passive ROM should focus on all planes of motion, progressing flexion as tolerated after 10 days. Weight bearing is limited to foot-flat weight bearing (20 lbs.) for 6 to 8 weeks.

A continuous passive motion machine is used for 6 to 8 weeks. Care should be taken during strengthening to avoiding compressive or sheering forces at the site of the microfracture.
PATIENTS AND METHODS

This study was conducted in Benha university hospital and Assiut university hospital, between January 2011, and June 2013. Hip arthroscopy was done for 30 patients with hip joint pain.

Patients

Age distribution

The patient’s age ranged between 17 and 58 years with a mean of 29.5 years.

Sex distribution

There were 27 males, and 3 females in this study.

Table (3): Sex distribution of patients included in this study

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages</td>
<td>27(90%)</td>
<td>3(10%)</td>
</tr>
</tbody>
</table>

Graph (1): Chart showing sex distribution of patients included in this study

Side of affection

In our study, 16 (53.3 %) hips were left, and 14 (46.7 %) hips were right
Table (4): Side of affection

<table>
<thead>
<tr>
<th>Side of affection</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>14</td>
<td>46.7</td>
</tr>
<tr>
<td>Right</td>
<td>16</td>
<td>53.3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Duration of symptoms

The duration of symptoms before proceeding to hip arthroscopy ranged from 6 months to 30 months with a mean of 13.6 months.

Table (5): Preoperative duration of symptoms

<table>
<thead>
<tr>
<th>Preoperative duration of symptoms</th>
<th>minimum</th>
<th>maximum</th>
<th>mean</th>
<th>St. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
<td>30</td>
<td>13.6</td>
<td>5.47471</td>
</tr>
</tbody>
</table>

Methods:

Criteria for patient selection:

Inclusion criteria:

- Patients with hip pain not responding to conservative treatment for more than six months.
Exclusion criteria:
- Open wounds  - Active infection
- Recent fracture  - Ankylosis
- Morbid obesity.  - Poor bone quality

Preoperative evaluation
A- Careful history taking and scoring assessment using
   - Modified Harris hip score (mHHS)
   - Non arthritic hip score (NAHS)

   All patients were assessed using Modified Harris hip score. This included an assessment based on pain (44 points) and function (47 points); A multiplier of 1.1 provides a total possible score of 100.
**Modified Harris Hip Scoring System**

<table>
<thead>
<tr>
<th>Pain (points)</th>
<th>44 None/ignores</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Slight, occasional, no compromise in activity</td>
<td></td>
</tr>
<tr>
<td>30 Mild, no effect on ordinary activity, pain after activity, uses aspirin</td>
<td></td>
</tr>
<tr>
<td>20 Moderate, tolerable, makes concessions, occasional codeine</td>
<td></td>
</tr>
<tr>
<td>10 Marked, serious limitations</td>
<td></td>
</tr>
<tr>
<td>0 Totally disabled</td>
<td></td>
</tr>
</tbody>
</table>

**Function: Gait**

- **Limp**
  - 11 None
  - 8 Slight
  - 5 Moderate
  - 2 Severe
  - 0 Unable to walk

**Functional Activities**

- **Stairs**
  - 4 Normally
  - 2 Normally with banister
  - 1 Any method
  - 0 Not able

- **Socks/Shoes**
  - 4 With ease
  - 2 With difficulty
  - 0 Unable

- **Sitting**
  - 5 Any chair, 1 hour
  - 3 High chair, ½ hour
  - 0 Unable to sit, ½ hour, any chair

- **Public Transportation**
  - 1 Able to enter public transportation
  - 0 Unable to use public transportation

**Distance Walked**

- 11 Unlimited
- 8 6 blocks
- 5 2-3 blocks
- 2 Indoors only
- 0 Bed and chair

Total Points $\times 1.1$
Total Score

*N.B: The elements of deformity (4 points) and range of motion (5 points) from the original Harris hip score were deleted because neither of these are principal indications for arthroscopy. Arthroscopy is principally indicated for pain and function*

**B – Clinical examination:**
All patients had the following tests done:
- Impingmenet (FADDIR) test
- Labral stress test
- log rolling test
- FABER test
- SLR test & An active straight leg raise or straight leg raise
against resistance
- Fluoroscopic guided injection of hip

B- Radiological evaluation

All patients were preoperatively assessed by:

(A) Plain x ray:

1- Anteroposterior view

Well-centered Anteroposterior view of the pelvis taken with the patient supine, the beam perpendicular to the table and centered over the pubic symphysis, the distance between the sacroccygeal joint and pubic symphysis measuring about 3.2 cm for male, 4.7 cm for female.

2- Frog leg lateral view

(B) MRA (magenetic resonance arthrography)

was done in all patients for detection of labral pathology.

C- Laboratory investigations

In the form of routine preoperative investigations and acute phase reactants to exclude possibility of infection in suspected patients.

Technique:

Instruments (Fig. 145)

The arthroscopic unit used consists of:

- Light source, and monitor, video recorder, 30- and 70-degree video-articulated arthroscopes.

- Arthroscopic (Fluid) pump, Irrigation bags with their tubing.

- 20-ml syringe, No. 11 scalpel blade, 16-gauge spinal needle.
- Nitinol guidewires for portal establishment
- Switching stick
- Extra-length cannulas for portal placement over the nitinol wires; Graduated sizes (4.5, 5.0, and 5.5 mm cannulas)
- Slotted cannula for passage of curved instruments.
- Extra long probe, graspers, arthroscopic knife.
- Extra-length curved shaver and blades burr/abrader with curved tip.
- Extra long flexible radiofrequency probe.
- Suture anchors, extralong suture passing and retrieving instruments that can pierce labral tissue and retrieve sutures after anchor placement.

**Fig. 145**: Instruments arranged on Mayo stand
Anesthesia

General endotracheal intubation anesthesia was used for all patients in this study.

Prophylactic antibiotics

Prophylactic antibiotics were administered intravenously with induction of anesthesia, before positioning, and the skin incision.

Positioning of the patients (Fig.146,147)

The patient was positioned supine on the fracture table. Lower-extremity holders were applied to a standard operating Table, Large, well-padded perineal post was used, positioned laterally against the medial thigh of the operative leg.

Slight traction was applied to the non-operative limb; this stabilized the torso on the table and keeps the pelvis from shifting during distraction of the operative hip.

The operative limb, The hip was flexed to about 45 degrees, neutral rotation, neutral abduction, the knee was extended, and 10 to 20 kg traction was applied
SURGICAL TECHNIQUE

We preferred to use the peripheral compartment first technique (peripheral approach), whereby the hip periphery is accessed first without traction

**Positioning**

We preferred the supine position, because of the almost exclusive use of the proximal and distal anterolateral and anterior portals during hip arthroscopy without traction.

To allow for a complete diagnostic arthroscopic examination of the hip, we combined both (with and without traction) technique; this required specific attention to positioning, table equipment, and draping.

The patient was placed in the supine position. The contralateral hip was kept in abduction of about 20°, neutral rotation, and 0° of extension. Moderate traction was then applied to the contralateral side first. This was done by careful manual lengthening of the extension bar of the extension table.

For arthroscopy of the peripheral compartment, the foot of the ipsilateral limb was kept in the traction module. The traction was released, and the traction module with the foot is slid in with the extension bar, the leg was allowed to remain dynamically flexible to allow for various amounts of rotation and abduction to obtain the best view possible of various points of the peripheral compartment.

With this technique the hip and knee can be flexed up to 90 degrees, abducted to about 30 degrees, and rotated 20 degrees internally and externally.
Portal placement:

In our practice, we have used 3 portals, the proximal anterolateral portal & standard anterolateral and mid anterior portal with alternating use of camera and instruments between these portals.

FAI management:

The arthroscopic technique included the use of proximal anterolateral portal & standard anterolateral portal as well as the modified anterior portal. The routine use of several accessory portals was to enhance visualization and bone resection.

Management of CAM impingement:

To perform peripheral compartment arthroscopy with the patient in the neutral flexion and extension position, the standard anterolateral portal was used along with a proximal anterolateral portal.

The blunt trocar and the sheath for the arthroscopic camera were introduced via the anterolateral portal to the apex of the femoral head–neck deformity. The trochar was exchanged for the arthroscope within the cannula. The scope and cannula were maintained on the capsule and bone at the apex of the cam deformity. Next, the arthroscopic motorized shaver was introduced through the proximal anterolateral portal.

The shaver then was used to clear some of the soft tissue over the capsule. The shaver tip soon becomes visible, and the shaver was used to make a capsulotomy of the anterolateral capsule. This was enlarged as a partial capsulectomy.
generally performed with the use of a 30-degree arthroscopic lens and a 5.0-mm aggressive shaver.

After the partial capsulectomy was completed, the shaver was introduced into the peripheral compartment. A partial synovectomy was performed to allow for the adequate visualization of the anterior, lateral, and posterior femoral head, with its cam deformity; the extra-articular acetabular rim; the labrum; and the capsular reflection on the acetabulum, in addition to many other peripheral compartment structures.

The hip then was flexed, adducted, and rotated to demonstrate the impingement arthroscopically, either with the traction boot attached to the fracture table or by removing it from the traction device. With the use of a motorized burr, the femoral head–neck offset was restored after removal of the excessive bone.

The surgery was tailored to the patient’s pathology, as not all cam impingement patients had the same anatomy, because the bumps differ: (some may be lateral, some may be anterior, and most are anterolateral).

Thus, the same operation (i.e., the location and amount of bone removed) was not performed on every patient.
At this point, a Kirschner wire was introduced into the middle of the tumor under direct arthroscopic view. En bloc resection of the tumor was performed with currette.

The removed specimen was inspected and a radiograph obtained to assure complete removal of the tumor, complete excision was achieved with an arthroscopic burr.

The specimen was sent for histologic examination to confirm the diagnosis.

Postoperative Management

In the recovery area, after the patients had regained alertness and orientation, a neurovascular examination was done to ensure that no neurovascular compromise had occurred.

Hip arthroscopy surgery is often considered a “same day procedure,” all patients were discharged on the same day, after receiving discharge instructions and prescriptions for pain medicines and antibiotics course.

A course of antibiotics was prescribed until the incisions have become dry usually at approximately 7 – 10 days later.

Rehabilitation Program started as early as the first day, as following:

Control Pain and Swelling:

Swelling and pain were controlled through the use of ice and nonaspirin nonsteroidal anti-inflammatory drugs.
Protected Weight bearing:

Partial weight-bearing (PWB) was ordered based on the extent of the surgery as well as the healing properties/timelines for the involved tissue, mostly for 4–6 weeks postoperatively.

Early ROM:

- ROM was started the day of surgery to restore joint motion and decrease tissue scarring in the joint, by:

  - A continuous passive motion (CPM) machine, passive ROM exercises, and stationary bicycling. The CPM was typically used 8–12 hours per day for 4 to 6 weeks.

  - With early PROM, emphasis was placed on internal rotation and flexion of the hip to prevent formation of adhesions between the joint capsule and the labrum.

Muscle strengthening exercises:

Strengthening exercises were initiated by the sixth week postoperative for lumbar-pelvic region (core stability), hip and lower extremity including:

- Core stability exercises: Transverse abdominis (TA) and pelvic floor setting,
- The gluteals, quadriceps, hamstrings, and hip adduction and abduction isometrics
- Prone internal and external rotation isometrics are started as early as week 2.
Precautions and limitations regarding ROM and Weight bearing during post-operative rehabilitation were determined by which arthroscopic procedures were performed.

Osteoplasty

In these cases, passive movements started as soon as possible after surgery and were performed 2–3 times a day to prevent adhesions. A continuous passive motion machine was used for 4 weeks. Passive movements were taken to the limits of pain resistance. Flexion was limited to 90° for 10 days to protect the joint from impingement.

Data Management and Analysis:

The collected data was revised, coded, tabulated and introduced to a PC using Statistical package for Social Science (SPSS 15.0.1 for windows; SPSS Inc, Chicago, IL, 2001). Data was presented and suitable analysis was done according to the type of data obtained for each parameter.

i. Descriptive statistics:
   1. Mean.
   2. Standard deviation (± SD).
   3. Minimum and maximum values (range) for numerical data.
   4. Frequency and percentage of non-numerical data.

ii. Analytical statistics:
   1. Independent-Samples T Test was used to assess the statistical significance of the difference between two study group means.
   2. Paired T Test was used to assess the statistical significance of the difference between two means of one study group over time or before and after an event.
3. **Correlation analysis (using Pearson's method):** To assess the strength of association between two quantitative variables. The correlation coefficient denoted symbolically "r" defines the strength and direction of the linear relationship between two variables.

- **P- value:** level of significance
  - P>0.05: Nonsignificant (NS).
  - P< 0.05: Significant (S).
  - P<0.01: Highly significant (HS).
RESULTS

The causes of hip joint pain in our study were confirmed during arthroscopic examination to be

- One case of isolated labral tear
- One case of osteoid osteoma of femoral neck
- One case of post traumatic loose bodies in hip
- 27 cases of femoracetabular impingement, were subdivided as following into:
  - 3 cases of pincer impingement associated with labral tear
  - 10 cases of cam impingement associated with labral tear
  - 14 cases of mixed FAI (femoracetabular impingement) associated with labral tear

Graph 2: Chart showing different hip arthroscopy diagnoses and their relative percentage.
Regarding arthroscopic procedures, among the 30 patients in our study 1 patient underwent labral repair only, 1 patient underwent arthroscopic excision of osteoid osteoma of neck femur 1 patient underwent arthroscopic removal of post-traumatic loose bodies, 3 patients underwent acetabular rim trimming with labral repair, 1 patient had femoral osteoplasty with labral repair, 9 patients had femoroplasty with labral debridement and 9 patients had combined osteoplasty with labral repair and 5 patients had combined osteoplasty with labral debridement.
Assessment of results of surgery

All patients (30 cases) in our study were preoperatively assessed using the modified Harris Hip Score (mHHS) and NAHS and the scores were recorded for each patient in the results analysis.

All patients of our study were followed up routinely at appointments in outpatient clinics at 6 w, 3 months, 6 months, 1 year up to 2 years post-operative periods. The minimum allowed follow up period was 6 months, the patients were assessed at each visit using mHHS and NAHS, the sixth month follow up score was that which was recorded for each patient in the results analysis, compared to preoperative scores.
Assessment by NAHS

Regarding overall outcome of all patients in the study, the preoperative score ranged between 42.5 and 67.5 with a mean value of 56.5 and standard deviation of 6. The postoperative score at 6 months ranged between 60 and 95 with a mean value of 81.7 and standard deviation of 9.5, mean improvement was 25.2 points.

![Graph 5: Chart comparing the mean NAHS at preoperative and 6 months postoperatively](image)

The improvement of the NAHS at 6 months postoperatively was statistically highly significant with P value < 0.001.

Table 6: Comparison of preoperative NAHS and 6 months postoperatively

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard deviation</th>
<th>P value (paired t test)</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre NAHS</td>
<td>56.5167</td>
<td>6.01361</td>
<td>&lt;0.001</td>
<td>Highly significant</td>
</tr>
<tr>
<td>6 months NAHS</td>
<td>81.6667</td>
<td>9.52726</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assessment by modified HHS

Regarding overall outcome of all patients in the study, the preoperative score ranged between 46.2 and 66 with a mean value of 55.7 and standard deviation of 5.3. The postoperative score at 6 months ranged between 60 and 92.4 with a mean value of 79.9 and standard deviation of 9.3, mean improvement was 24 points.

The improvement of the mHHS at 6 months postoperatively was statistically highly significant with P value < 0.001.

Table 7: Comparison of preoperative mHHS and 6 months postoperatively

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard deviation</th>
<th>P value</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre mHHS</td>
<td>55.7373</td>
<td>5.33438</td>
<td>&lt;0.001</td>
<td>Highly significant</td>
</tr>
<tr>
<td>6 months HHS</td>
<td>79.9333</td>
<td>9.26634</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

mHHS scores are grouped according to Harris’ original scheme into (90–100 excellent, 80–89 good, 70–79 fair, below 70 poor).
Correlation with Age:

Correlation between age and mean mHHS improvement revealed statistical significant negative correlation

Table 9: Correlation between patients ages and mHHS improvement

<table>
<thead>
<tr>
<th>Age (r) (pearson correlation)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>mHHS improvement -0.260</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Graph 8: Shows a negative correlation between patients’ ages and mHHS improvement

Correlation between age and mean NAHS improvement revealed statistical significant negative correlation
Table 10: Correlation between patients ages and NAHS improvement

<table>
<thead>
<tr>
<th>Age</th>
<th>(r) (pearson correlation)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean NAHS improvement</td>
<td>-0.241</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Graph 9: Shows a negative correlation between patients ages and NAHS improvement
Correlation with Duration of symptoms:

Correlation between preoperative duration of symptoms and mean mHHS improvement revealed statistical significant negative correlation.

Table 11: Correlation between preoperative duration of symptoms and mHHS improvement

<table>
<thead>
<tr>
<th>Duration of symptoms</th>
<th>(r)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>mHHS</td>
<td>-.652</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Graph 10: Shows a negative correlation between between preoperative duration of symptoms and mHHS improvement.

Correlation between preoperative duration of symptoms and mean NAHS improvement revealed statistical significant negative correlation.
Table 12: Correlation between preoperative duration of symptoms and NAHS improvement

<table>
<thead>
<tr>
<th>Duration of symptoms</th>
<th>(r) (pearson correlation)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAHS improvement</td>
<td>-.580</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Graph 11: Shows a negative Correlation between preoperative duration of symptoms and NAHS improvement
Complications

Among 30 cases in our study, only 2 patients showed transient neurapraxia of the femoral nerve with a percentage of 7%.

All cases showed complete recovery on postoperative rehabilitation programs and conservative therapy.

**Graph 21:** Chart showing percentages of complications among study group
Case No.(1)

History
A 26-year-old male, manual worker, presented with a 12-months history of persistent left hip pain, and frequently experienced clicking with moderate activity; he attributed the onset of his symptoms to squats while working out with weights. Pain increased with walking, going up and down stairs, running, and changing direction.

His symptoms persisted for 12 months despite restricting his activities and participation in a trial of physical therapy and nonsteroidal antiinflammatory medications.

Examination findings were consistent with hip joint pathology. Flexion combined with rotation movement elicited painful pop. Flexion-abduction external rotation (FABER) test and labral stress test were positive.

Scoring: Preop. mHHs = 53
Preop NAHS = 52.5

Radiographs were unremarkable for any underlying disease.

MRA revealed evidence of tearing of the anterior – superior labrum. Patient also experienced temporary pain relief from the anesthetic effect of the marcaine used to dilute the intraarticular contrast.

Arthroscopy: revealed the anterior superior labral tearing, no cam or pincer lesions, which underwent partial debridement, followed by repair of the healthy tissue by 2 anchors fixing the labrum down to the rim.

Rehabilitation:
Weight bearing was restricted to toe touching with the use of crutches for the first 4 weeks, early ROM and continuous passive movements started as soon as
the day after surgery for 4 weeks, Rotational stresses were limited during the first few weeks, internal or external rotation limited to 25 degrees. Limitations are placed on flexion past 90 degrees for 10 days, whereas abduction and adduction are limited to 25 degrees for 4 weeks.

**Follow up:**

Patient was followed up at 2w, 1 m, 3m, 6m and 12 months, The patient experienced prompt symptomatic improvement with good outcome , mHHS (53 preop vs 84.7 postop) and NAHS (52.5 preop. Vs 87.5 postop) on the 6th month follow up

![Fig.153](image1.png)

**Fig.153:** A) Preoperative plain X ray anteroposterior view  
B) Preoperative plain X ray lateral view
Fig. 154: Preoperative MRI of left hip

Fig. 155: (A – D) Intra operative arthroscopic view of labral repair
Case No.(2)

History

A 38-year-old male, presented by Left hip pain after 10 months of being involved in a car accident in which he sustained posterior hip dislocation with fracture of the acetabulum. At that time, he was treated conservatively after successful closed reduction was performed in the emergency department.

Computed tomography (CT) of the pelvis showed concentric reduction but revealed retained intraarticular fragments.

He had developed progressive mechanical hip joint symptoms including pain, and catching, with discomfort localized to the groin area. These symptoms didn’t resolve by conservative measure in the form of physical therapy and nonsteroidal anti-inflammatory medications.

Scoring:

Preop. mHHs = 57.9          Preop NAHS = 60

Preoperative radiographs and CT scan showed changes consistent with his previous fracture and intraarticular loose bodies.

Arthroscopy:

A hip capsulotomy by the shaver was performed between the anterolateral and anterior portal holes in the hip capsule to improve access and mobility of instruments within the hip joint, identification of the free fragments which were found to be firmly fixed within the acetabular fossa, then grasper was inserted to retrieve the loose fragments.

Rehabilitation:

Weight bearing was restricted to toe touching with the use of crutches for the first 4 weeks, early ROM and continuous passive movements started as soon as the day after surgery for 4 weeks, core exercises started by the sixth week postoperative.

Follow up:

Patient was followed up for 18 months, he experienced significant symptomatic...
improvement with excellent outcome, mHHS (57.9 preop vs 90.2 postop) and NAHS (60 preop. Vs 92.5 postop) on the 6th month follow up

Fig. 156: A) Preoperative plain X ray  
B) Preoperative CT scan

Fig. 157: Intraoperative arthroscopic view of Loose body extraction
**Case No.(3)**

A 42-year-old male, manual worker, presented with a 8-months history of persistent groin pain, this pain increasing with wrestling activities and with prolonged sitting, symptoms persisted for 8 months and didn’t respond to conservative treatment (physical therapy and nonsteroidal antiinflammatory medications).

Examination findings were consistent with hip joint pathology.
- Positive anterior impingement test
- Positive FABER distance test
- Positive fluoroscopic guided inter articular hip injection: i.e patient symptoms temporarily relieved

**Scoring**: Preop. mHHs = 52.8 ; Preop NAHS = 52.5

**Radiographs**:  
*AP & Lat X rays views*: showed left cam lesion; Alpha angle = 80 °

*MRA* revealed Cam impingment, evidence of the anterior – superior labral pathology on the Right side. Patient also experienced temporary pain relief from the anesthetic effect of the marcaine used to dilute the intraarticular contrast.

*Arthroscopy* revealed Cam lesion which underwent Femoral osteoplasty and labral degeneration, which underwent debridement,  

**Rehabilitation** :  
Weight bearing was restricted to toe touching with the use of crutches for the first 4 weeks, early ROM and continuous passive movements started as soon as the day after surgery for 4 weeks, core exercises started by the 6th week.
Post op x rays: Alpha angle = 58°

Follow up:
Patient was followed up at 2w, 1m, 3m, 6m
The patient experienced prompt symptomatic improvement with good outcome, 
mHHS (52.8 preop vs 75.9 postop) and NAHS (52.5 preop. Vs 75 postop) on the 6th month follow up

Fig.164: A) Preoperative plain X ray anteroposterior view
B) Preoperative plain X ray lateral view
Case No.(4)

19-year-old male, employee, presented with a 12-months history of persistent left hip pain, pain increased sitting with his legs crossed, he has had some increasing pain as well after doing treadmill activities, the pain is catching in nature and disappears by avoiding these positions, patient sought medical advice and prescribed NSAID which failed to relieve the symptoms.

On Examination: findings were consistent with hip joint pathology.
- Positive impingement test
- Positive FABER distance test
- Positive fluoroscopic guided inter articular hip injection: i.e patient symptoms temporarily relieved

Scoring: Preop. mHHs = 60.8 Preop NAHS = 62.5

Radiographs:
AP & Lat X rays views: showed Mixed FAI: left cam lesion, acetabular
retroversion (cross over sign)
Alpha angle = 70° ; Center edge angle = 70° on the left side

**CT : Mixed FAI**

**MRA** revealed mild Cam lesion, focal acetabular retroversion and labral pathology on the left side [Mixed FAI]

Patient also experienced temporary pain relief from the anesthetic effect of the marcaine used to dilute the intraarticular contrast.

**Arthroscopy**: revealed Cam lesion which underwent Femoral osteoplasty, Pincer lesion underwent acetabular rim trimming and labral degeneration which underwent debridement,

**Rehabilitation**:
Weight bearing was restricted to toe touching with the use of crutches for the first 6 weeks, early ROM and continuous passive movements started as soon as the day after surgery for 4 weeks, core exercises started by the 6th week

**Postoperative x rays**:
Alpha angle = 50° Center edge angle = 37°

**Follow up**:
Patient was followed up at 2w, 1 m, 3m, 6m, 12 m
The patient experienced prompt symptomatic improvement with good outcome, *mHHS (60.8 preop vs 85.5 postop) and NAHS (62.5 preop. Vs 87.5 postop) on the 6th month follow up*
Fig. 171: A) Preoperative plain X ray anteroposterior view  
B) Preoperative plain X ray lateral view

Fig. 172: Preoperative CT scan

Fig. 173: Preoperative MRI of left hip
Fig. 174: Arthroscopic view of Cam lesion / bruised labrum

Fig. 175: Arthroscopic view acetabular rim trimming
DISCUSSION

Diagnosis and treatment of hip problems especially in young patients present a challenge to hip surgeons. Previous studies have demonstrated that non-invasive investigations such as radiographs, computer tomography (CT) and magnetic resonance imaging (MRI) provide limited help. Non-operative treatment is most likely to result in persistent symptoms and surgical options for hip intra-articular problems involve open arthrotonomy of the hip joint, which carries potential risks associated with joint dislocation. Arthroscopy of the hip joint, therefore, appears to be an attractive option. 1

Hip arthroscopy is one of the most rapidly evolving arthroscopy techniques. It combines the benefits of a minimally invasive procedure and a short rehabilitation period. Improved instrumentation and technical skills have advanced our ability to accurately diagnose and treat various conditions. 82

Pain is usually the chief complaint of patients with hip problems. The differential diagnosis of hip pain must include structures distant to the joint and periarticular tissues. The importance of referred pain from the lumbar spine, abdominal and pelvic viscera, genitourinary problems, sacroiliac problems, sporting hernias, osteitis pubis, and other pelvic conditions should also be considered. Similarly, pain from the knee and thigh may be referred proximally to the hip and vice versa. 83

The management of patient with chronic hip pain starts with proper history taking and clinical examination, then imagining and radiological evaluation is usually needed in an attempt to narrow the differential diagnosis. After determining that the problem is musculoskeletal, the next step is to differentiate intraarticular sources from extraarticular disorders. 84
in this study were subjected to preliminary systematic diagnostic hip arthroscopy, the arthroscopic findings and procedures done for the 30 patients in the study were as following:

* one case of Osteoid osteoma of neck femur underwent arthroscopic excision
* one case of neglected post traumatic loose body who underwent arthroscopic removal / extraction,
* one case of Isolated labral tear who underwent arthroscopic labral repair
* 27 cases of FAI as following:
  3 cases of pincer impingment associated with labral tear underwent acetabular rim trimming with labral repair,
  10 cases of cam impingment with one patient underwent Cam osteolasty with labral repair, 9 patients underwent cam osteoplasty with labral debridement,
  14 cases of mixed FAI (femoroacetabular impingement) associated with labral tear/pathology among which and 9 patients underwent combined osteoplasty with labral repair and 5 patients underwent combined osteoplasty with labral debridement

All patients were assessed with mHHS and NAHS preoperatively and postoperatively at 6, 12 and 24 months, the minimum allowed follow up period was 6 months, the sixth month follow up score was that which was recorded for each patient in the results analysis, compared to preoperative scores.

Regarding overall outcome of patients in the study, Mean NAHS improved from 56.6 preoperatively to 80.6 postoperatively (mean improvement = 25.2), and mean mHHS scores improved from 55.7 preoperatively to 79.9 postoperatively (mean improvement = 24)

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  3 cases of pincer impingment associated with labral tear underwent acetabular rim trimming with labral repair,

  10 cases of cam impingment with one patient underwent Cam osteolasty with labral repair, 9 patients underwent cam osteoplasty with labral debridement,

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improved from 57.9 preoperative to 90.2 postoperative, and the NAHS improved from 60 preoperative to 92.5 postoperative.
That was supported by the results of (Byrd et al., 2010) in a prospective study on seven cases of loose bodies among a cohort of 50 patients (52 hips) represent the substance of the study, they reported that the mHHS improved by a median score of 39 points, and they stated that removal of symptomatic loose bodies was recognized to be one of the most gratifying of all arthroscopic procedures. 96

(Chernchujit et al., 2009) also reported on seven cases of retained loose fragments after hip reduction that were treated by arthroscopic loose body removal. This improved to a post-operative score at follow-up was 89.8 + 4.7 (p = 0.003), which is near the results of our study 97

For the case of isolated labral tear that underwent labral repair, it showed good outcome results with The mHHS showed significant improvement (53 preop. vs 84.7 postoperative), and the NAHS showed significant improvement (52.5 preop. vs 87.5 postop.), which was supported by the results of (Ross et al., 2006) who conducted a study on 19 patients with labral tear managed by arthroscopic labral repair with follow up of 6 months resulting in significant improvement in mHHS, nonarthritic hips, and Visual Analog Score (VAS); 67% satisfied. 98

Another study was conducted by (Philippon et al., 2007) on 52 patients of labral tear managed by arthroscopic labral repair with follow up of 9 months showing 85% good/excellent results. 99

In our study, 27 patients underwent arthroscopic management of femoroacetabular impingement (FAI), 10 patients underwent femoral osteoplasty only for cam impingement, 3 patients underwent rim trimming only for pincer impingement, and 14 patients underwent both procedures for mixed-type impingement
For overall outcome of the FAI cases, mean NAHS improved from 56.6 preoperatively to 80.6 postoperatively (mean improvement = 24), and mean mHHS scores improved from 55.8 preoperatively to 78.9 postoperatively (mean improvement = 23)

*(Philippon et al., 2009)* reported two year outcomes of 112 patients who underwent arthroscopic surgery of the hip for femoroacetabular impingement. 23 patients underwent osteoplasty only for cam impingement, 3 underwent rim trimming only for pincer impingement, and 86 underwent both procedures for mixed-type impingement. Mean follow-up was 2.3 years. Mean modified Harris hip score (HHS) improved from 58 to 84 (mean difference = 24) which match the results of our study.

Variables studied included age, sex, duration of symptoms, Preoperative and postop mHHS and NAHS. On analysis of the variables between different results groups, we have found:

Regarding Age, we have found significant negative correlation between age of the patients and the mean (HHS & NAHS) improvement, with older patients showed less improvement

Regarding duration of Symptoms, we have found significant negative correlation between preoperative duration of Symptoms and the mean (HHS & NAHS) improvement, with longer preoperative duration of symptoms correlated with less successful outcomes

Of the variables studied among FAI cases, the most statistically significant finding was that older patients with longer duration of symptoms showed less improvements and inferior outcome results of surgery.
Among the 27 patients of the FAI in the study, 13 patients (48%) underwent labral repair done using from 2 to 3 anchors and 14 patients (52%) had labral debridment.

The mean mHHS, NAHS improvement of patients underwent labral repair were 26.6, 27.6 respectively, while the mean mHHS, NAHS improvement of patients underwent labral debridment was 19.8, 20.8 respectively, The mean mHHS, NAHS improvement in the labral repair was 6.8 points greater than in the debridment.

We also noted that 62% of FAI cases who underwent labral repair reported good or excellent outcomes, compared with 40% of FAI cases who underwent labral debridment.

These findings were less satisfactory than the results of (Larson et al., 2012) who conducted a comparative study of arthroscopic labral debridment (44 hips) and labral refixation (50 hips), The mHHS (P = .001), SF-12 (P = .041), and VAS pain scores (P = .004) were all significantly better for the refixation group compared with the debridment group at the most recent follow-up. At a mean 3.5 years’ follow-up, good to excellent results were noted in 68% of the focal excision/debridement group and 92% of the refixation group (P = .004), these results were close to the results of our study.

This may be related to the building up learning curve with the labral repair (technical demanding) technique in our study, and the small number of patients with heterogeneous pathologies, compared with larger number of cases in the above mentioned study, which was also exclusive to that pathology.
Among 30 cases in our study, only 2 patients showed transient neurapraxia of the femoral nerve with percentage of 7%. All cases showed complete recovery on postoperative rehabilitation programs and conservative therapy.

We suggest that neuronal manifestations was attributed to long traction time in 1 case and plantar flexion position during traction in the other case, there was no recurrence of this complication after a protocol of intermittent traction and proper preoperative positioning in subsequent cases.

(Sampson, 2001) has reviewed complications in 530 cases of hip arthroscopy and found a total complication rate of 5.5%. Of these, 0.5% were considered permanent, and 5% were transient. The most common complications were transient neuropraxias of the peroneal, femoral, sciatic, lateral femoral cutaneous and pudendal nerves secondary to traction. These complications typically resolved in 2 to 3 days.  

(Lo et al., 2006) reported on complications experienced in their prospective study of 73 hips, 7% had transient sciatic nerve neuropraxia.

(Rodeo and colleagues., 1996) reviewed the complications from arthroscopy and reported that most complications were neurapraxias resulting from excessive or prolonged traction.
SUMMARY

The frequency of hip arthroscopies has been increasing explosively over the past years, leading to a hugely improved technique and greater understanding of the arthroscopic anatomy of the hip joint. Arthroscopic hip procedures can successfully treat conditions previously unrecognized or only treatable by open procedures.

Current indications for hip arthroscopy include the presence of symptomatic acetabular labral tears, femoroacetabular impingement, chondral lesions, osteochondritis dissecans, ligamentum teres injuries, snapping hip syndrome, iliopsoas bursitis, and loose bodies. Less common indications include management of osteonecrosis of the femoral head, synovial abnormalities, crystalline hip arthropathy (gout and pseudogout), infection, and post-traumatic intra-articular debris.

Patient selection is an important issue for a potentially successful outcome. General parameters include younger patients, mechanical joint symptoms, unremitting joint symptoms, and no diagnosis has been made. Presence of the symptoms for more than six months with failure of conservative treatment and reasonable expectations from the patient.

A comprehensive inspection of the hip joint requires the combination of hip arthroscopy with traction and hip arthroscopy without traction. Although traction is necessary for access to the central compartment for evaluation of the direct weight-bearing cartilage, acetabular fossa, and ligamentum teres, the periphery of the joint can best be seen without traction.

A peripheral compartment starting point, without initial traction applied to the hip, is attractive because it has the advantage of entry outside of the joint, so minimal
or no injury occurs to the articular cartilage or labrum and Traction time is significantly decreased

Hip arthroscopy with and without traction can be performed in the lateral or supine position. Both techniques are equally effective, and the choice simply depends on the surgeon’s preference. An advantage of the supine approach, which we preferred to use in this study, is its simplicity in patient positioning, application of traction and portals placement.

Hip arthroscopy is considered a safe procedure, but like any other surgical procedure it has complications. Most reported complications are associated either with traction injuries or patient positioning, or other surgery-related injuries. Traction can cause nerve palsy or neuropraxia, mostly transient. Other traction-related complications include perineal integument injuries and genitoperineal skin necrosis. Surgery-related complications include lateral femoral cutaneous nerve injury upon introducing the posterolateral portal or sciatic nerve injury upon introducing the anterolateral portal.

The purpose of this study was to assess the role of hip arthroscopy in the management of hip joint pain. This was a prospective review of a consecutive series of 30 patients with heterogeneous group of indications over a 30-months period. There were 27 male and 3 female patients with a mean age of 29.5 years (range, 17 to 58 years). All patients had symptoms of ongoing hip pain for more than 6 months with no response to conservative measures.

All patients were assessed with a modified Harris hip score and NHAS preoperatively and postoperatively until most recent follow up. The follow-up ranged from 6 to 24 months (minimum 6 months). Variables studied included age, sex, diagnosis, duration of symptoms, Preoperative and postop mHHS and NAHS.
All cases showed significant improvements in all outcome measures, the Mean NAHS improved from 56.6 preoperatively to 80.6 postoperatively (mean improvement = 25.2), and Mean mHHS scores improved from 55.7 preoperatively to 79.9 postoperatively (mean improvement = 24).

Excellent outcomes were shown in cases of osteoid osteoma excision and symptomatic loose body removal, good outcome was shown in case of isolated labral repair, while good and excellent outcome were shown in 52% of FAI cases.

The median improvement for the following diagnoses was: 1 case of osteoid osteoma (mHHS= 39; NAHS= 38), 1 case of symptomatic loose bodies (mHHS: 32; NAHS: 33), 1 case of isolated labral tear (mHHS= 32; NAHS= 35), 27 cases of Femoracetabular impingement (mHHS=24; NAHS=23).

Arthroscopic treatment of femoracetabular impingement with labral repair resulted in superior improvement (6.8 points greater in all outcomes) compared with labral debridement.

Of the variables studied among FAI cases, the most statistically significant finding was that older patients with longer duration of symptoms showed less improvements.

Among 30 cases in our study, only 2 patients showed transient neurapraxia of the femoral nerve with percentage of 7%. All cases showed complete recovery on postoperative rehabilitation programs and conservative therapy.

The results obtained throughout this study had revealed that hip arthroscopy can be performed for a variety of conditions provided it is properly selected for the appropriate patients, with reasonable expectations of success and an acceptable complication rate. Such results are consistent with many other recently published case series and systematic reviews.
Conclusion

Hip arthroscopy, although being technically demanding with a steep learning curve, is a valuable diagnostic and therapeutic procedure for patients with hip pain refractory to conservative therapy; hip arthroscopy can be performed for a variety of conditions provided it is properly selected for the appropriate patients, with reasonable expectations of success and an acceptable complication rate.

Young patients with short preoperative duration of symptoms are the most significant factors for patient selection that may be associated with superior outcome results of surgery in our study.

Removal of symptomatic loose bodies, resection of osteoid osteoma and labral repair were recognized to be of the most gratifying of all arthroscopic procedures, hip arthroscopy was considered an effective treatment for patients with preoperative diagnosed problems as FAI syndrome.

Recommendations

The key to a successful outcome of hip arthroscopy is largely dependent on patient selection. A well-performed procedure fails when performed for the wrong reasons. Proper patient selection includes not only selecting lesions amenable to arthroscopic intervention but also assessing the patient as a whole. The patient must have reasonable expectations of what may be accomplished with arthroscopy.

Poor patient selection, preoperative cartilage damage or osteoarthritis in, and failure to recognize or inadequately address combined lesions may result in poor results of arthroscopic management, that needs further work up to be analysed which goes beyond the scope of our study.
الملخص العربي

إن مفصل الورك يعد من المفاصل التي تصيبها الأمراض العديدة سواء من الأمراض التحليلية أو التي تنتج عن إصابات الملاعب، بالإضافة إلى أنه يعد من آخر المفاصل اقتحاماً بالمناظر سواء للتشخيص أو للعلاج.

الحقيقة أن هناك بعض المعوقات التي حالت دون استخدام المناظر لمفصل الورك على نطاق واسع فالطبecera الخاصة للجانب التشريحي لمفصل الورك سواء من شكل رأس عظمة الورك أو حق المفصل أو الأربطة القوية المحيطة بالمفصل كانت من الأسباب الهامة في تأخر استخدام المناظر في هذا المفصل.

وقد جعل وجود مفصل الورك في عمق الجسم و ليس سطحياً مثل مفصل الركبة الوصول إليه يحتاج إلى مناظر وآلات أطول من تلك المستخدمة للركبة. كما أن كتلة العضلات المحيطة بالورك كبيرة مما يعيق تحريك الآلات بسهولة عند إجراء المناظر بالإضافة لذلك فإن مفصل الورك لا يوجد به فراغ كافي حتى يدخل فيه المنظار ولذا فلا بد من وضع المريض على سرير خاص يقوم بشد قدمه المريض حتى يتم إبعاد رأس عظمة الورك عن الحق بحيث يكون هناك فراغاً لدخول المنظار.

بسبب هذه العوامل الفريدة التي تخص مفصل الورك، لم يتطور منظار مفصل الورك سريعاً مثل منظار الراكبة و الكتف، حتى تم اختراعات جراحية خاصة منظار مفصل الورك تتيح حرية الحركة داخل المفصل بعد تمدد.
أن التقدم الحديث في منظار الحوض جعله طريقة أقلًة تدخلًا لتشخيص وعلاج الأمراض التي تصيب مفصل الحوض. ولقد وفر الاستفادة من أن تكون العملية مبسطة بالنسبة للمريض مع علاج طبيعي قصير الأمد وقليل من الأعراض الجانبية المسجلة أيضًا لا يعيب أي تدخل جراحي في المستقبل بالنسبة للمريض.

حديثاً هناك العديد من استخدامات المنظار في مفصل الورك، والتي تتطور بتطور الآلات والأسلوب الجراحي، لعل أشهرها: القطع الشفجي حول الحدق، اصابات الغضروف، الاجسام الحرة داخل المفصل، الإصطدام الوركي الحقيقي، شق جزئي للغشاء الزليل. أو فشل في العلاج التحفظي.

و يترافق التدخل الجراحي بالمنظار بين عمليات بسيطة مثل ازالة الأجسام الحرة داخل المفصل وتهذيب قطع الغضروف وتهذيب قطع الشفة الحقيقى وعمليات أكثر صعوبة مثل: اصلاح شفة التجويف الحقيقى باستخدام خطاطيف جراحية أو ازالة وتهذيب التنفوات العزيمى في حالات الاصطدام الوركي الحقيقى.

يمكن منظار مفصل الورك أن يتم و المريض راقدا على الظهر أو الجانب، وتكفي ثلاثة أبواب (داخلية) لاستكشاف الجزء المركزي و الجزء الطري للمفصل، وهي الباب الأمامي المباشر، الباب الامامي الجانبي و الباب الخلفي الجانبي.

يمكن تجنب مضاعفات منظار مفصل الورك عن طريق وضع المريض بطريقة ملائمة و الحرص عند ادخال الابواب للمفصل لتجنب اصابة الحزم الوعائية العصبية و أيضا استخدام السوائل داخل المفصل بطريقة حكيمة.
تعتمد النتائج بعد منظار مفصل الورك بالدرجة الأولى على اختيار المريض وتوافقات بالنسبة للتدخل الجراحي. فالمعايير العامة تشمل صغر سن المريض وحركة المفصل مع وجود مساحة كافية بالمنصل بالإضافة إلى قصر الحدادة بين بداية الشكوى من الأعراض والتدخل الجراحي.

من نواحي استخدام المنظار في مفصل الورك الجروح حول المفصل، تيس المفصل، هشاشة العظام المتقدمة والتي لا تسمح باستخدام الشد أثناء المنظار وكذلك السمنة المفرطة والتي قد تعوق استخدام الآلات ووصولها داخل المفصل.

يمكن للمريض بالحركة بعد العملية مباشرة وينصح بالتمايل قدر المستطاع مستخدماً عكازات لمنع التحميل الزائد على المفصل ويستخدم الأم كمؤشر للتحميل الزائد.

لقد تبين أن منظار الحوض يحمل القليل من المخاطر الجسيمة فأشهر ما يحمل من المخاطر هي الضعف المؤقت لأعصاب البدن والورك والعضلات الفرج (عصب الأعضاء التناسلية)، أيضاً من أشهر الأعراض الجانبية له هي إصابة غضروف مفصل الحوض أثناء العملية.

شملت هذه الدراسة عدد 300 مريض عانوا من أم المفصل الورك وتم علاجهم بواسطة المنظار الجراحي بواحدة أو أكثر من هذه الطرق: حالة قطع في الغضروف وتم إصلاحه بواسطة خطاطيف جراحية، و حالة إجسام حرة بالمفصل وتم اخراجها بالمنظار، و حالة ورم حميد بعناق الورك و تم استئصاله بالمنظار، وحالات اصطدام فخذى حقي وتم فيها استئصال الزوائد العظمية بعناق عظمة الورك وحق مفصل الورك مع تهديب قطع وتهتكات بشفة حق المفصل أو إعادة رتة شفة حق المفصل بواسطة خطاطيف جراحية.

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تم تقييم المرضى في هذه الدراسة باستخدام مقياس هاريس المعدل لمفصل الورك، وهو مقياس يعاير درجة الألم والوظيفة لمفصل الورك ويتكون من 100 نقطة، أيضًا تم استخدام مقياس (NAHS) وظهر تحسن معتبر و هام في جميع الحالات بصفة عامة حيث تحسن متوسط عدد نقاط المرض من 56.6 نقطة على مقياس NAHS قبل العلاج بواسطة المنظار إلى 80.6 نقطة بعد إجراء المنظار و تحسن متوسط عدد نقاط المرضى من 55.7 نقطة على مقياس هاريس قبل العلاج بواسطة المنظار إلى 79.9 نقطة بعد إجراء المنظار.

قد ظهر من تحليل النتائج أن أكثر الحالات تحسنا كانت حالات استئصال الورم العظمي الحميد من المفصل، و حالة استخراج الأجسام الحرة من المفصل.

وقد ظهرت نتائج جيدة في حالات إصلاح شفة التجويف الحقيق باستخدام خطاطيف جراحية وحالات إزالة وتهذيب التنظفات العظمية في حالات الاصطدام الوركي الحقيق.

وقد تبين من نتائج الدراسة أن عمليات إصلاح شفة التجويف الحقيق باستخدام خطاطيف جراحية قد أعطت نتائج أفضل من تهذيب شفة التجويف الحقيق فقط وذلك في حالات الاصطدام الوركي الحقيق.

الاستنتاج

يعتبر استخدام المنظار الجراحي داخل مفصل الورك صعب فنيا، ولكن مع ازدياد الخبرة الجراحية في مجال جراحة المناظر أصبح منظار مفصل الورك وسيلة قيمة لتشخيص وعلاج المرضى الذين يعانون من آلام مفصل الورك المقاوم للعلاج التحفظي.

وبعد استعراض نتائج دراستنا تبين أنه تثبت فاعليا استخدام المنظار الجراحي لمفصل الورك كوسيلة لتشخيص وعلاج الأسباب المختلفة لآلام المفصل كدراسة أجريت على المدى القصير.
References


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