Hip Arthroscopy

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The video that accompanies this article is "Hip Arthroscopy," available on the *Orthopaedic Knowledge Online* Website, at http://www5.aaos.org/oko/jaaos/surgical.cfm

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Arthroscopic surgery of the hip was first proposed by Burman[1] in 1931 in a cadaveric study, and the first clinical report of the procedure was published by Takagi[2] in 1939. It was not until the 1980s, however, that hip arthroscopy became a standard element of the armamentarium for the diagnosis and treatment of hip pathology.[3] Many hip disorders that are now managed arthroscopically previously went undetected and therefore untreated. Arthroscopy is now an option for many patients who would have been forced to live with their symptoms and modify their lifestyles.

Indications and Contraindications

Evaluation of the patient with hip pain is focused on whether the source of symptoms is intra-articular and thus potentially amenable to arthroscopy.[4] Indications for hip arthroscopy include the following: loose bodies, labral tears, degenerative disease, chondral injuries, femoroacetabular impingement, osteonecrosis, synovial disease, ruptured ligamentum teres, impinging osteophytes, instability, adhesive capsulitis, joint sepsis, and unresolved hip pain. Characteristic features of intra-articular hip joint pathology include relatively well-tolerated straight plane activity, difficulty with torsional/twisting activities, discomfort with prolonged hip flexion (eg, sitting), pain/catching from flexion to extension (eg, rising from a seated position), and greater difficulty on inclines or stairs than on level surfaces.

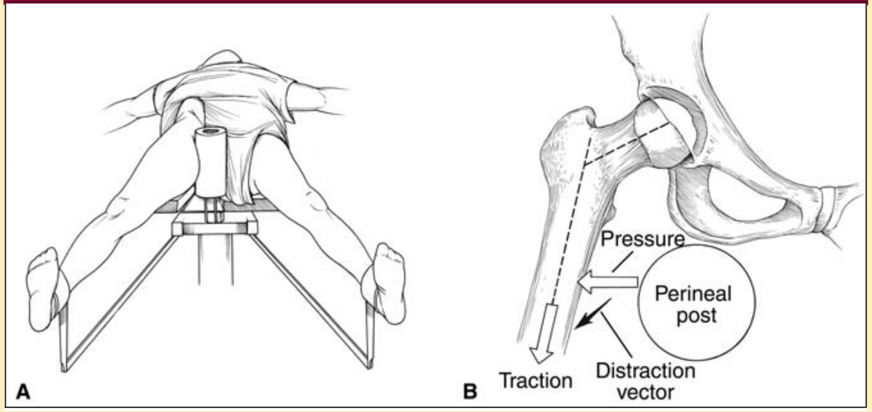
Proper patient selection is key to a successful outcome. Selection criteria include pathology (eg, degenerative arthritis, synovial disease) or clinical circumstances potentially amenable to arthroscopic intervention as well as assurance that the patient has reasonable expectations of postoperative outcomes.

Contraindications to hip arthroscopy include systemic illness, local soft-tissue disorders, open wounds, and poor bone quality (ie, bone that may not withstand the traction forces necessary to distract the joint). Ankylosis of the hip is an absolute contraindication, whereas lesser degrees of arthrofibrosis or capsular constriction may simply preclude arthroscopy when the joint cannot be adequately distracted or distended for introduction of the instruments. Restricted rotational motion on preoperative examination is often a harbinger of this type of process. Severe obesity may be a relative contraindication to hip arthroscopy. Extra-length instruments are necessary, even for moderate-sized patients. When encountering extremely dense soft tissues, current arthroscopic equipment and arthroscopes may not be strong enough or long enough to access the joint.

Surgical Technique

Critical to the differential diagnosis are an understanding of hip innervation, assessment of posterior pain, the C sign test, the log roll test, and evaluation for snapping of the iliopsoas tendon. Radiographs are an integral part of the assessment but are unreliable at detecting most intra-articular lesions amenable to arthroscopy. The most reliable indicators of intra-articular pathology are often indirect findings, including effusion, paralabral cysts, and subchondral cysts. Gadolinium arthrography combined with magnetic resonance imaging (MRI) or magnetic resonance angiography (MRA) shows labral pathology well but is

Figure 1



A, The patient is positioned on the fracture table with the perineal post placed as far laterally as possible toward the surgical hip, resting against the medial thigh. **B,** The optimal vector for distraction is oblique relative to the axis of the body and more closely coincides with the axis of the femoral neck than the femoral shaft. This oblique vector is partially created by abduction of the hip and partially accentuated by a small transverse component to the vector created by lateralizing the perineal post. (Adapted with permission from Smith & Nephew Endoscopy, Andover, MA. Copyright © Smith & Nephew, Inc. 2003-2004.)

poor at demonstrating lesions of the articular surface.

Anesthesia

Hip arthroscopy is commonly performed under general anesthesia. It can be performed under epidural anesthesia but requires an adequate motor block to ensure optimal distractability of the joint.

Patient Position

The hip joint has both an intra-articular and a peripheral compartment. Most hip pathology is found within the intra-articular region; therefore, distraction is necessary to achieve arthroscopic access. The patient can be placed supine or in the lateral decubitus position for the procedure.[5,6] Both techniques are equally effective; therefore, the choice simply depends on surgeon preference. An advantage of the supine approach is its simplicity in patient positioning; the lateral approach may be preferable for severely obese patients.

Performing hip arthroscopy without traction has not been popular because it does not allow access to the intra-articular region.[7] However, this method can be a useful adjunct to the traction technique.[8] Hip flexion relaxes the capsule and allows access to the peripheral compartment, which is intracapsular but extra-articular. Numerous lesions are encountered in this area that are overlooked with traction alone because synovial disease often covers the capsular surface, and free-floating loose bodies can hide in the peripheral recesses. Hip flexion allows generous access to the capsule for plication or thermal modulation.

The important principles for performing safe, effective, reproducible arthroscopy are the same whether the patient is in the lateral decubitus or supine orientation (Figure 1, A). Portal placements, relationship of the extra-articular structures, and arthroscopic anatomy are also the same, regardless of positioning.

A standard fracture table or custom distraction device is needed to achieve effective joint space separation. A tensiometer can be helpful to monitor the traction forces intraoperatively. The C-arm is important for precise placement of the instrumentation within the joint.

Intra-articular (Central) Compartment

The perineal post is heavily padded and lateralized against the medial thigh of the surgical hip (**video step 1**). This aids in achieving the optimal traction vector (Figure 1, B) and reduces direct pressure on the perineum, lessening the risk of neurapraxia of the pudendal nerve. Neutral rotation achieves a constant relationship between topographic landmarks and the joint. Slight flexion may relax the capsule, but excessive flexion should be avoided because this places undue tension on the sciatic nerve and may block access for the anterior portal. Approximately 50 pounds of force is typically needed to distract the joint. In general, the goal is to use the minimal force necessary to achieve adequate distraction and keep traction time as brief as possible (<2 hours is usually considered optimal).

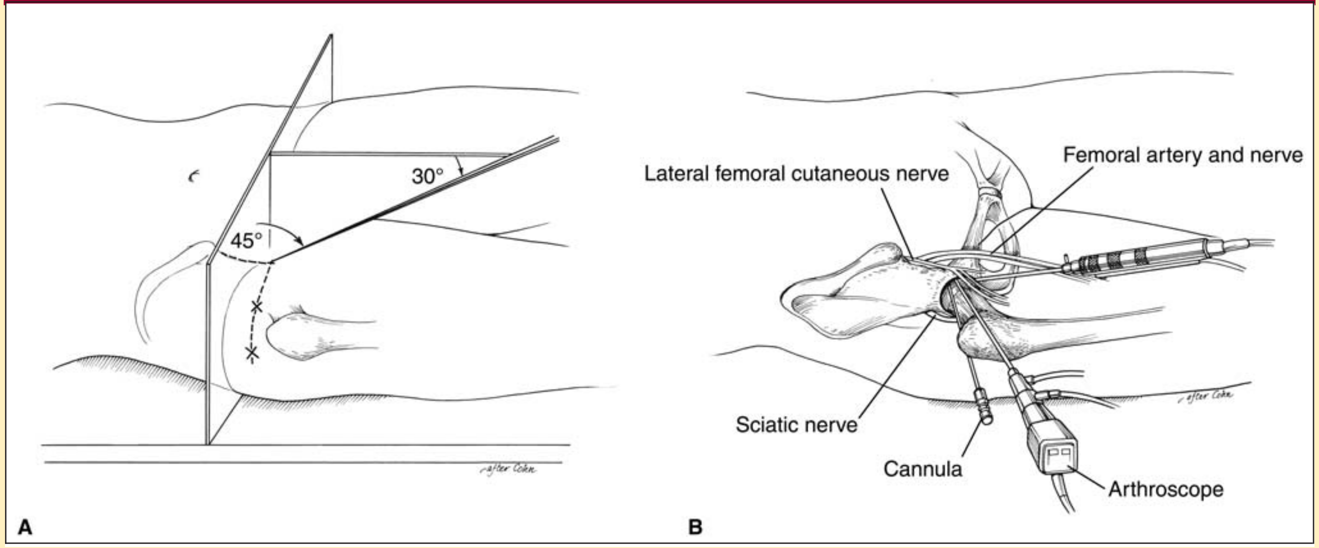
Portal Placement

Three standard portals are used for this portion of the procedure (Figure 2) (**video steps 2-4**). The anterolateral and posterolateral portals are placed laterally over the superior margin of the greater trochanter at its anterior and posterior borders, respectively. The anterior portal is placed at the site of intersection of a sagittal line drawn distally from the anterior-superior iliac spine and a transverse line across the tip of the greater trochanter. With careful orientation to the landmarks in relation to the joint, these portals are placed at a safe distance from the surrounding major neurovascular structures[9] (Figure 3, Table 1).

Diagnostic Procedure

After applying traction, a spinal needle is placed from the anterolateral position, and the joint is distended with fluid. The anterolateral portal is then established under fluoroscopic control for introduction of the arthroscope (Figure 4) (**video steps 5 and 6**). Careful attention is

Figure 2



A, The site of the anterior portal coincides with the intersection of a sagittal line drawn distally from the anterior-superior iliac spine and a transverse line across the superior margin of the greater trochanter. The direction of this portal courses approximately 45° cephalad and approximately 30° toward the midline. The anterolateral and posterolateral portals (x) are positioned directly over the superior aspect of the trochanter at its anterior and posterior borders. **B,** Relationship of the major neurovascular structures to the three standard portals. The femoral artery and nerve lie well medial to the anterior portal. The sciatic nerve lies posterior to the posterolateral portal. Small branches of the lateral femoral cutaneous nerve lie close to the anterior portal. Injury to these is avoided by using proper technique in portal placement. The anterolateral portal is established first because it lies most centrally in the safe zone for arthroscopy. (Part A adapted with permission from Byrd JWT: Hip arthroscopy utilizing the supine position. *Arthroscopy* 1994;10:275-280. Part B copyright © J. W. Thomas Byrd, MD, Nashville, TN.)

necessary to avoid perforating the labrum or scuffing the articular surface.[10] Using the 70° scope, the anterior and posterolateral portals are then placed under direct arthroscopic view as well as under fluoroscopic guidance for precise entry into the joint. Diagnostic and surgical arthroscopy is then achieved by interchanging the arthroscope and instruments between the three established portals. Use of both the 70° and 30° scopes provides optimal viewing, despite limited maneuverability within the joint (Figure 5).

Peripheral Compartment

After completing arthroscopy of the intra-articular compartment, the instruments are removed, the traction released, and the hip flexed approximately 45° (Figure 6). This relaxes the capsule, providing access to the peripheral compartment **(video step 7)**.

Two portals are routinely used to access the peripheral compartment: the anterolateral portal and an ancillary portal established 4 to 5 cm distally. The anterolateral portal is redirected onto the anterior neck of the femur (Figure 7, A). The ancillary portal is then established distally under direct arthroscopic and fluoroscopic guidance (Figure 7, B). The arthroscope and instruments are interchanged, and both the 30° and 70° scopes are used for inspection (Figure 8).

Iliopsoas Bursoscopy

Flexion is slightly less (15° to 20°) than that used to view the peripheral compartment. The hip is also externally rotated, which moves the lesser trochanter more anterior to and accessible to the portals.

Two portals are needed for viewing and instrumentation within the bursa (Figure 9, A) **(video step 7)**. These portals are distal to those used for the peripheral compartment and require fluoroscopy for precise positioning. The portals may be slightly more anterior to enable full access to the area of the lesser trochanter.

Iliopsoas Release

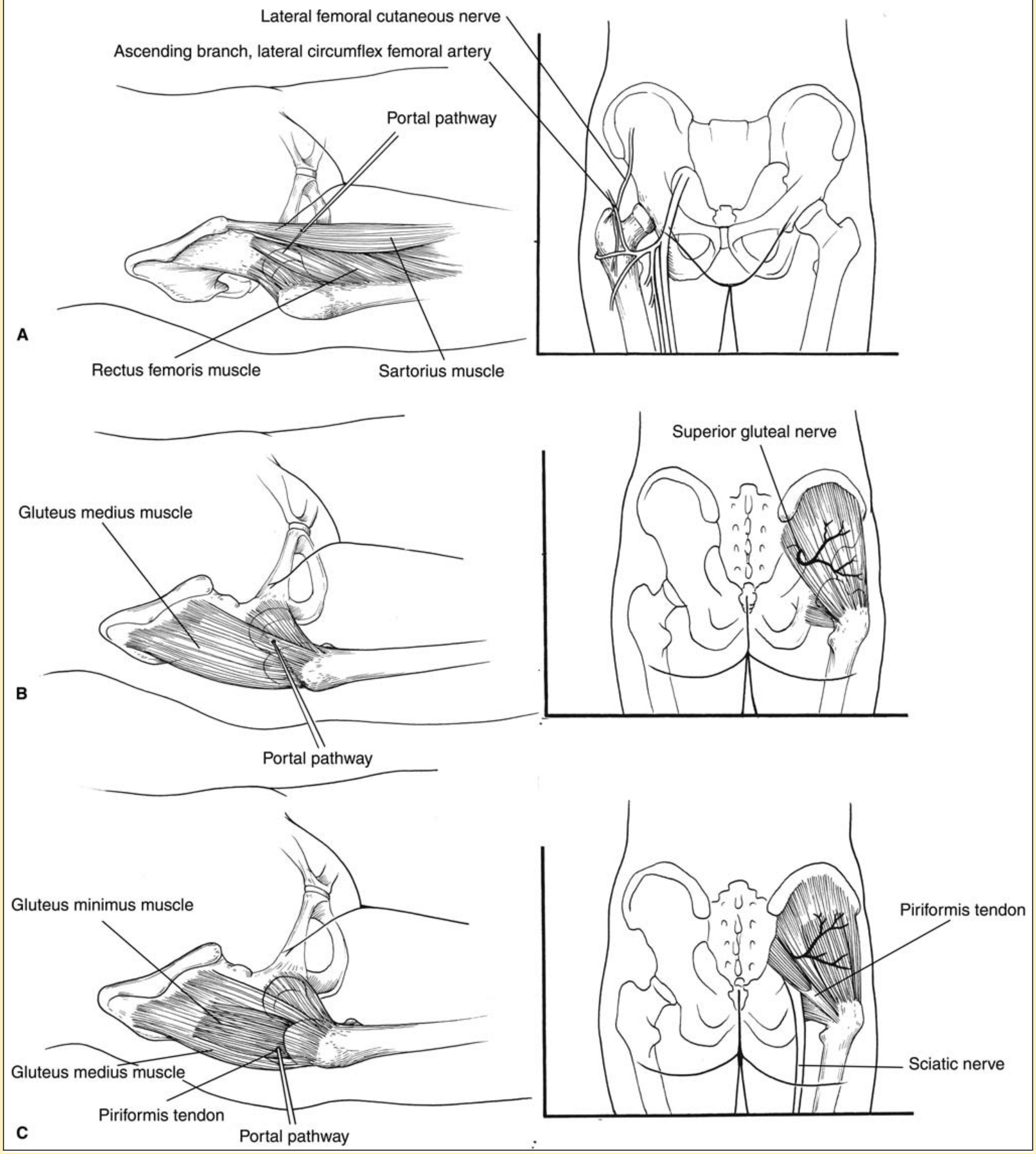
The spinal needle is placed directly on the lesser trochanter under fluoroscopy **(video step 8)**. With the arthroscope introduced, a second portal is then established. Adhesions or fibrinous debris within the bursa may need to be débrided to achieve clear visualization (Figure 9, A). Staying next to bone avoids straying into the medial soft tissues. As the iliopsoas is identified, the tendinous portion can be released (Figure 9, B).

Results

Loose Bodies

Removal of symptomatic loose bodies represents the clearest indication for arthroscopic surgery **(video step 9)**. Arthroscopic retrieval offers distinct advantages over open ap-

Figure 3



A, Anterior portal pathway. The portal penetrates the sartorius and rectus femoris muscles before entering the anterior capsule. Its course is almost tangential to the axis of the femoral nerve, lying only slightly closer at the level of the capsule. Inset (*right*), anterior view of the hip neurovascular structures. **B,** Anterolateral portal pathway. The portal penetrates the gluteus medius muscle, entering the lateral capsule at its anterior margin. Inset (*right*), posterior view of the hip. The superior gluteal nerve lies well cephalad to this site. **C,** Posterolateral portal pathway. The portal penetrates the gluteus medius and minimus muscles, entering the lateral capsule at its posterior margin. Its course is superior and anterior to the piriformis tendon and is closest to the sciatic nerve at the level of the capsule (*inset*). (Adapted with permission from Smith & Nephew Endoscopy, Andover, MA. Copyright © Smith & Nephew, Inc. 2003-2004.)

Table 1

Distance From Portal to Anatomic Structures*

Portal	Anatomic Structure	Average (cm)	Range (cm)
Anterior	Anterior-superior iliac spine	6.3	6.0-7.0
	Lateral femoral cutaneous nerve†	0.3	0.2-1.0
	Femoral nerve‡		
	Level of sartorius	4.3	3.8-5.0
	Level of rectus femoris	3.8	2.7-5.0
	Level of capsule	3.7	2.9-5.0
	Lateral circumflex femoral artery		
	Ascending branch	3.7	1.0-6.0
	Terminal branch§	0.3	0.2-0.4
Anterolateral	Superior gluteal nerve	4.4	3.2-5.5
Posterolateral	Sciatic nerve	2.9	2.0-4.3

* Based on anatomic dissection of portal placements in eight fresh cadaver specimens

† Nerve had divided into three or more branches and measurement was made to the closest branch

‡ Measurement made at superficial branch of sartorius, rectus femoris, and capsule

§ Small terminal branch of ascending branch of lateral circumflex femoral artery identified in three specimens

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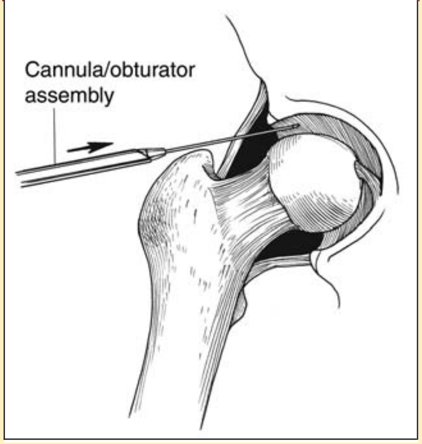
proaches, including lower morbidity and quicker recovery.[11] Loose fragments resulting from trauma can usually be detected with various imaging techniques. Loose bodies associated with synovial chondromatosis (a purely cartilage lesion) are more elusive, remaining undetected in half of patients with the condition, but they are eventually identified on arthroscopy.[12] Bony fragments may simply occur in association with osteoarthritis (OA); thus, it is important to critically assess for accompanying degenerative disease. Where such an association exists, the fragments may be inconsequential in the face of advanced joint deterioration. In patients with Legg-Calvé-Perthes disease, fragments may occur as a result of osteochondritis dissecans. Excision can relieve symptoms effectively, even in the presence of significant radiographic deformity.[13] Arthroscopy has also been used to remove foreign bodies, such as bullets.

Labral Lesions

Both MRI and MRA are becoming more effective at detecting labral lesions; however, MRI evidence of labral pathology has been reported even among asymptomatic volunteers.[14] Although it is likely that patients in whom such lesions fail to be treated may incur more damage, it is also likely that some of these lesions may resolve, with patients becoming asymptomatic.

Successful outcomes from labral débridement range between 68% and 82%[15-17] **(video step 10)**. Byrd and Jones[17] found diminished results in the presence of associated articular damage, and Farjo et al[16] reported poor results in the presence of radiographic evidence of arthritis, with only 21% success. More than half of all labral tears will have associated articular damage. Preoperative studies are relatively ineffective at demonstrating associated articular injury, yet it is the extent of this associated injury that is often the limiting determinant on the outcome of labral débridement.

Figure 4



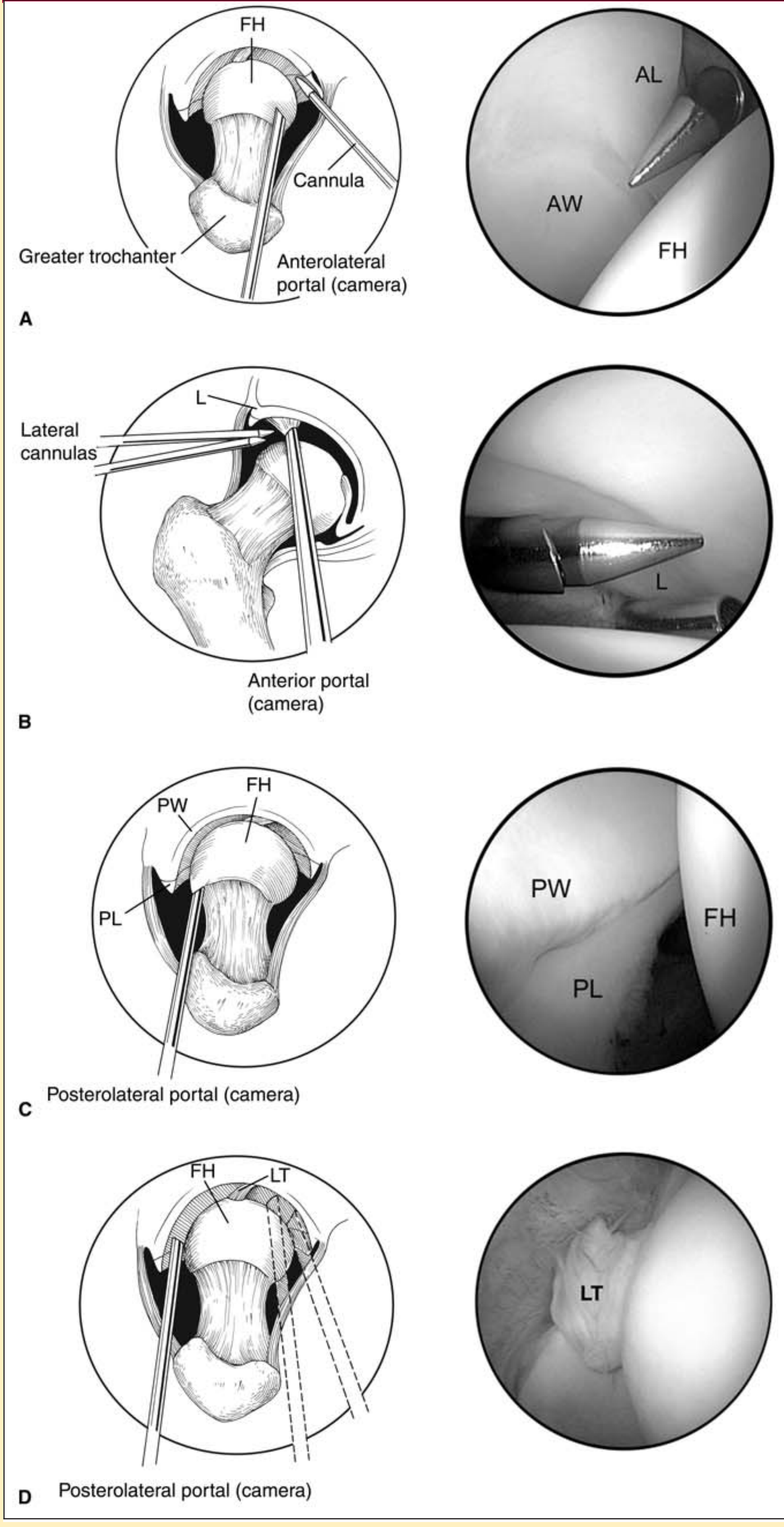
The arthroscope cannula is passed over a guide wire that was inserted through a prepositioned spinal needle. (Adapted with permission from Smith & Nephew Endoscopy, Andover, MA. Copyright © Smith & Nephew, Inc. 2003-2004.)

Preliminary experience in labral repairs has met with mixed results. The technology is available, but one limitation is our incomplete understanding of the pathomechanics of such lesions.[18,19] Much remains to be learned regarding the pathophysiology, pathomechanics, and natural history of labral lesions. Normal variants occur, such as a labral cleft, which should not be interpreted as a traumatic detachment.[20] Labral lesions are commonly observed in patients with hip dysplasia. Although the results of arthroscopic management of such lesions are often successful, these patients must be carefully evaluated for more definitive joint-preserving procedures, such as osteotomy.[21] An inverted labrum is known to cause secondary OA.[22] Débridement is sometimes beneficial, but results are dictated by the extent of accompanying arthritis.

Degenerative Disease

For OA, Villar[23] reported that 60% of 40 patients improved with arthroscopic débridement and therefore

Figure 5



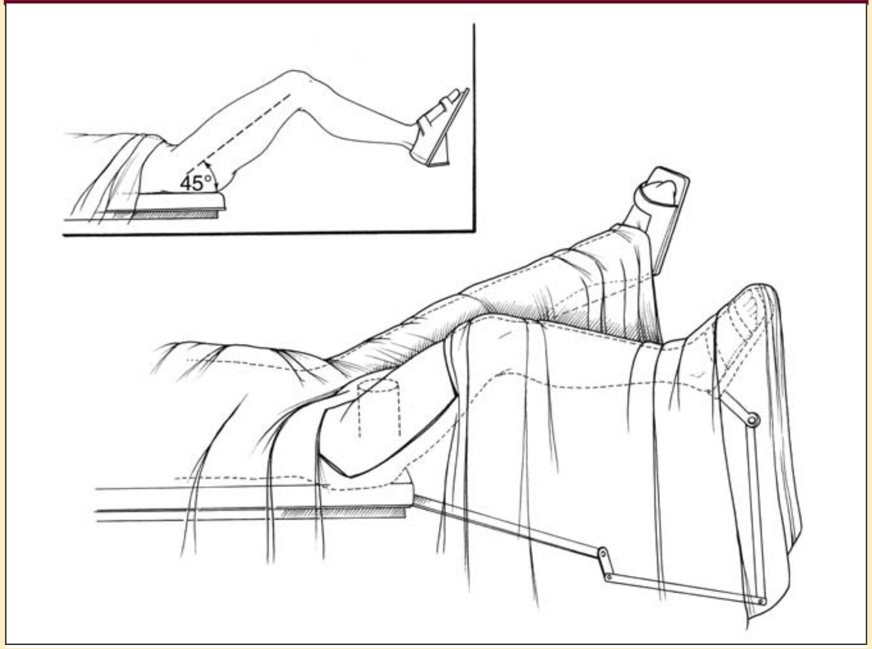
A, Arthroscopic view of a right hip from the anterolateral portal demonstrating the anterior acetabular wall (AW), anterior labrum (AL), and femoral head (FH). The anterior cannula is seen entering underneath the labrum. **B,** Arthroscopic view from the anterior portal demonstrating the lateral aspect of the labrum (L) and its relationship to the lateral two portals. **C,** Arthroscopic view from the posterolateral portal demonstrating the posterior acetabular wall (PW), posterior labrum (PL), and the femoral head (FH). **D,** The acetabular fossa can be inspected from all three portals to view the ligamentum teres (LT) with its accompanying vessels traversing in a serpentine fashion from its more posteriorly placed acetabular attachment. (Line art adapted with permission from Smith & Nephew Endoscopy, Andover, MA. Copyright © Smith & Nephew, Inc. 2003-2004. Arthroscopic image in part D reprinted with permission from Byrd JWT: The supine position, in Byrd JWT [ed]: *Surgical Hip Arthroscopy*. New York, NY: Thieme Medical Publishers, 1998, p 137.)

proposed this procedure for mild to moderate disease in patients younger than 50 years. Farjo et al[24] reported, however, that only 34% of 41 patients with OA found the procedure worthwhile and therefore proposed that débridement might be useful for milder chondromalacia, with the purpose of postponing the eventual need for total hip arthroplasty.

Published results of arthroscopic débridement used for degenerative disease have demonstrated improvement in between 34% and 60% of patients.[23,24] Although these results are not encouraging, it is important to note that a portion of these patients fare remarkably well. Factors to be considered include younger patients with relatively well-preserved joint space and range of motion; acute change in symptoms suggesting a dislodged fragment; mechanical symptoms (eg, locking, catching); failure of nonsurgical treatment, especially activity modification; and reasonable expectations of modest improvement.

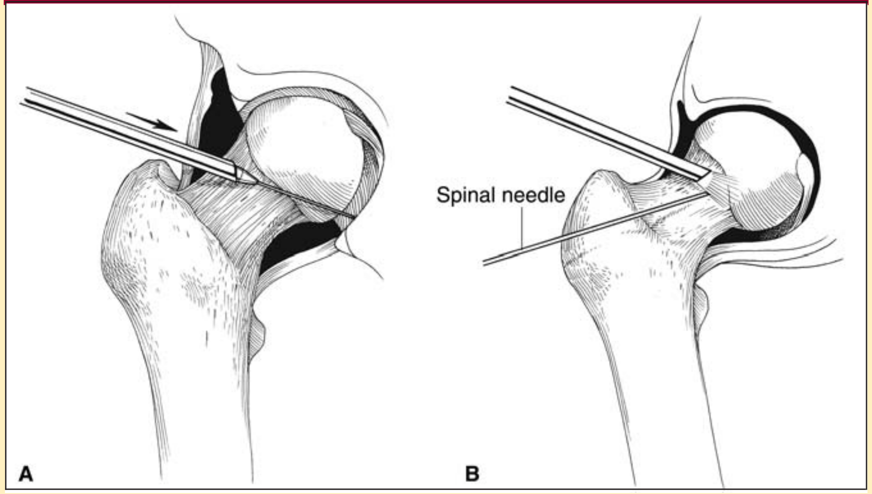
Radiographs are an insensitive indicator of degenerative disease because articular changes are generally far more advanced than suggested by plain radiographs or computed tomography scans. Arthroscopy is able to better assess the condition of the joint cartilage for the early stages of OA.[25] Recent attention has been given to femoroacetabular impingement;[26] reshaping the femoral neck and acetabular rim through a conventional incision may halt the progression of arthritis, but this result can also be accomplished arthroscopically.

Figure 6



The surgical area remains covered in sterile drapes while the traction is released and the hip flexed 45°. *Inset*, Position of the hip without the overlying drape. (Adapted with permission from Smith & Nephew Endoscopy, Andover, MA. Copyright © Smith & Nephew, Inc. 2003-2004.)

Figure 7

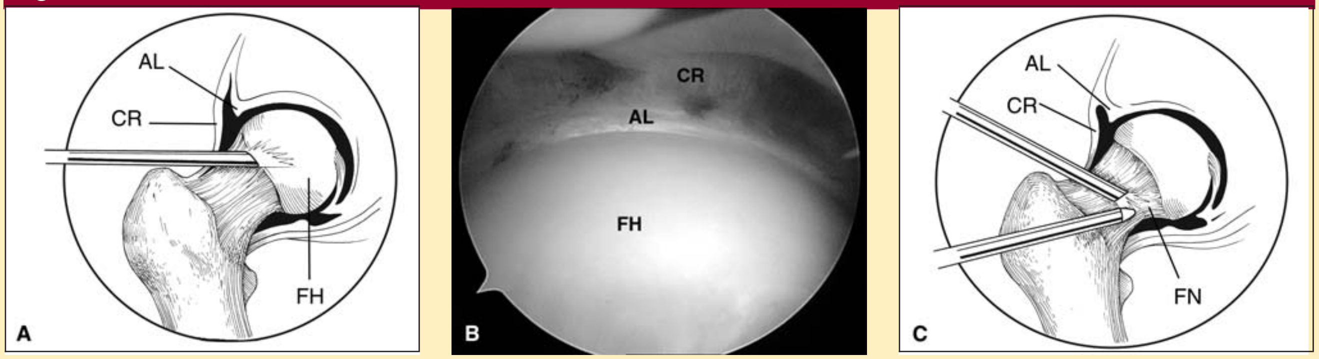


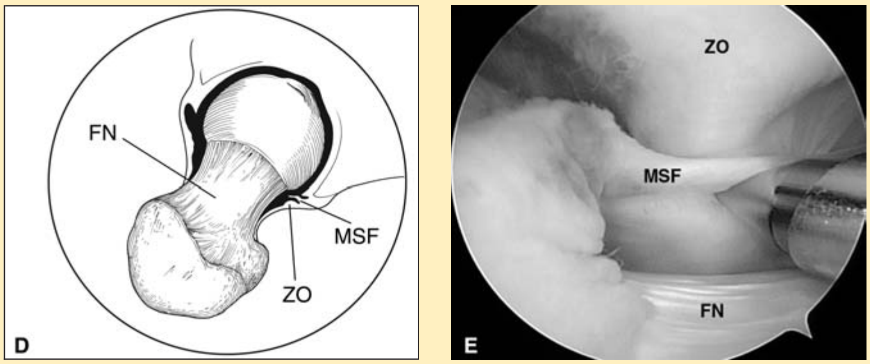
A, From the anterolateral entry site, the arthroscope cannula is redirected over the guide wire through the anterior capsule onto the neck of the femur. **B,** With the arthroscope in place, prepositioning is performed with a spinal needle for placement of an ancillary portal distally. (Adapted with permission from Smith & Nephew Endoscopy, Andover, MA. Copyright © Smith & Nephew, Inc. 2003-2004.)

Chondral Injuries

In the presence of hip dysplasia, the earliest signs of articular breakdown are observed in the anterolateral acetabulum.[27] Such breakdown can occur in morphologically normal hips as well, with selected patients treated with microfracture to stimulate a fibrocartilaginous healing response. This procedure is indicated for grade IV lesions with healthy surrounding articular surface and intact subchondral bone (**video step 11**). It necessitates 8 to 10 weeks of protected weight bearing during the early postoperative heal-

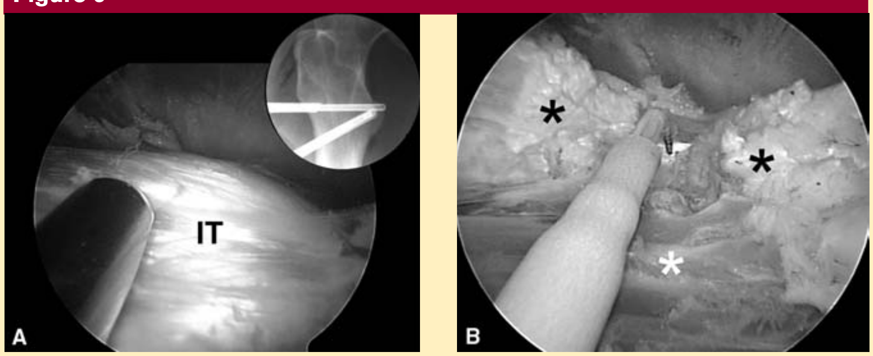
Figure 8





A, **B**, and **C,** Peripheral compartment viewed superiorly demonstrating the anterior portion of the joint, including the articular surface of the femoral head (FH), anterior labrum (AL), capsular reflection (CR), and femoral neck (FN). **D** and **E,** Peripheral compartment viewed medially demonstrating the femoral neck (FN), medial synovial fold (MSF), and zona orbicularis (ZO). (Line art adapted with permission from Smith & Nephew Endoscopy, Andover, MA. Copyright © Smith & Nephew, Inc. 2003-2004.)

Figure 9



A, The arthroscope and shaver are positioned within the iliopsoas bursa directly over the lesser trochanter (*inset*), identifying the fibers of the iliopsoas tendon (IT) at its insertion site. **B,** An electrocautery device is used to transect the tendinous portion of the iliopsoas (black asterisks), revealing the underlying muscular portion (white asterisk), which is preserved.

ing phase. Of 21 patients, 86% demonstrated a successful response at minimum 2-year follow-up.[28]

Traumatic chondral injuries, occurring from a direct blow to the greater trochanter, are increasingly recognized, especially in physically fit young adults.[29] With little adipose tissue to cushion the blow and in the presence of healthy bone structure, the force is transferred directly to the hip joint **(video step 12)**. This results in acute chondral fragmentation. In elderly or osteoporotic patients, this type of injury results in a fracture of the proximal femur; children are more likely to incur a physeal injury.

Femoroacetabular Impingement

Femoroacetabular impingement has been recognized as a distinct entity that can result in labral tearing, articular breakdown, and OA.[30] Pincer impingement occurs from an overhanging lip of bone from the anterior acetabulum; cam impingement occurs from a bony prominence of the anterior femoral head/neck junction. Traditionally, these have been resected after exposure by open surgical hip dislocation. These lesions can now be addressed arthroscopically in a much less invasive fashion[31,32] **(video step 13)**. Competent arthroscopic skills are required for the technically challenging aspects of this procedure.

Osteonecrosis

Arthroscopy has a limited role in the management of patients with osteonecrosis of the femoral head. With strict selection criteria (Marcus and Enneking stage IV lesions), arthroscopic inspection of the integrity of the articular surface may be helpful in selecting patients for revascularization procedures. Such inspection allows coexistent intra-articular pathology to be addressed.[33] For end-stage disease, however, arthroscopy as a palliative procedure has been uniformly unsuccessful.

Synovial Disease

Arthroscopic synovectomy of the hip can be performed for a variety of conditions, including inflammatory arthritides, synovial chondromatosis, and pigmented villonodular synovitis.[34] Focal lesions may emanate from the pulvinar within the acetabular fossa, whereas more diffuse patterns involve the synovial lining of the capsule. A subtotal synovectomy can be performed but requires arthroscopy of the peripheral compartment for the most complete resection (**video step 14**).

Synovectomy for inflammatory disease (eg, rheumatoid arthritis) may reduce discomfort and slow the destructive process. The results of a synovectomy that is performed through a conventional incision, however, are often dependent on the extent of joint deterioration. Synovial chondromatosis in the hip is more difficult to define on preoperative studies. Surgical treatment depends on excising the diseased synovium as well as removing the loose bodies. Many of these loose bodies reside in the peripheral compartment, again emphasizing the importance of inspecting this area. Diffuse and nodular patterns of pigmented villonodular synovitis may eventually be managed arthroscopically. The experience to date is anecdotal, however, and radical synovectomy would still require an open procedure with dislocation of the joint.

Ruptured Ligamentum Teres

Disruption of the ligamentum teres is increasingly recognized as a cause of painful hip symptoms.[35] This disruption often occurs as the result of a twisting injury, even in the absence of dislocation or subluxation of the joint.[36] Current imaging techniques are unreliable at detecting these lesions, and examination findings are usually indistinguishable from a labral tear or articular fragment. Disruption of the ligamentum teres is the third most common pathology encountered among athletes undergoing arthroscopy. In this population, the results of arthroscopic débridement have been remarkably good, comparable with results achieved in removal of loose bodies[37] (**video step 15**).

Among a cohort of 23 patients with traumatic lesions who achieved a minimum 1-year follow-up, average improvement was 43 points (preoperative, 47; postoperative, 90) on a 100-point modified Harris hip scale.[36] Degenerate ruptures accompany degenerative disease of the joint, and hypertrophic lesions are not uncommon in association with dysplasia.

Posttraumatic Osteophytes

Impinging bone fragments secondary to trauma have been successfully addressed with arthroscopic excision, resulting in significant symptomatic improvement[34] (**video step 16**). Excision of degenerative osteophytes is less predictable because associated joint deterioration cannot be reversed.

Instability

Thermal modification of the hip capsule can be effectively performed[34] (**video step 17**). In a small cohort of four hips with 2- to 5-year follow-up, average improvement was 38 points (preoperative, 52.5; postoperative, 90.5) on the Harris hip scale. This procedure is most clearly indicated for symptomatic instability (the result of an incompetent capsule with normal joint geometry) that is unresponsive to nonsurgical management. Symptomatic instability is most commonly encountered in hyperlaxity states associated with collagen vascular disorders, such as Ehlers-Danlos syndrome. Occult hip instability remains incompletely understood. The constrained bony architecture of the hip provides much intrinsic stability and, unlike in the shoulder, the labrum is not an integral component of the capsular complex.[18]

Adhesive Capsulitis

Adhesive capsulitis of the hip has rarely been described.[38] However, recent arthroscopic experience indicates that the condition is more common than suggested by previous reports and that it shares many of the same features encountered in the shoulder. In nine patients (eight women; average age, 42 years [range, 36 to 49 years]) who presented to my practice, the characteristic finding was painful restricted range of motion. With this condition, there is often a history of a precipitating event, such as a twisting injury or a fall. It is likely that many patients with adhesive capsulitis will respond to nonsurgical treatment, whereas recalcitrant cases can benefit from manipulation under anesthesia. Hip arthroscopy, however, defined other associated intra-articular pathology in six of these patients.

Joint Sepsis

A recent study supports the role of arthroscopy in the management of the infected hip,[39] with the principal advantage of reduced morbidity. With proper patient selection, arthroscopy has also been reported to be successful in a series of late, acutely infected total hip arthroplasties.[40] Selection criteria for this condition include early diagnosis, well-fixed components, a sensitive microorganism, and patient tolerance to, and compliance with, antibiotic therapy.

Unresolved Hip Pain

Arthroscopy has uncovered many previously unrecognized but treatable causes of hip pain. This has stimulated advancements in the investigative methods used for detecting these causes. As clinical assessment tools become more sophisticated, diagnostic arthroscopy should assume a reduced role. Currently, arthroscopy continues to be valuable in the management of numerous incompletely defined hip problems, but it should be considered only when evaluation suggests that the patient is likely to benefit from the procedure.[41] Arthroscopy should not be casually considered simply for ill-defined hip pain.

Adjunct to Open Procedures

Accounts of arthroscopy being used in conjunction with, or as a prelude to, select open procedures (eg, pinning for slipped capital femoral epiphysis, revascularization for osteonecrosis, osteotomy, and in association with mini-arthrotomy) are being reported.[33,34,42] This role has been limited but may expand with the growing emphasis on less invasive techniques around the hip and the potential for arthroscopically assisted methods in a variety of procedures.

Snapping Iliopsoas Tendon

Snapping of the iliopsoas tendon is usually an incidental, inconsequential event. Symptomatic patients usually respond to nonsurgical treatment. However, in recalcitrant instances, arthroscopy offers an effective method for releasing the tendon, a procedure that often corrects the problem. The procedure is best performed through the iliopsoas bursa. The joint can first be assessed for associated intra-articular pathology. Published results of the arthroscopic method are superior to open techniques with minimal morbidity.[43,44]

Pearls and Pitfalls

Patient Selection

- Successful hip arthroscopy is most dependent on proper patient selection. This includes pathology or clinical findings suggestive of a problem amenable to arthroscopic intervention. Additionally, the patient must have a reasonable expectation of outcome. A well-performed operation will be deemed a failure if it does not fulfill patient expectations.

Hip Distraction

- It is important that the patient have adequate distractibility of the hip joint before performing the procedure. Rotational motion of the joint provides a crude indication of its distractibility. Be cautious in patients with ill-defined symptoms or examination findings, unreasonable expectations, and a stiff hip.

Patient Positioning

- Proper patient positioning is essential for safe and effective joint distraction. This is important to avoiding compression or distraction neuropathies and to achieving the optimal traction vector for accomplishing distraction with the least amount of force.

Portal Placement

- Because of its constrained ball-and-socket architecture and dense surrounding soft-tissue envelope, the hip is especially susceptible to iatrogenic injury during arthroscopy. Proper orientation and technique in portal placement is essential for minimizing this risk and optimizing accessibility to the joint. Placement of the spinal needle for the first portal is especially critical. It is important to avoid perforating the labrum with the needle because this would lead to penetration by the cannula as well. Once the arthroscope has been placed, the other portals are then positioned with direct arthroscopic visualization, controlling entry into the joint (avoiding the labrum and the articular surface).
- Small capsular incisions around the cannulas markedly improve maneuverability within the joint. The latter can be performed after a thorough joint survey has been completed. These capsular incisions lead to slightly more fluid extravasation and thus are created only as they come to be needed.
- With the joint distracted, intraoperative rotational motion of the hip improves access to the medial side of the femoral head and portions of the ligamentum teres.

Complications

The reported complication rate associated with hip arthroscopy series is between 1.3% and 6.4%.[45-47] Most of these complications are minor or transient, but a few major complications, such as traction neurapraxia, direct trauma to neurovascular structures, fluid extravasation, and iatrogenic joint damage, have also been reported.

Traction neurapraxia is usually associated with prolonged procedures and excessive traction but can occur even when surgery is done within established guidelines. With normal precautions, the condition is transient and recovery complete. Direct trauma to the major neurovascular structures is avoidable with thoughtful orientation to the landmarks and careful technique in portal placement. The consequences of direct trauma injuries are generally devastating. Small branches of the

Pearls and Pitfalls

Peripheral Compartment

- Arthroscopy of the peripheral compartment should be an integral part of any routine procedure. Failure to inspect this area can cause a surgeon to overlook contributing pathology. Additionally, the surgeon must become facile with arthroscopy of this area done for routine procedures; confidence thus is developed for addressing advanced disease states.

Visualization

- After poor patient selection, poor visualization is the next most serious pitfall. When the surgeon cannot see well, either the procedure will not be effective or it will take an inordinate length of time. Use both 70° and 30° arthroscopes, and make sure the instruments are in good working order. A high-flow fluid management system is essential for maintaining the flow necessary for keeping the surgical field clear without having to use excessive pressure. Maintaining the patient's systolic blood pressure below 100 mm Hg aides in minimizing bleeding, as do installation of dilute epinephrine in the arthroscopy fluid and judicious use of a radiofrequency device for coagulation.

Rehabilitation

- The success of hip arthroscopy often depends on a proper postoperative rehabilitation program. This can be especially jeopardized by overzealous intensity of activity during early postoperative recovery.

lateral femoral cutaneous nerve invariably lie around the anterior portal. In this author's experience, even with careful technique, there is a 0.5% chance of incurring a small patch of reduced sensation in the lateral thigh as a result of instrumentation around one of these branches.

Potentially life-threatening intra-abdominal extravasation of fluid has been reported.[48] This condition is generally attributed to fresh acetabular fractures, extra-articular procedures, and prolonged surgical times.[46] It is imperative that the surgeon be cognizant of the balance of ingress and egress of fluid throughout the surgical procedure.

It is likely that the most common complication, which goes largely unreported, is iatrogenic intra-articular damage. Even with careful attention to the details of the procedure, the chance of encountering this complication cannot be entirely avoided. However, that possibility can be minimized by careful, meticulous technique.

Summary

Hip arthroscopy can be effectively performed for numerous conditions. Three important principles must be thoroughly considered before performing the procedure, however. First, successful outcome is dependent on proper patient selection. A technically well-performed procedure will fail when done for the wrong reason, which can include failure of the procedure to meet patient expectations. Second, the patient must be properly positioned. Poor positioning will ensure a difficult procedure. Third, the surgeon must gain access to the hip joint in an atraumatic fashion. Because of the constrained architecture and dense soft-tissue envelope of the hip, the potential for inadvertent iatrogenic arthroscopy trauma is significant and, to some extent, unavoidable. Thus, the procedure must be performed as carefully as possible and for the right reason.

References

Evidence-based Medicine: Level I and II prospective studies include reference 41. The majority of references are level III and IV case-controlled studies.

Citation numbers printed in **bold type** indicate references published within the past 5 years.

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