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CHAPTER 78

Hip Arthroscopy by the Lateral Approach

James M. Glick and Thomas G. Sampson

In the first edition of *Operative Arthroscopy* we described the technique of hip arthroscopy based on over 80 cases (1). We have now performed over 200 cases and have further improved and refined the technique. Even though many indications exist, few patients fit into the various categories. Therefore the procedure is still difficult to many surgeons primarily because they don't have enough opportunity to perform it and hone their surgical skills. The purpose of this chapter is to build a foundation for hip arthroscopy in order to simplify the procedure.

PREOPERATIVE PLANNING

Two elements of the physical examination are important in planning for hip arthroscopy. First, evaluation of the range of motion is necessary to determine the presence of contractures. If there is a hip contracture, the hip must be left in that position in order to distract the hip adequately with a safe amount of traction. For example, it may be impossible to distract a hip with a flexion contracture positioned in extension. The second important test is roentgenograms to identify spurs and dysplasia. Large spurs make it difficult and sometimes impossible to insert instruments into the hip joint. The results of arthroscopic treatment of dysplastic hips are often poor.

A magnetic resonance imaging (MRI), computed tomographic (CT), or bone scan should be performed only after roentgenograms have been taken. In our experience MRI is helpful in diagnosing avascular necrosis. We have found a CT scan beneficial in determining the presence of loose bodies. Moreover, a bone scan is sensitive enough to diagnose subtle arthritic changes that are not apparent on plain roentgenograms.

EQUIPMENT AND OPERATING ROOM SETUP

The procedure is performed with the patient on his or her side with the involved hip on top. We have found that the hip must be fully distracted to visualize the joint adequately and maneuver arthroscopic instruments. Eriksson and associates (2) reported that, in an anesthetized patient, 300–500 newtons of force was required to distract the hip for arthroscopy. Initially, we fixed the leg in skin traction by hanging it from overhead pulleys attached to the ceiling of the operating room (3). We learned that some extremely tight hips could not be distracted enough for the instruments to be inserted by this technique. We changed to a fracture table and were consistent in adequately entering the hip in all cases (Fig. 1) (4). There were some problems with the fracture table, however. Sciatic nerve and pudendal nerve neuropraxias occurred from the effect of prolonged traction (Fig. 2). Needed maneuverability of the leg was restricted by the confines of the table and perineal post. In other words, flexion, extension, abduction, and adduction were limited. We now use a traction apparatus that fits on to a conventional operating table (Fig. 3). The apparatus includes a foot piece and stretcher to hold the leg, a well-padded perineal post for countertraction, and a tensiom-

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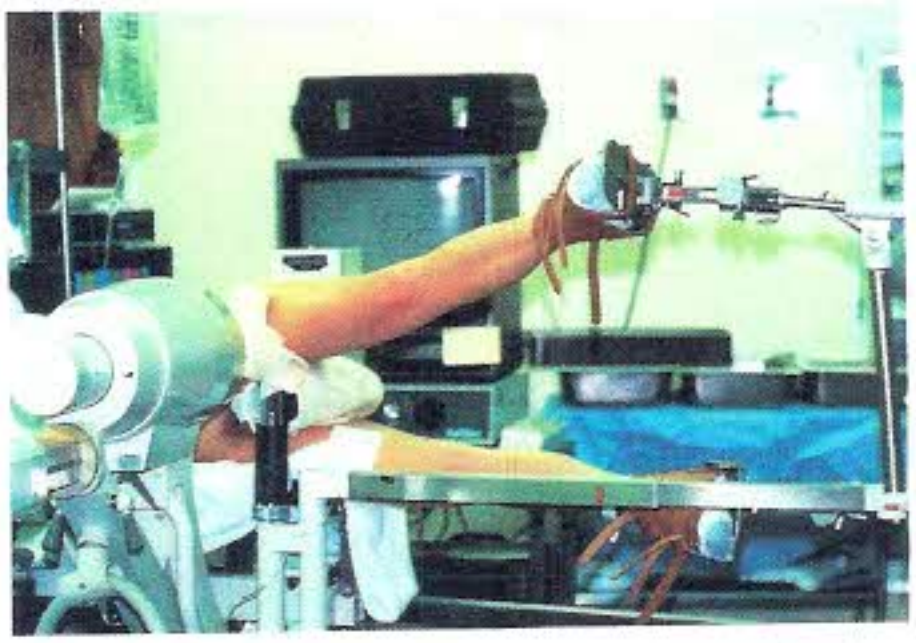


FIG. 1. Patient in the lateral decubitus position on a fracture table. From Glick (10).

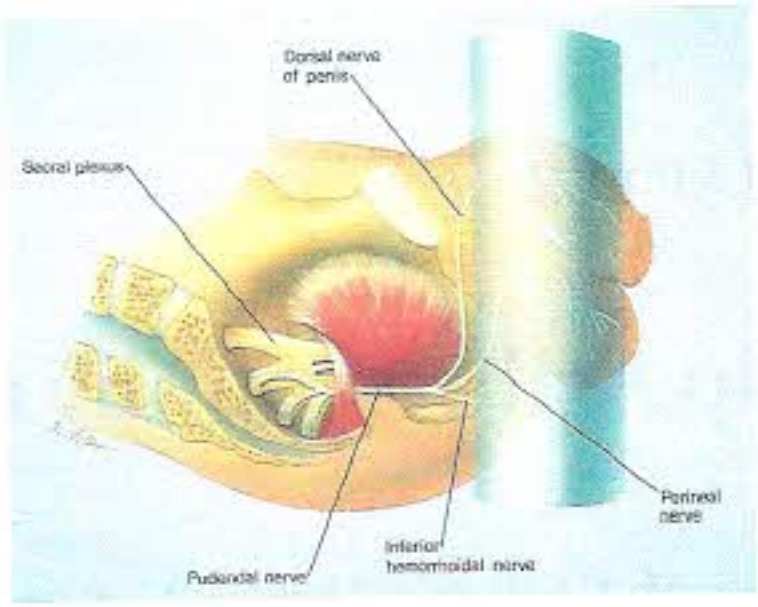


FIG. 2. A diagram of the course of the pudendal nerve and its branches in relationship to the pubic bone and the peroneal post placed between the legs of a patient. From Glick, (9).

eter to gauge the amount of traction applied. We have found it to be safer and more reliable than the fracture table. This distracter provides adequate distraction of the hip joint in all such operations. Two studies have described satisfactory arthroscopic evaluations without the use of traction (5,6). Dorfmann and coauthors (5) are most concerned with synovial pathology, and therefore entrance into the confines of the acetabulum is not extremely important to them. Klapper and Silver (6) include only eight cases. We too were successful in many of our initial cases of hip arthroscopy where little traction was applied. As our indications grew and more diseased and tighter hips were arthroscoped, we began to notice the limitations in the undistracted hip.

In the lateral position the fat around the hip joint falls away, providing free maneuverability of the instruments. This is particularly beneficial in the obese individual. Likewise, the approach into the hip over the greater trochanter is a straight line, simplifying entrance into the hip joint. If there is a large anterior spur on the acetabulum the only way to enter the joint is laterally. Some authors (2,7) prefer the supine position as preparation is less time-consuming and does not require special traction equipment. We found that the extra time spent on setting up the patient in the lateral position makes completion of the actual surgery quicker and more consistent. This is particularly important for the surgeon who is faced with the prospect of performing the procedure for either the first time or the first time following a long interval. Although the setup time for the lateral approach is long, it is not complicated and is not dangerous to the patient. We find that entrance into the hip joint is much

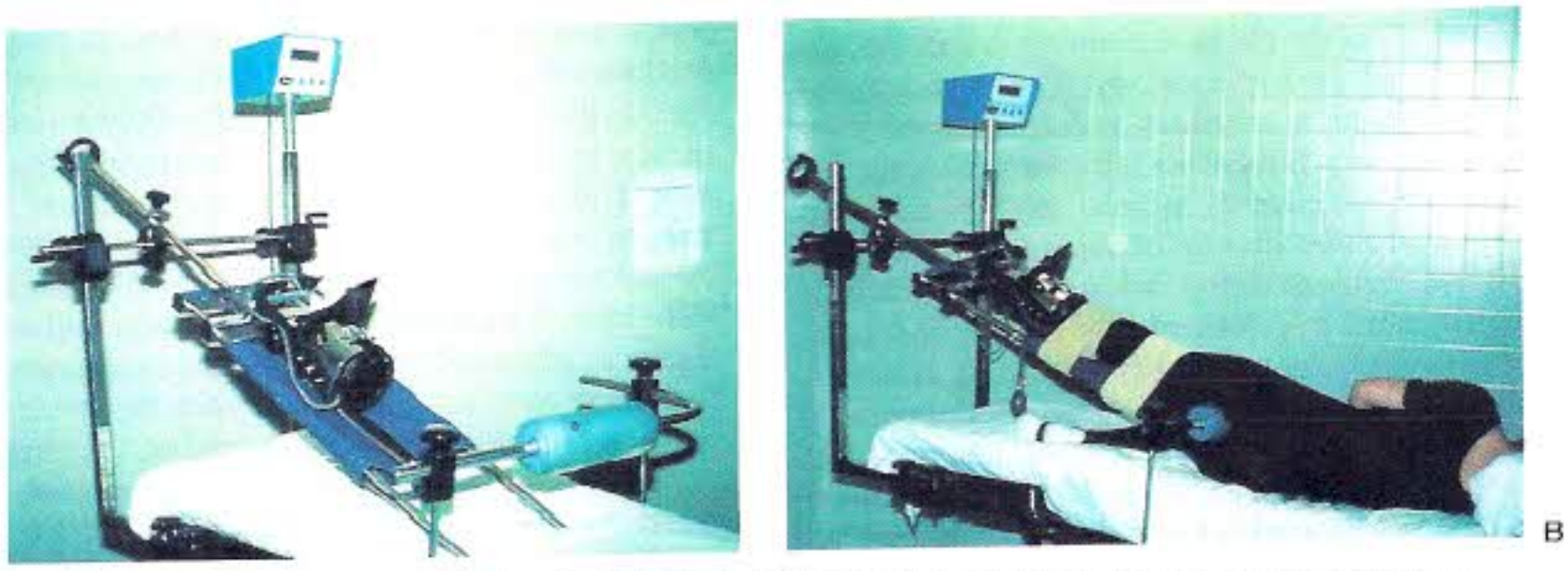


FIG. 3. The Hip Distraktor (Arthronix, 510 Route 304, New City, New York 10956). **A:** Note the tensiometer, the foot piece on the leg holder, and the well-padded peroneal post. The distraction is applied by turning the wheel at the foot of the operating table. The hip can be adducted or abducted by turning the handles on the sides of the cross bar. Likewise the hip can be flexed and extended by sliding the traction device back and forth on the cross bar. **B:** The model is lying in the lateral decubitus position with the involved left leg upward. The left leg is strapped into the hip distraction device.

easier by the lateral approach than the anterior approach, especially when it is performed for the first time.

Along with a distracting device we find the following special equipment and instruments helpful in the performance of hip arthroscopy.

Image intensifier to establish the amount of distraction and to guide the instruments into the joint
Extra long 18- or 16-gauge spinal needles (Fig. 4A)
Extra long arthroscope (Fig. 4B)
Extra long motorized instruments, cannulas, and hand instruments (Fig. 4C)
Telescoping cannulas (Fig. 5)
Extra long curved motorized and hand instruments
Arthroscopic knives
Arthroscopic electrocautery

A longer arthroscope and longer instruments permit deeper penetration into the joint.

The room setup is depicted in Figure 6. The patient is on his or her side on a conventional operating table. The foot and leg are strapped into a traction device. A padded post is placed in the perineum for countertraction. A tensiometer to measure the amount of traction is on one of the posts at the foot of the traction device. An image intensifier (fluoroscope) is positioned around the hip for anteroposterior views. After all the portals are completed, the image intensifier can be removed. The surgeon stands in front of the patient. The video monitor, image intensifier screen, and power and fluid pump equipment are to the rear of the patient. The nurse stands on the side and a little in back of the surgeon.

TECHNIQUE

The patient, under general anesthesia or an epidural block, is placed in the lateral decubitus position with the hip to be treated on top (Fig. 7). The leg is strapped into the distraction device which places the leg in abduction. The amount of flexion and abduction is dependent on whether or not a contracture is present. If there is a hip flexion or adduction contracture, then this hip must be left in that position in order to distract the hip adequately with a safe amount of traction. The perineal post placed between the legs is pushed upward against the medial portion of the thigh on the involved leg. This produces

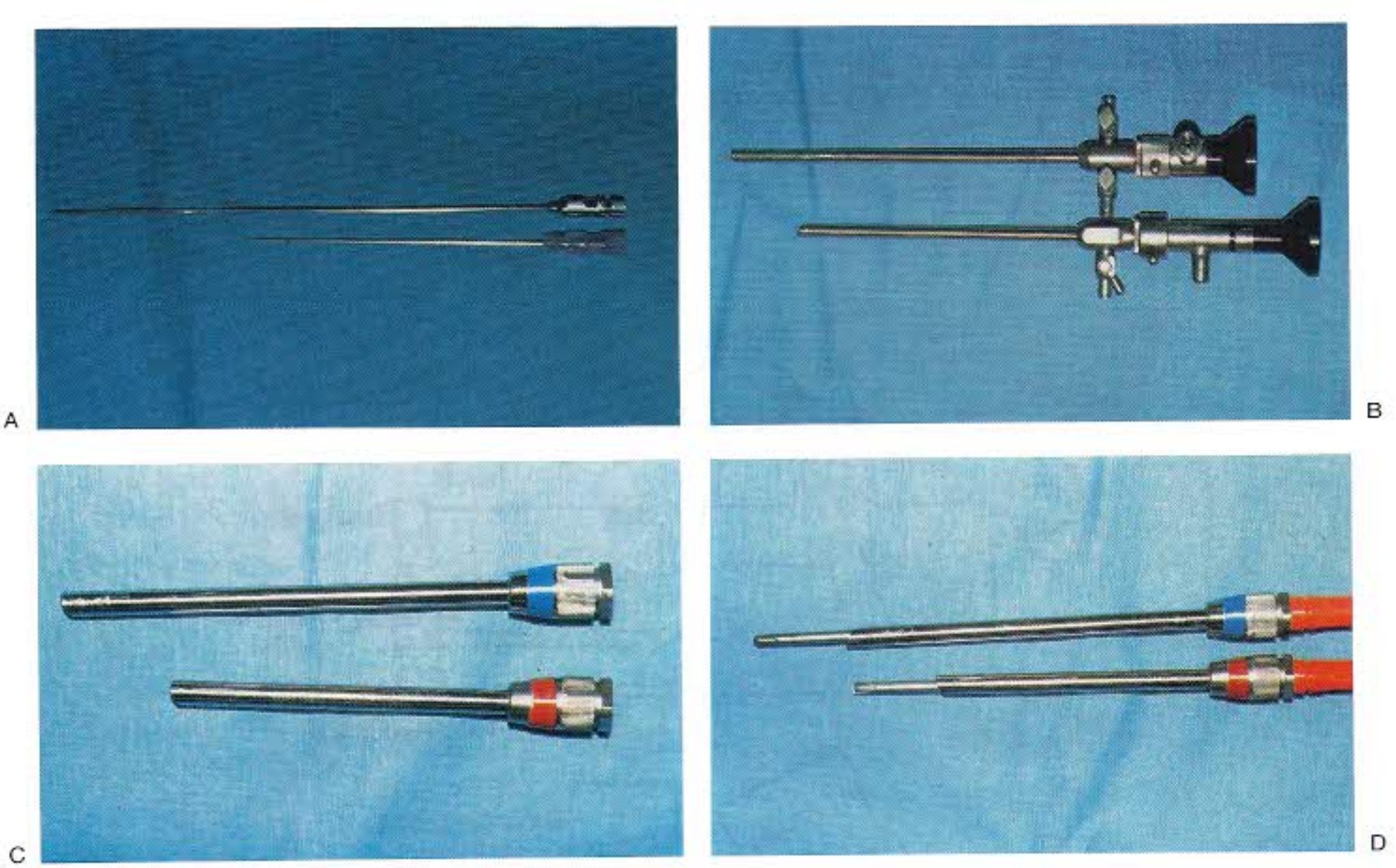


FIG. 4. Extra long instruments: **A:** 6-inch, 18-gauge spinal needle next to a standard-size spinal needle. **B:** A long arthroscope next to a standard-size arthroscope ($1\frac{1}{4}$ inch difference in length). **C:** A long cannula next to the standard cannula ($1\frac{1}{4}$ inch difference in length). **D:** A long full-radius resector next to a standard-size resector ($1\frac{1}{4}$ inch difference in length. From Glick (10).

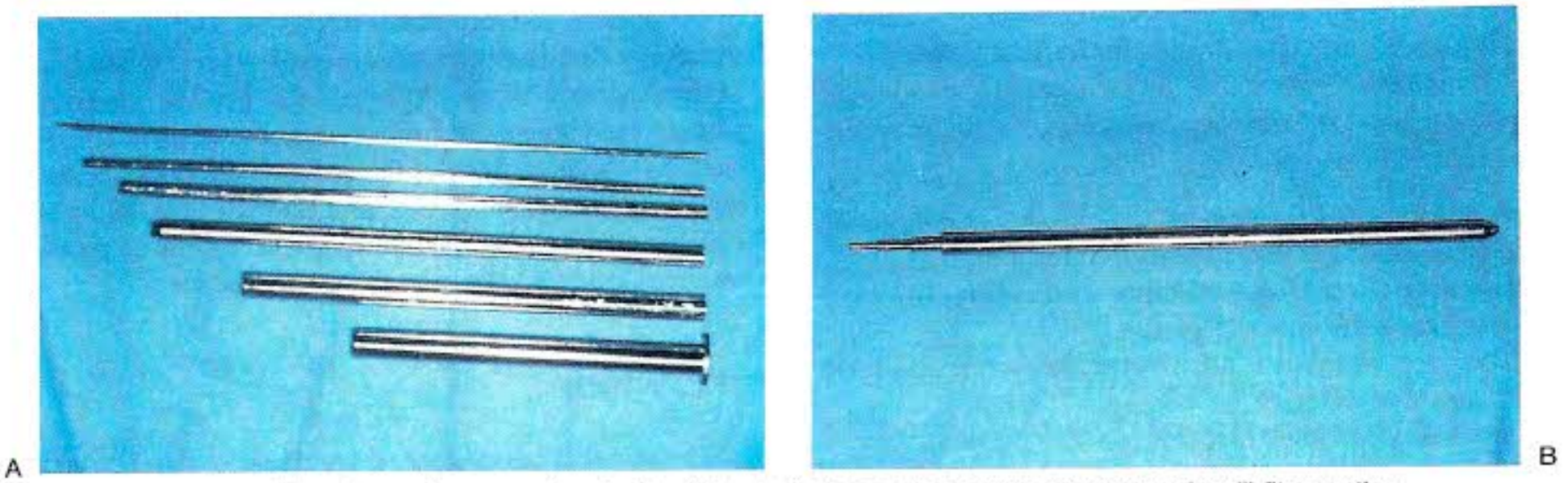


FIG. 5. The telescoping cannulas. **A:** The full set of six cannulas. Each larger cannula will fit over the next smaller size. The switching stick fits through the third largest cannula (third from the bottom). **B:** Three cannulas nested together. From Glick (10).

slight upward distraction and will keep the post away from the branch of the pudendal nerve that crosses over the pubic ramus (Fig. 2). Two portals are made over the greater trochanter and one directly anterior (Fig. 8). Additional portals can be made, but instrument crowding may become a problem. The extra long 18-gauge spinal needles are inserted into the skin at the planned portal sites to ensure accurate placement of the incisions. Important arteries and nerves are safely away from the insertion sites (Fig. 9). Branches of the lateral femoral cutaneous nerve are near, but are not dangerously close to the direct anterior portal.

While the image intensifier is being sterilely draped, insert an extra long spinal needle over the anterior edge of the greater trochanter and advance it down the neck of the femur into the hip joint. A definite "give" is felt when the capsule is penetrated and the needle is then stopped by the bony floor of the acetabulum. At this point, verify the position of the needle in the hip joint with the image intensifier. If the joint has not been en-

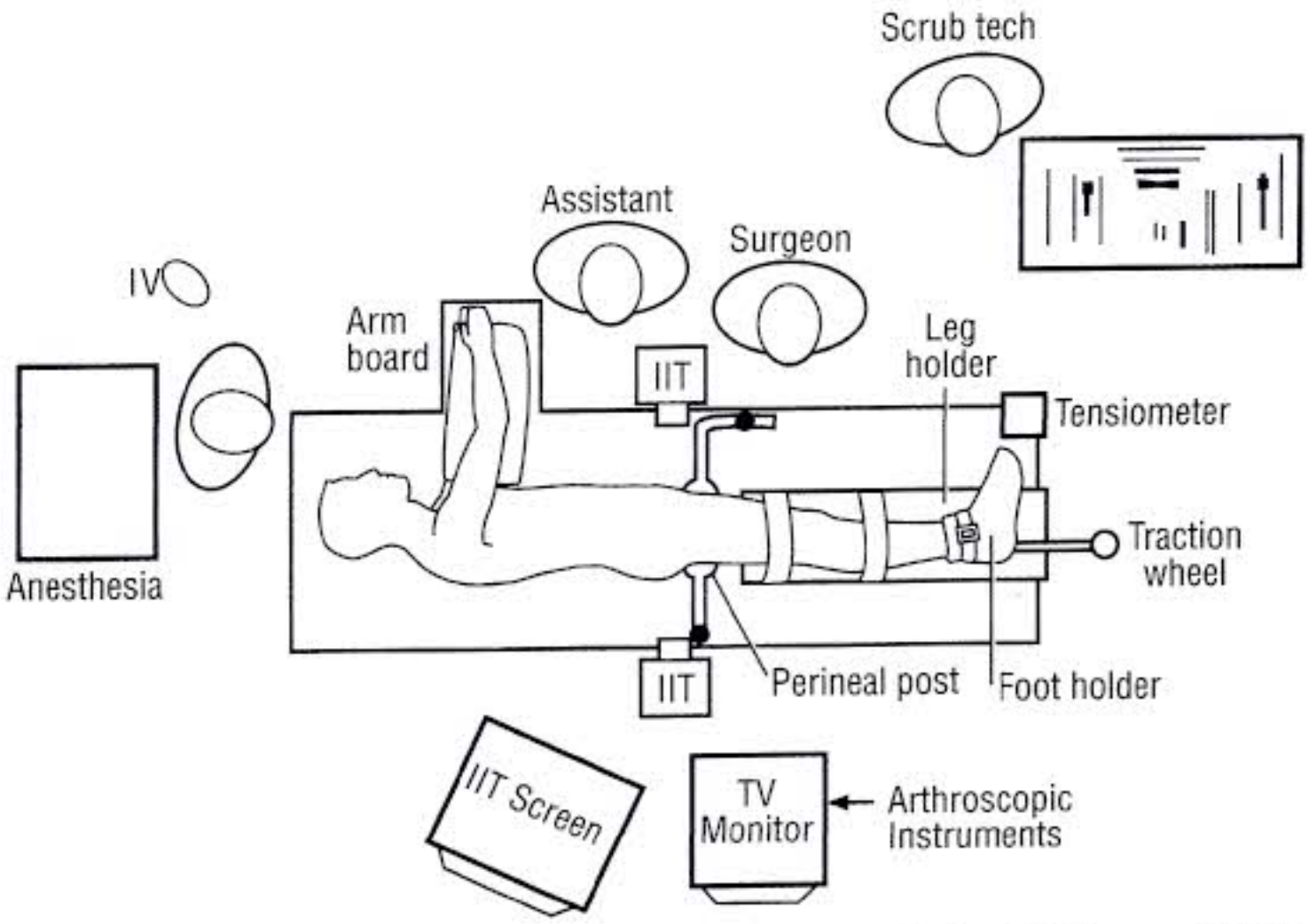


FIG. 6. Room setup. Patient is in the left lateral decubitus position with the right hip upward. Note the surgeon working in front of the patient with the arthroscopic technician.

FIG. 7. The patient is in the left lateral decubitus position with the right hip upward. The right leg and foot are strapped into the leg and foot piece of the hip distraction device. The perineal post is pushed upward against the medial portion of the thigh to lever the head of the femur upward. The image intensifier is set in place to verify the amount of distraction and help guide the instruments into the hip joint.

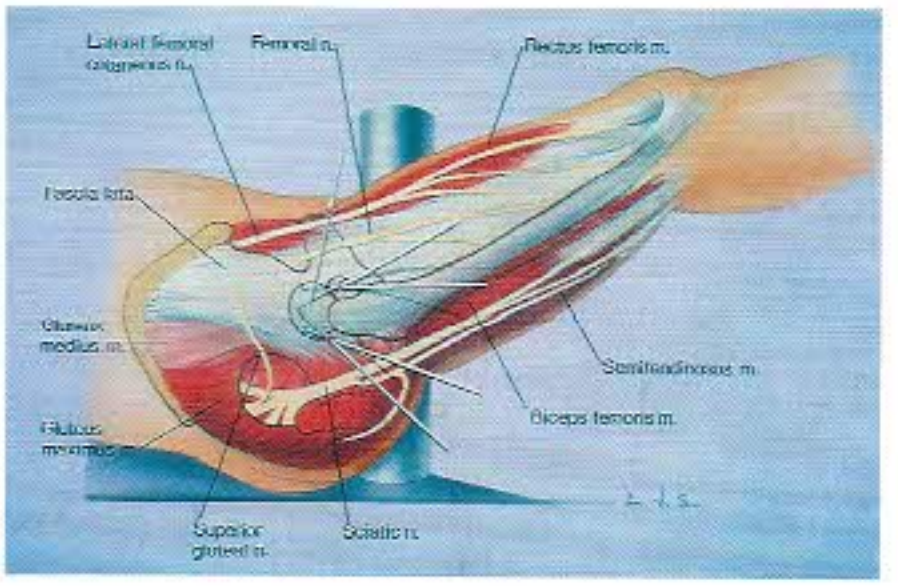


FIG. 9. A diagram of the important nerves around the hip joint and their relationship to the portals used for hip arthroscopy by the lateral approach. From Glick (9).

tered, manipulate the needle into the joint under image intensification. Next, remove the stylet and with a syringe inject 10 to 15 ml of room air into the joint to break the suction seal. Once the suction seal is broken, the hip will relax and some distraction will occur. At this time, aspirate the hip to see if intraarticular fluid is present. Next, apply at least 50 pounds of traction and use the image intensifier to verify that sufficient distraction is present. Do not hesitate to apply more traction if necessary, but after all instruments have been inserted the traction should be reduced back to 50 pounds. After the traction is brought back to 50 pounds, the distraction will remain, owing to muscle relaxation. Next, insert two more extra long spinal needles in a similar matter, one over the posterior aspect of the greater trochanter and the other directly anterior. Check the positioning with the image intensifier and verify entrance into the hip joint by injecting fluid into one needle and watching for it to emerge through the other (Fig. 10).

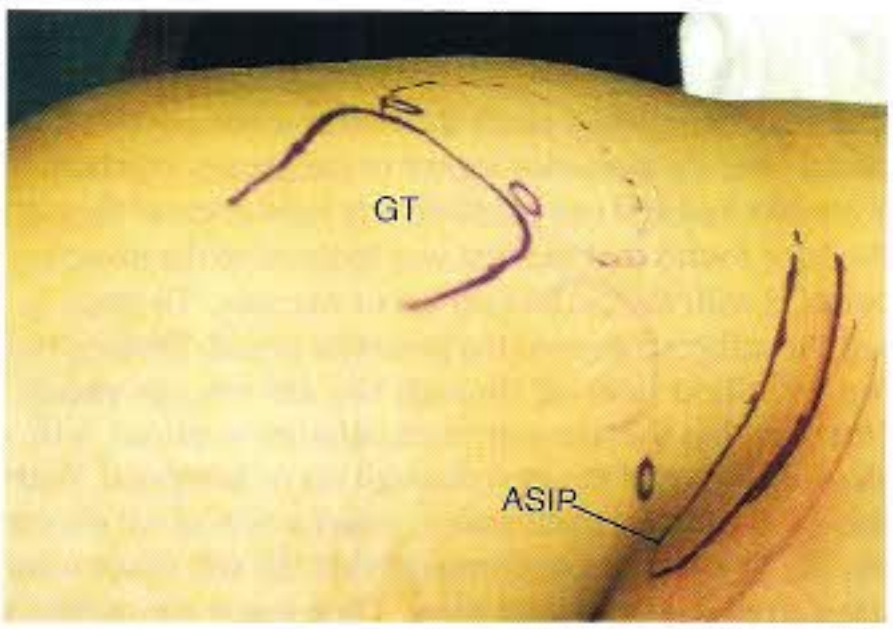


FIG. 8. The direct lateral approach. The right hip is viewed from the front. The iliac crest, the greater trochanter, and the femoral head are marked on the skin. The small circles mark the three portals most commonly used. The circles from anterior below to posterior above represent the direct anterior portal, the portal at the anterior edge of the greater trochanter, and the portal at the posterior edge of the greater trochanter, respectively. GT, greater trochanter; ASIP, anterior superior iliac spine.

Once the 18-gauge spinal needles are in place to mark the portal sites, the incisions are made. First, remove the needle over the anterior edge of the greater trochanter and make a skin incision at this point. Next, either introduce the arthroscopic sheath with its stylet or the telescoping cannulas. The telescoping cannulas help maintain the portal so its position is not lost. The smallest cannula is inserted first and is directed into the hip joint under image intensification. The procedure is continued by placing the next larger size of cannula over the one in the joint and removing the first cannula. The procedure is repeated with progressively larger cannulas until adequate dilatation of the tissue around the incision is achieved (Fig. 11). Then place a switching stick through the last telescoping cannula. Insert the arthroscope sheath over the switching stick and into the hip joint and couple the arthroscope to it. The process may be repeated for each portal. Place an inflow/outflow cannula into the direct anterior portal and a shaver sheath into the posterior portal. After the arthroscope is in the joint, telescoping cannulas are inserted under direct vision (Fig. 11). When the portals have been completed and all instruments are in the joint, the image intensifier can be removed.

The last step is to widen the capsular portion of each portal to increase instrument mobility and to improve access to all portions of the hip joint. To do so, an arthro-

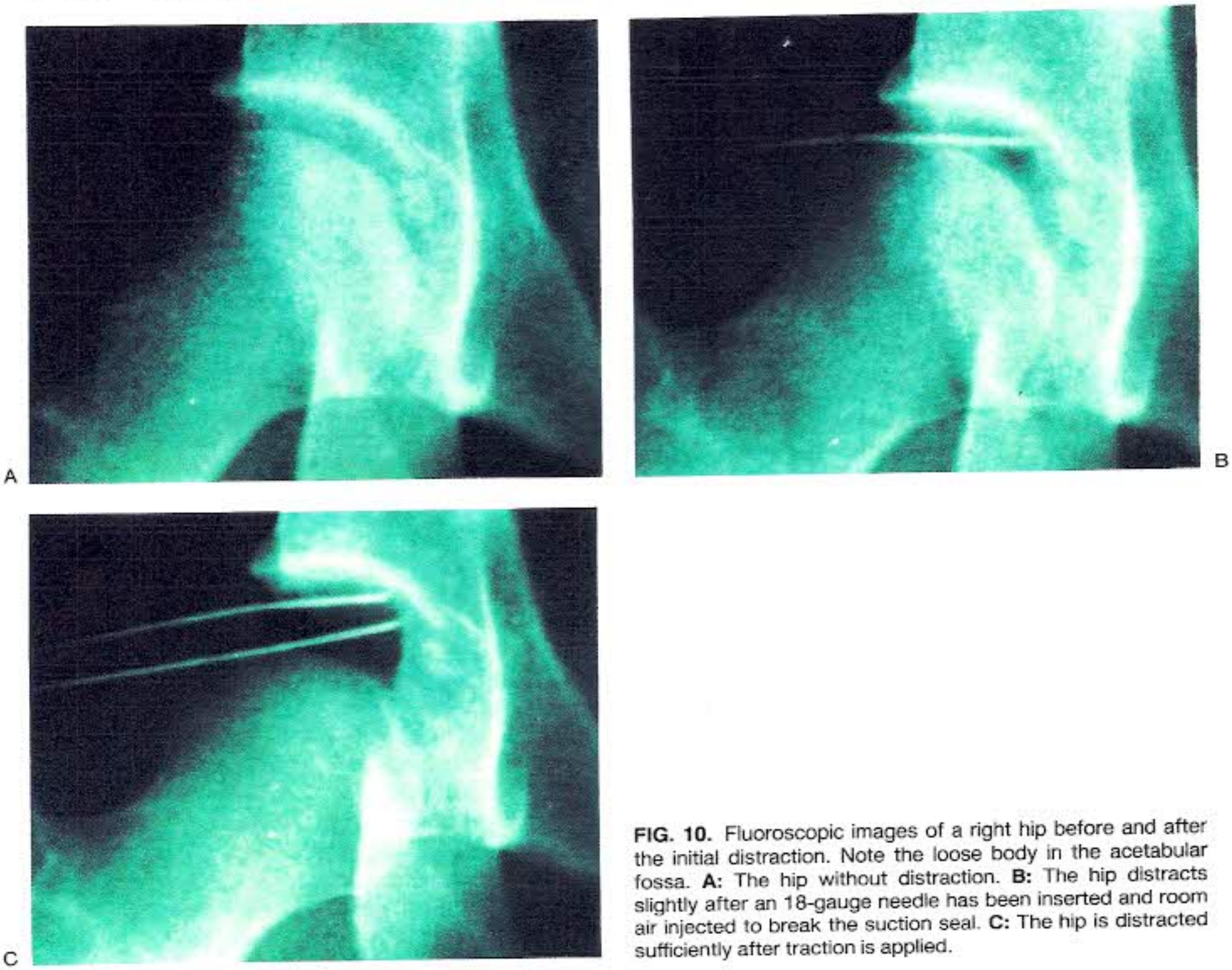


FIG. 10. Fluoroscopic images of a right hip before and after the initial distraction. Note the loose body in the acetabular fossa. **A:** The hip without distraction. **B:** The hip distracts slightly after an 18-gauge needle has been inserted and room air injected to break the suction seal. **C:** The hip is distracted sufficiently after traction is applied.

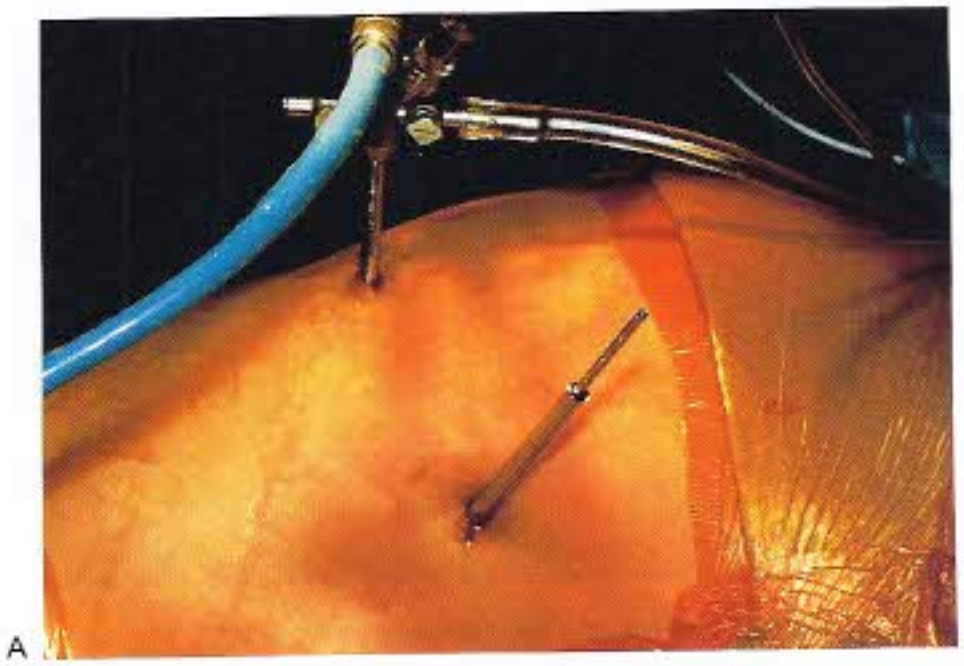
scopic knife is inserted under direct vision and the capsule is cut in all directions as far as possible (Fig. 12).

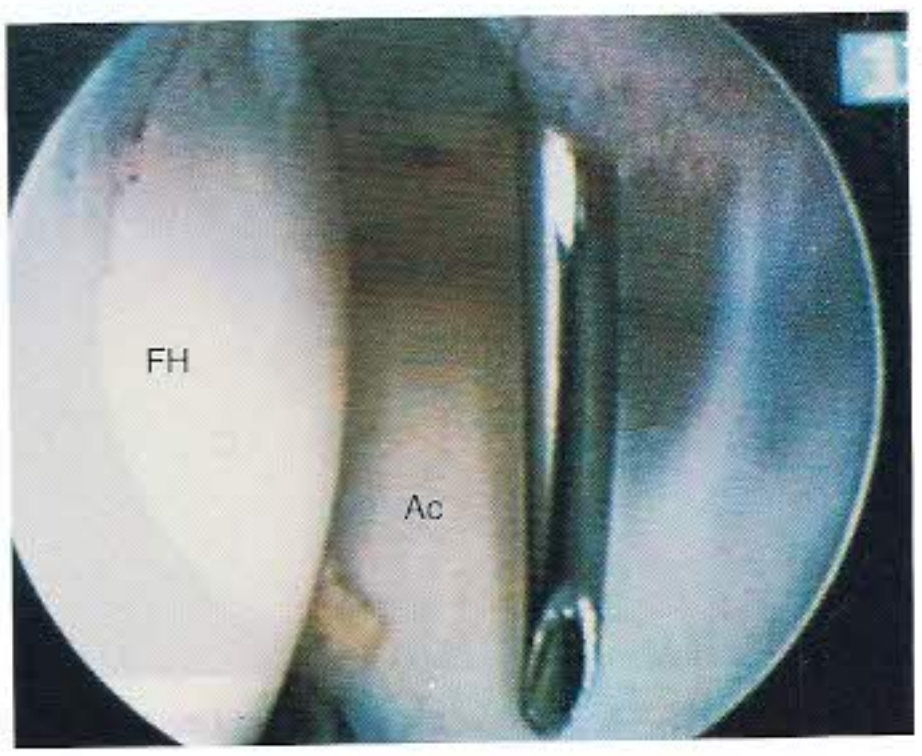
To visualize the periphery or capsular portion of the hip, pull the arthroscope back and reduce the traction until the head retracts into the acetabulum. Keep the contour of the femoral head in sight. Then, perform a capsulotomy with a motorized full-radius resector, an electrocautery knife, and a side-biting suction punch. I have found that cuts made with the electrocautery knife not only release the synovium, but "marbleize" the tissue so that the motorized resectors and punches work more efficiently. Trim the capsule proximal and distally so that the junction of the head and the neck is easily visualized (Fig. 13). Debridement and synovectomy in this area are easily performed. Surgical instruments and the arthroscope can be interchanged among any of the portals. A complete view of the hip can be achieved by rotating, adducting, abducting, flexing, and extending the leg and transferring the arthroscope to each portal.

When a large anterior spur is present, entrance into the hip joint is difficult and sometimes impossible. The spur may completely block the two anterior portals. The portal over the posterior aspect of the greater trochanter is not blocked and can be effectively used to enter the hip. We have found that the best way to develop the posterior portal is with the patient on his or her side. To start, insert the arthroscope into the posterior portal. Distend the hip with fluid inserted through the arthroscope sheath. Next develop the anterior peritrochanteric portal. Visualize the region of the spur through the arthroscope. With the aid of the image intensifier, insert a motorized shaver blindly down to the spur and debride the soft tissue until the shaver tip comes into view. Then insert a motorized abrader and under direct vision take off the spur. Once the spur is removed, the third direct anterior portal may be developed (Fig. 14).

ANATOMY

The lateral approach provides a safe route for the arthroscope. The vital structures are away from the ac-





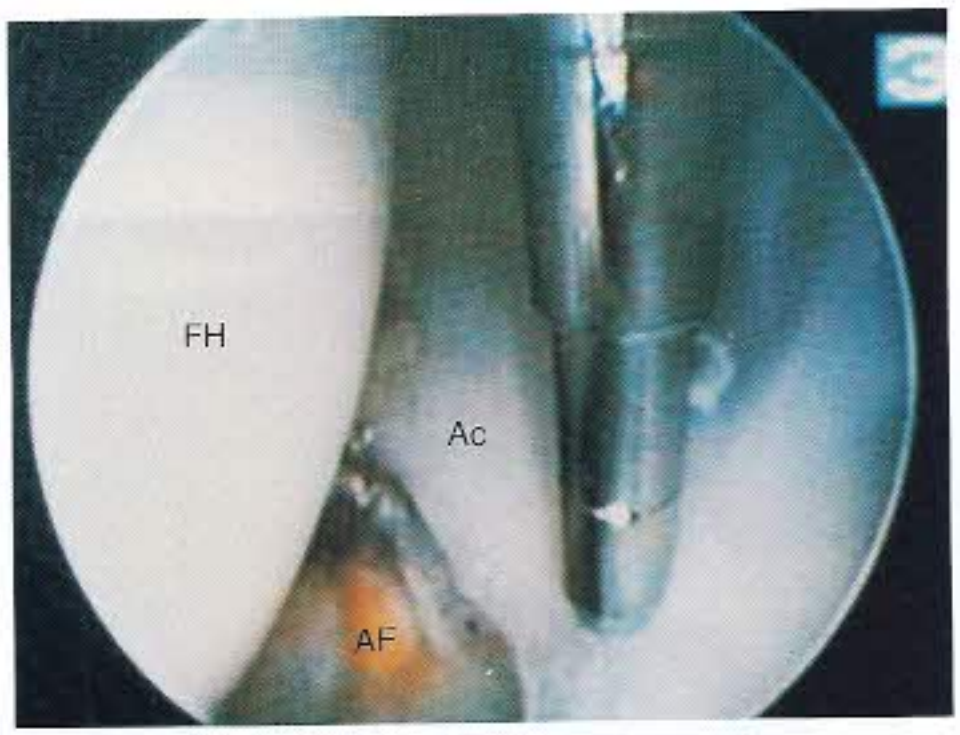


FIG. 11. Telescoping cannulas inserted in the hip joint. **A:** The telescoping cannulas as they appear in a portal adjacent to the arthroscope. **B:** The first sharp cannula inside the hip joint. **C:** The sharp cannula has been removed. The second cannula is touching the acetabulum. The third cannula is telescoped over the second cannula. FH, femoral head; Ac, acetabulum; AF, acetabular fossa; A, anterior; P, posterior. From Glick (10).

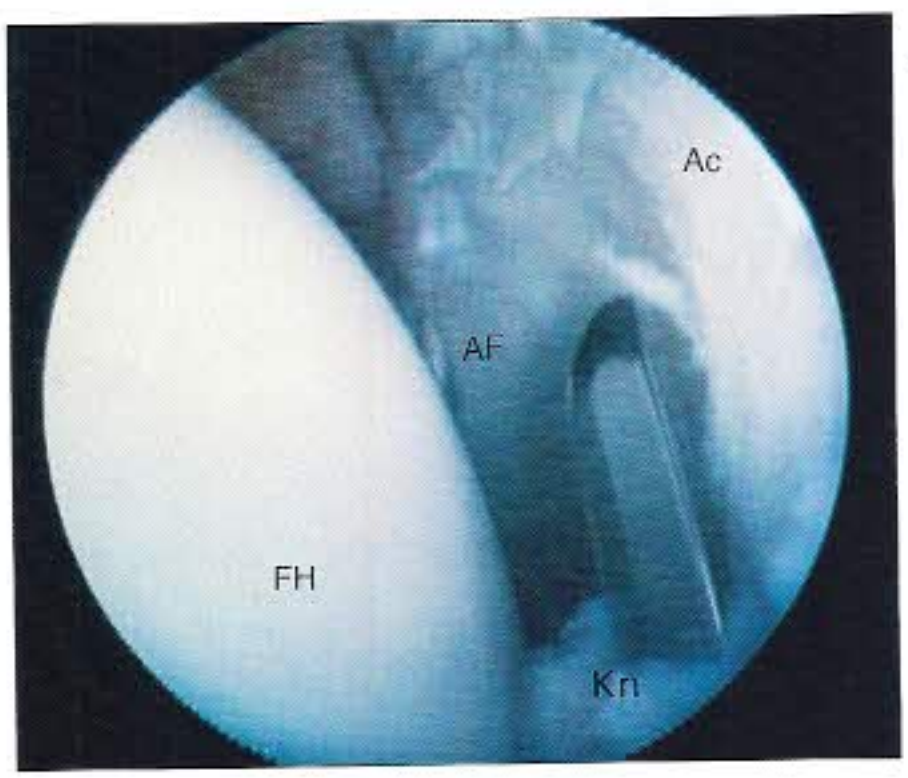


FIG. 12. Cutting and elongating the right hip capsule with an arthroscopic knife. The knife is in the portal over the anterior edge of the greater trochanter, and the arthroscope is viewing from the posterior portal. FH, femoral head; Ac, acetabulum; AF, acetabular fossa; Kn, knife blade; A, anterior; P, posterior.

tual insertion sites and are in jeopardy if the bony landmarks are not recognized (Fig. 9). The palpable bony landmarks are the greater trochanter and the anterior superior iliac spine. The deep bony landmarks are the neck and head of the femur and the acetabulum. These are palpated with the spinal needle and the trocar as the joint is approached. The instruments pass through the gluteus medius and minimus muscles as they are directed into the hip joint. A definite "give" on either side is felt as the capsule is pierced, and the instrument is stopped by the bony floor of the acetabulum. If bone is not struck, the joint has not been entered. If bone is struck before the capsule appears to be penetrated, the instrument is placed too superior, striking the outer wall of the acetabulum, or too inferior, hitting the head of the femur. The vital adjacent structures include the sciatic nerve posteriorly and the lateral femoral cutaneous nerve anteriorly. The femoral artery and nerve anteriorly and the superior gluteal nerve are far removed from the portals of entry (8), but their location should be kept in mind.

With the surgeon in the anterior position, the video

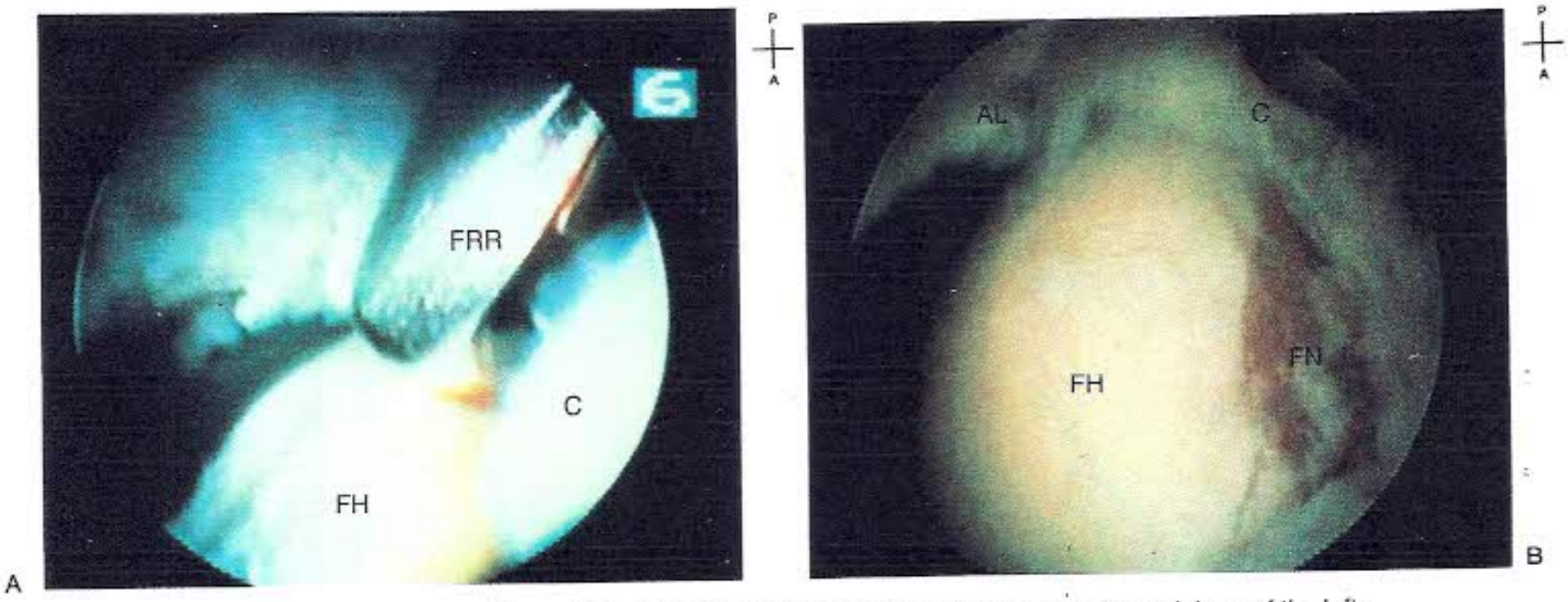


FIG. 13. Views of the periphery of the hip joint. **A**: Trimming the capsule around the periphery of the left hip with a motorized full radius resector inserted through the portal at the anterior edge of the greater trochanter. The arthroscope is viewing from the posterior portal. The traction has been reduced. **B**: View of the head-neck junction after the capsule was resected. FRR, full-radius resector; AL, acetabular labrum; FH, femoral head; FN, femoral neck; C, capsule; A, anterior; P, posterior. From Glick (11).

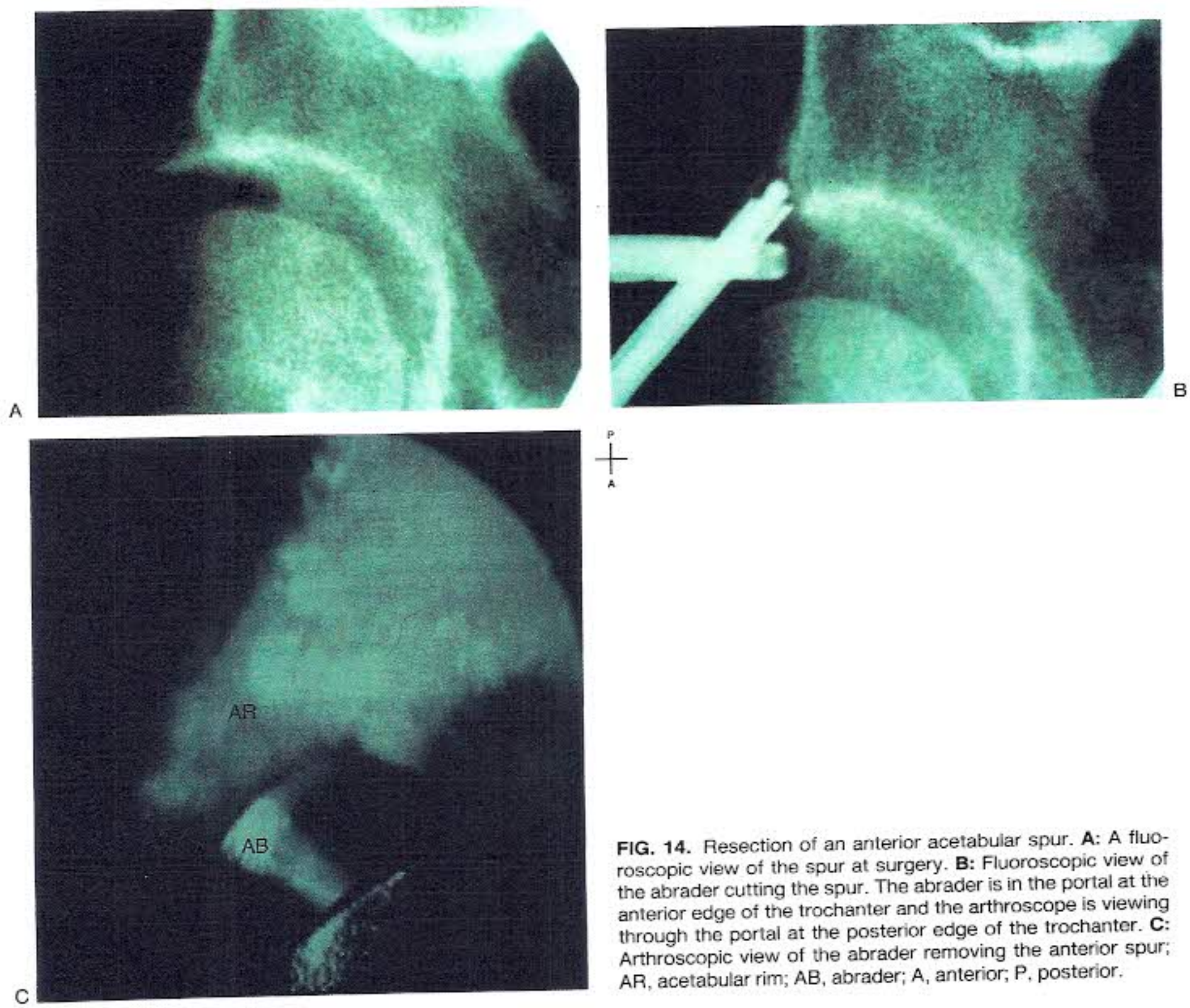


FIG. 14. Resection of an anterior acetabular spur. **A**: A fluoroscopic view of the spur at surgery. **B:** Fluoroscopic view of the abrader cutting the spur. The abrader is in the portal at the anterior edge of the trochanter and the arthroscope is viewing through the portal at the posterior edge of the trochanter. **C:** Arthroscopic view of the abrader removing the anterior spur; AR, acetabular rim; AB, abrader; A, anterior; P, posterior.

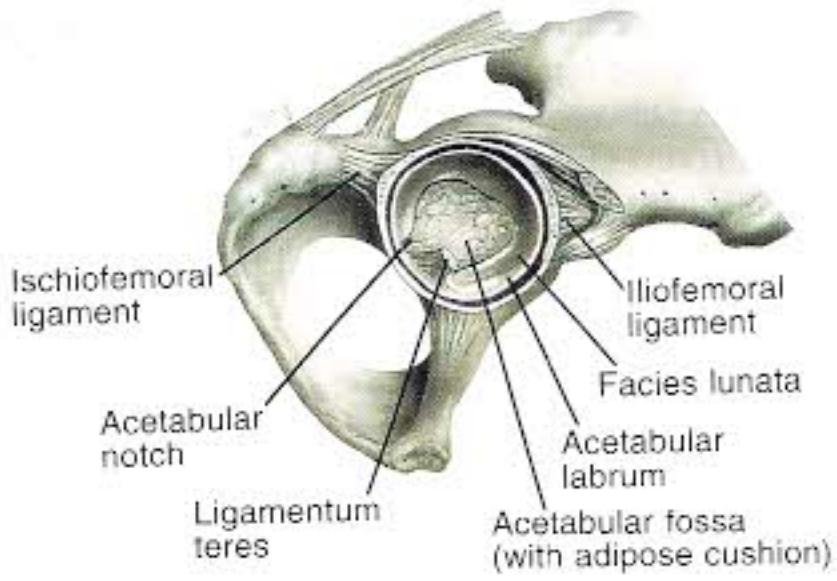


FIG. 15. Diagram of the right acetabulum. Note the increased thickness of the anterior hip capsule caused by the iliofemoral ligament. From Glick (10).

camera is oriented to provide the same image that the surgeon sees through the arthroscope. On the video screen, the head of the femur appears on the side opposite to that operated on. (For example, in the right hip the femoral head is on the left, and in the left hip the femoral head is on the right; anterior is down and posterior is up in both the right and left hips.) The entire acetabulum can be seen by the direct lateral approach. Figure 15 is a diagram of the acetabulum in relation to the arthroscope. The acetabular labrum is attached to the rim of the acetabulum and the transverse acetabular ligament at the site where the acetabular fossa opens inferiorly. Figure 16 is an arthroscopic view of a normal hip joint. Note the orientation and the position of the ligamentum teres. This structure is best seen with the arthroscope directed to the medial aspect of the joint. The capsular attachments define the joint and what can be seen with the arthroscope. Proximal, the capsule covers the labrum. Distally, it attaches to the intertrochanteric line on the anterior aspect of the neck and just proximal to the intertrochanteric crest on the posterior side of the neck. A greater portion of the femoral neck is visible anteriorly than posteriorly because of the way the capsule attaches. The folds in the capsule are formed by the thick overlying ligaments of the hip. The zona orbicularis is a ligament which forms a circular ring around the neck of the femur at the base of the head of the femur. Loose bodies frequently hide under this structure (Fig. 17).

Acetabular dysplasia is a developmental variation consisting of a shallow acetabulum. This condition predisposes the hip to degeneration. Occasionally, an individual with dysplasia will experience pain before arthritis occurs. Sometimes, the roentgenographic findings of dysplasia are subtle. The arthroscope is useful for verification. The major arthroscopic finding is an enlarged labrum. The ligamentum teres is also enlarged and is more prominent than in a normal hip (Fig. 18).

COMPLICATIONS AND PREVENTION

The complications attributable to this procedure are nerve traction palsy and scuffing of the joint surfaces (9). The vital neuromuscular structures, which include the sciatic nerve and the femoral nerve and artery, are a good distance from the portals. As long as the anatomic landmarks are observed, the vital structures can be avoided. A tensiometer on the hip distraction device is a significant help in preventing neuropraxia. Safe continuous traction should be in the range of 50 pounds and, like

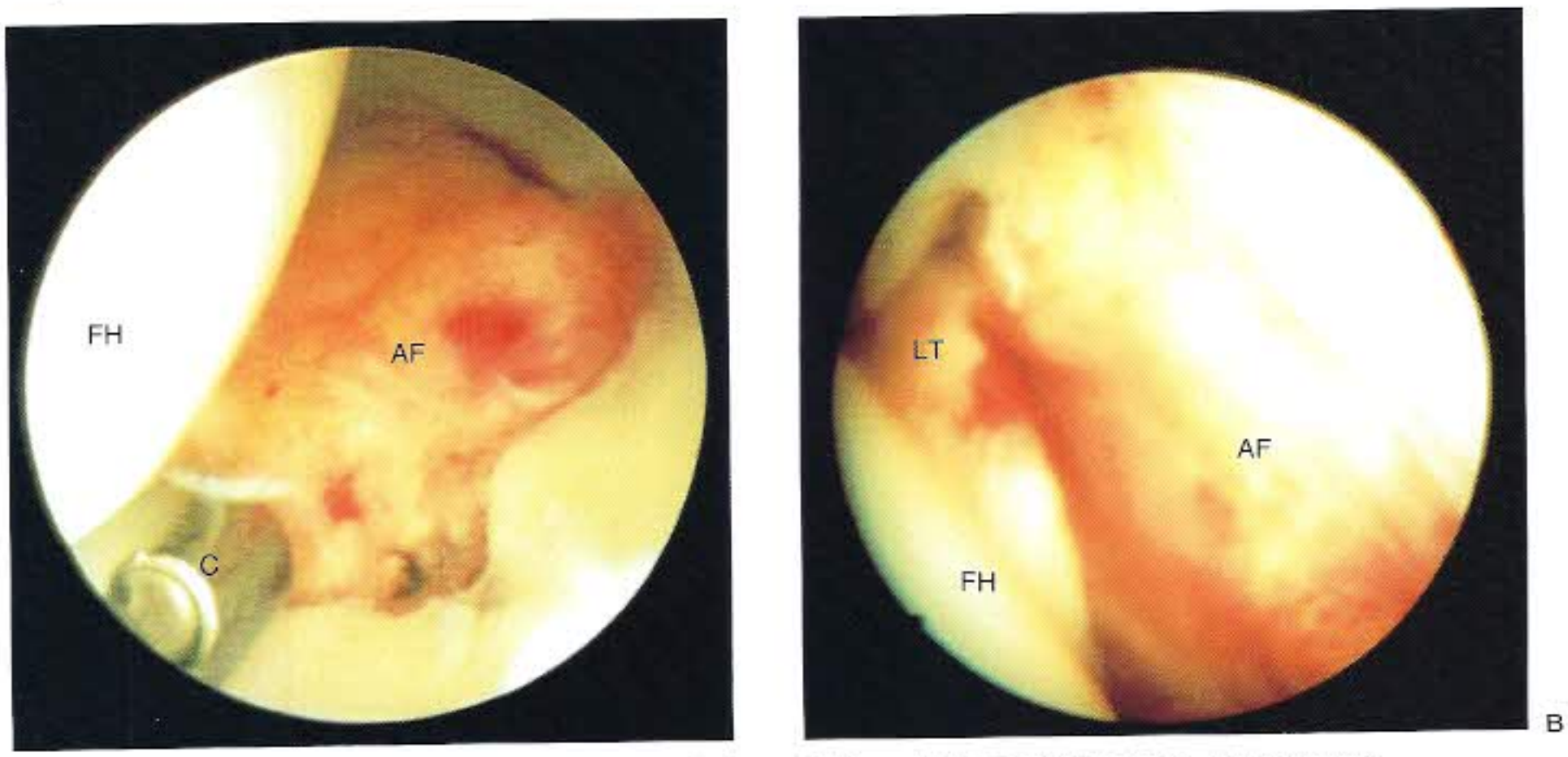


FIG. 16. The right hip joint. **A:** The acetabular fossa. **B:** Deep in the acetabular fossa. AF, acetabular fossa; FH, femoral head; C, cannula; LT, ligamentum teres; A, anterior; B, posterior.

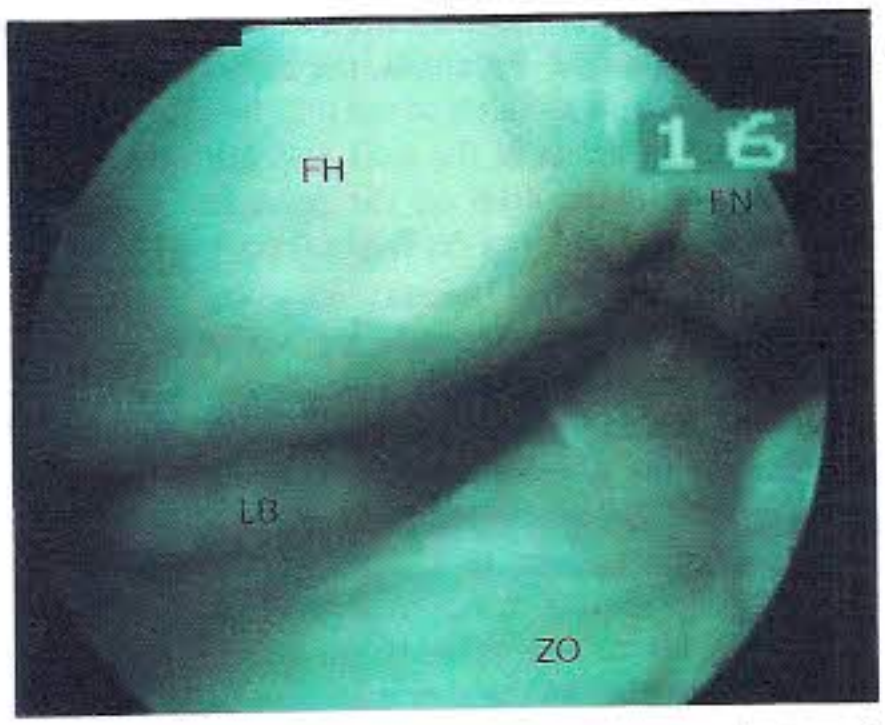
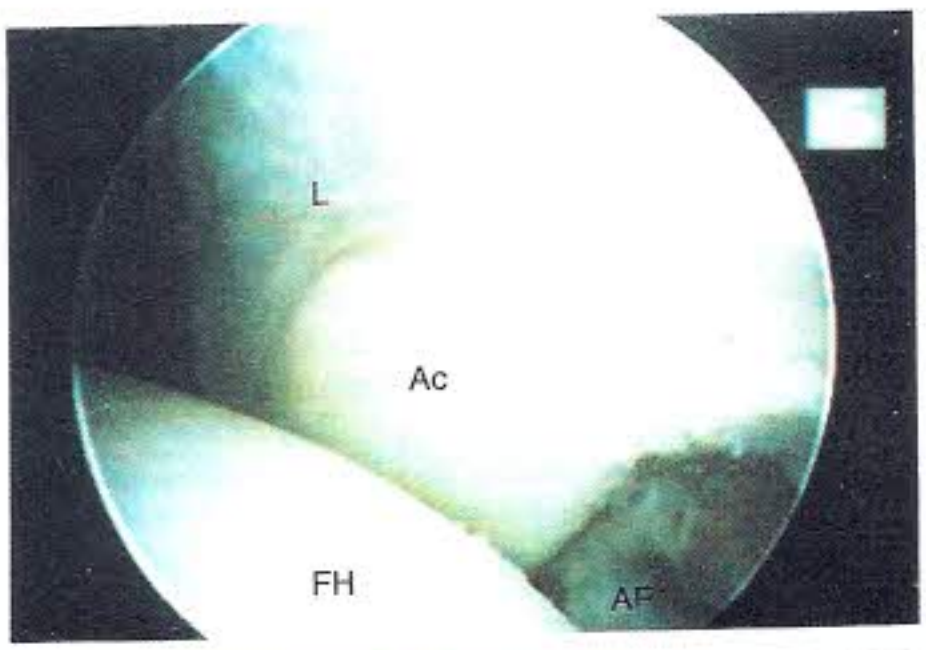


FIG. 17. Arthroscopic view of the zona orbicularis at the head-neck junction of a left hip. A loose body is entrapped under the anterior aspect of the femoral head. FH, femoral head; FN, femoral neck; ZO, zona orbicularis; LB, loose body; A, anterior; P, posterior.

a tourniquet, should be discontinued in 2 hr. Adequate distraction of the hip is important not only to visualize the confines between the femoral head and acetabulum but also to prevent scuffing. The arthroscope and the arthroscopic instruments can be easily brushed against the chondral surfaces, resulting in scuff marks if the hip is not distracted sufficiently. Adequate distraction should be at least 10 mm for ease of entrance. In our experience, instrument breakage occurred once, and the piece was removed arthroscopically. Infections and pressure necrosis of the foot and scrotum were not noted.

CONCLUSIONS

The benefits of hip arthroscopy are well established. The need for dislocating the hip to reach intraarticular pathology is avoided. The procedure produces little postoperative morbidity and can be performed on an outpatient basis. The prompt recovery from the operation is



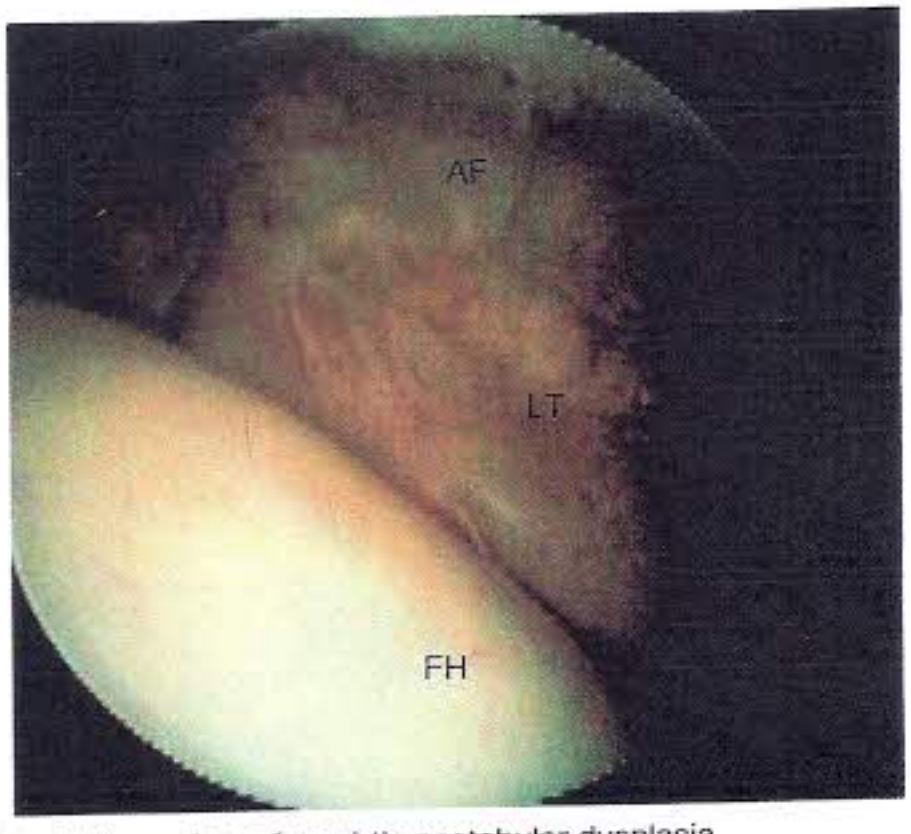


FIG. 18. Arthroscopic diagnosis of acetabular dysplasia. **A:** X-ray view of a subtle acetabular dysplasia of the right hip. **B:** Enlarged posterior labrum of the right hip. **C:** A comparison view of a left hip showing a normal size posterior labrum. A probe is placed at the edge of the labrum. **D:** Enlarged ligamentum teres. FH, femoral head; Ac, acetabulum; AF, acetabular fossa; L, labrum; C, capsule; LT, ligamentum teres; Pr, probe; A, anterior; P, posterior.

also beneficial, particularly for elderly patients. Distraction of the hip by traction is necessary. To accomplish this safely, special precautions are necessary. A tensiometer is required to determine the amount of traction applied. The foot piece and perineal post should be well-padded and adjustable. Safe continuous traction should be about 50 pounds. The traction time should be limited to 2 hr. Enough traction should be applied to distract the femur sufficiently out of the acetabulum, at least 10 mm.

Arthroscopy of the hip joint by the lateral approach is a valuable addition to the evaluation and treatment of hip disorders.

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