

Techniques in

Orthopaedics

*Hip
Arthroscopy*

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Complications of Hip Arthroscopy

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Summary: Hip arthroscopy has not been done routinely by most orthopedic surgeons. We have done 1,000 hip arthroscopies after more than 22 years after developing a safe "lateral approach." There have been 38 complications, most of which occurred in the early years of the development of a traction device. The majority of complications were transient neuropraxias and intra-abdominal fluid extravasation both related to unusually long procedures. Serious complications included severe scuffing of the articular cartilage, femoral neck fracture, and avascular necrosis. Our complication rate declined from 15% on the first 60 cases to 6.2% in the next 500 cases, and currently is 0.5% in the last 500 cases. Safe traction and experience has reduced the complication rate. **Key Words:** Hip arthroscopy—Complications—Safe traction.

Hip arthroscopy has been done routinely by orthopedic surgeons since the early 1980s. We developed a lateral approach to hip arthroscopy and first reported on it in 1987 in an effort to establish a safe and reproducible method for entering the hip joint with traction. Before this, hip arthroscopy was done in a supine position using standard traction tables or no traction at all, and getting into the hip joint was not always accomplished. The potential for complications were great since standard portals were not yet established, traction devices were not available, the intra-articular arthroscopic anatomy was not well understood and instruments were close to neurovascular structures.

Interest in hip arthroscopy has increased as it has been shown to benefit the painful nonarthritic hip. As there are only a few residency programs that teach hip arthroscopy, most learn it by fellowship training or at the Learning Center in Chicago. Industry has taken more interest in hip arthroscopy by providing instruments that are specific to the procedure such as the Glick Hip Set and the Smith and Nephew Hip Set as well as special hip distractors for traction.

The hip is difficult to arthroscope for the following

reasons: 1) the hip is deep and surrounded by dense structures such as muscle, tendon, fascia and adipose tissue; 2) the hip is an encapsulated ball and socket which makes maneuverability of instruments within its confines hard; 3) the hip capsule requires distraction forces to allow instruments into the articular portion of the joint; 4) special equipment is necessary such as longer scopes, longer and curved tools, distractors, tensiometers, and a fluoroscopic C-arm; 5) the set up time is lengthy for those who do it occasionally and the operating room usually is crowded with equipment and personnel.

Most of the complications associated with hip arthroscopy are a result of traction and fluid management, and are usually preventable. Fortunately, most are not serious and usually transient in nature with rare permanent damage.⁹

Among the pioneers in hip arthroscopy, many of the complications occurred early in their experience, and modifications to the technique such as the use of special distractors and monitoring with tensiometers have reduced the incidence of neuropraxias.⁶

In 1990, my associate, James M. Glick was one of the first to report on complications associated with hip arthroscopy on our first 60 cases. There were nine complications with an incidence of 15%, including 8 transient neuropraxias (4 sciatic, 4 pudendal) and 1 instrument breakage and an unrecorded number of articular cartilage scuffing because of inadequate distraction. We felt that better padding, positioning, and a specialized distractor device

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with a tensiometer would reduce the number of complications.⁵

In 1996, Funke and Munzinger reported on 3 complications in 19 cases including 4 transient neuropraxias of the pudental nerve, a hematoma of the labia majora, and acute abdominal pain during a procedure performed under spinal anesthesia. They cited insufficient padding of the peroneal post and poor positioning as the cause of the neuropraxias and the hematoma. Fluid extravasation into retroperitoneal space was thought to be the cause of the abdominal pain while under a regional anesthetic. It was their opinion that these problems would be avoidable in the future by attention to careful positioning and padding, careful monitoring of fluid pressure and fluid management, and the use of general anesthesia.⁴

In 1999, Griffin and Villar reported on their complications in 640 consecutive procedures with a complication rate of 1.6%.⁸ A supplemental report by Clark and Villar on the senior authors experience was done in 2003 on 1054 consecutive hip arthroscopies. Their 1.4% incidence of complications updated their previous study and included neuropraxias (3 sciatic, 1 femoral), 1 vaginal tear, 1 trochanteric bursitis, 2 portal bleeding, 2 portal hematomas, 2 instrument breakages, 2 arthrotomies, 1 deep infection, and 30 failures of adequate access or observation. They concluded that with only a few exceptions, most of the complications occurred in relation to joint traction or joint entry. They also felt on the most contentious issues related to iatrogenic chondral or labral damage whether seen or unseen, and its true frequency is unknown.²

We reported in 2001 on 34 complications on a combined experience of 530 consecutive cases done by myself and my associate (JMG). The overall complication rate was 6.4% of which 0.4%³ was considered significant and the rest transient.²⁷ The complications included 20 transient neuropraxias (10 peroneal; 4 pudental; 1 lateral femoral cutaneous; 1 femoral/sciatic; 4 sciatic), 9 fluid extravasations, 2 instrument breakages, 2 scuffings, and 1 avascular necrosis (AVN) of the femoral head. Most of the neuropraxias occurred during the early years while developing a hip distractor and there have been none in the last 10 years.⁹

Byrd found 20 complications (1.34%) in 1491 cases reviewed among several experienced surgeons and those reported in the literature.¹ Pudental nerve neuropraxias occurred the most (6 cases) followed by 4 cases of sciatic nerve neuropraxias. There was 1 femoral nerve involvement and 2 lateral femoral cutaneous nerves. In only 1 case was there permanent damage from a laceration of the lateral femoral cutaneous nerve. He also found 1 scrotal necrosis, 1 retrieved broken instrument, and 1

TABLE 1. Complications in 1000 Hips

| | |
|---------------------------------|-----------|
| Transient Neuropraxias | |
| Peroneal | 10 |
| Pudental | 4 |
| Lateral Femoral Cutaneous | 1 |
| Femoral / Sciatic | 1 |
| Sciatic | 4 |
| Total Neuropraxias | 20 |
| Fluid Extravasations | |
| Intra-abdominal | 10 |
| Instrument Breakage | 3 |
| Scuffing | 3 |
| Avascular Necrosis Femoral Head | 1 |
| Femoral Neck Fracture | 1 |
| Total | 38 |

case of heterotopic ossification. There also were 3 cases of intra-abdominal fluid extravasations requiring paracentesis.¹

MATERIALS AND METHODS

We have looked at all of our complications in 1,001 cases done since 1977 by myself and my associate (JMG), and have found 38 cases. Of those we felt 34 were transient and 4 were significant as outlined on Table 1. All except 11 patients were done in the lateral decubitus position. All hips were distracted with 1 of 3 devices of which 2 used electronic tensiometers. The indications for arthroscopy are well reported.^{7,10}

RESULTS

There were 20 transient nerve injuries in which 10 were peroneal and 4 pudental and 4 sciatic with one case both femoral and sciatic. The high number of peroneal neuropraxias could be related to the early developments and evolution of hip distractors for the lateral approach. All neuropraxias occurred from prolonged traction times (5–6 hours) on complex cases despite relieving the traction intermittently throughout the surgery.

The high numbers of fluid extravasation (10 cases) are because of longer operative times and extra-articular procedures such as iliopsoas tendon release in which the surgery is done with a pump. One case was done with higher pressure than 75 mm Hg. With the change to an outflow dependent pump extravasations have been nearly eliminated.

There were no infections, thrombophlebitis, lacerated nerves, nor deaths. We had neither scrotal or labial injuries from the peroneal post nor any foot injuries from the foot holder because of strict attention to using a padded perineal post diameter greater than 9 cm and a lot of padding around the foot.

TABLE 2. Classification of Complications Associated with Hip Arthroscopy

| Traction Injuries | Distraction Type |
|---------------------------------|--|
| | Neuropraxia |
| | Femoral nerve |
| | Sciatic nerve |
| | Lateral Femoral cutaneous nerve |
| | AVN-Femoral Head |
| | Compression Type |
| | Neuropraxia |
| | Pudental Nerve |
| | Scrotal Necrosis |
| | Labia Majora Hematoma |
| Inadequate traction injuries | Cartilage Scuffing (Gouging) |
| Fluid injuries | Labral Avulsion |
| | Extravasations |
| | Intra-abdominal Thigh |
| Infection | Deep Superficial |
| Instruments | Breakage |
| Avascular Necrosis Femoral Head | Disturbance medial femoral circumflex artery |
| Fracture | Femoral Neck from resection osteoplasty |
| Late | Heterotopic Ossification |

All neuropraxias were transient except for the 1 femoral/sciatic injury the numbness and weakness never exceeded more than 2 to 3 days. The patient with the femoral/sciatic nerve neuropraxia resolved in 1 week. He required 4 hours of operative time with traction up to 95 lbs done intermittently for the removal of loose bodies.

Three patients suffered significant scuffing of the femoral head because of inadequate distraction. To facilitate entry of the arthroscope and operative equipment the femoral head must be subluxed at least 1 cm or more.⁷ With tissue stiffness, previous trauma, or arthritis, it may be more difficult to decompress the seal of the joint and may require large forces to obtain adequate distraction. With inadequate distraction, the head of the femur is at great risk for gouging and the labrum is at risk for an iatrogenic peripheral tear or avulsion. Cutting the capsule will make entry easier in tight hips. Most hip arthroscopies will result in minor scuffing from needle placement and instrument maneuvering and shouldn't result in permanent damage.

The one patient who developed avascular necrosis of the femoral head was a 36 year old male who tore his labrum after slipping off a ladder at work. Seven months after a partial labrectomy and debridement for minor arthritis, a magnetic resonance image (MRI) revealed AVN. A core decompression was done. The initial hip arthroscopy was done within the safe parameters. It is speculated that his hip may have been at risk for AVN, however, the distraction and partial capsulectomy done to facilitate instrument mobility may have contributed to the event. One possibility may be that the lateral epiph-

yseal branch of the medial femoral circumflex artery was disturbed during the procedure.

Table 2 is a classification of complications of both reported and potential problems encountered during hip arthroscopy.

DISCUSSION

Most complications occurring in hip arthroscopy are related to traction whether from distraction or compression forces. Too much force for too long causes neuropraxias from stretching of the nerves or compression injuries to the perineum and pudental nerve. Traction is necessary to see the innermost depths of the articular surfaces and without it only the peripheral compartment anatomy may be visualized.²³ If done with good padding on the foot plate and in the perineum as well as a peroneal post greater than 9 cm in diameter, compression problems may be avoided. The careful attention to the amount of traction (<50 lbs) for less than 2 hours and releasing traction intermittently for prolonged cases will reduce the incidence of neuropraxias because of distraction. Injury to the Labia majora and scrotum are avoided by inspecting, repositioning away from the post and the use of adequate padding.

It is very important to understand the inherent laxity index of each patient to modify distraction forces during surgery. A dysplastic hip with a 4+ laxity index may require very little force for distraction after the suction seal of the hip is broken (<25 lbs). Too much force may result in hyper-elongation of the leg and neuropraxia of the nerves at risk.

Inadequate distraction may result in traumatic entry of instruments into the hip and scuff the cartilage surface or avulse the labrum. Careful attention to portal placement and feeling the tissue turgor or stiffness noting the difference between capsule and labrum with readjusting the spinal needle will diminish damage.

Extravasations of fluid into the abdominal space and thigh are predictable with prolonged cases, acetabular fractures, and extra-articular hip arthroscopic procedures as in iliopsoas release. Careful attention to the pump mechanics, pump pressure, and strict attention to the outflow will reduce this problem. If the pump is spinning and no fluid is flowing out, the fluid has to be going somewhere. Predictably it is filling up the thigh or going intrapelvic.

Instrument breakage is rare, however, the hip is at high risk for it because of the curvature encountered and the extra forces needed to get around corners to grasp loose bodies. Tools need to be maintained and inspected before

use. Care is needed to ensure detachable blades are tightened and checked.

Before our recent understanding of the importance the lateral epiphyseal branch of the medial circumflex artery had on the femoral blood supply, we thought the rare instance of AVN was because of capsular distention or traction. It is now clear that injury to this vessel may cause AVN, and care must be taken to avoid laceration either by capsular cutting or resection osteoplasty.

Femoral neck fracture after resection osteoplasty for femoroacetabular impingement is avoidable with weight bearing and activity precautions until the resection has healed. They are also instructed on fall prevention for 4 to 6 weeks.

There is no data to indicate DVT and Heterotopic ossification prophylaxis is useful or necessary. We often, however, use sequential compression devices and/or TED hose during surgery.

CONCLUSION

Complications associated with hip arthroscopy occur between 1.4% and 6.4%. Our complication rate in this latest review is 3.8% coming down from the high of 15% in our first 60 cases to 6.2% in the next series of 530 cases. Most of the complications were transient neuropraxias and fluid extravasations resulting in no permanent damage fortunately only 0.5% were considered

serious because of severe scuffing of 3 femoral heads, AVN and a femoral neck fracture. With the greater understanding of the etiology of the complications, the advice for prevention by experienced hip arthroscopists and advancements made on techniques and equipment, the incidence is declining.

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