

Complications of Hip Arthroscopy: Analysis of Seventy Three Cases

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Background: Hip arthroscopy is recognized as a highly effective means of treating joint disorders. Complications in hip arthroscopy, including neurovascular traction injury, compression injury to the perineum and scope trauma, have been reported. We report our experience with 73 hip arthroscopy procedures and complications at Chang Gung Memorial Hospital.

Methods: Seventy-two patients with 73 hips with severe hip pain were enrolled in this prospective study. The average age of the patients was 42 years (range, 22-61 years). The average follow-up period was 16 months (range, 12-36 months). Surgical indications for hip arthroscopy were labral tears (54 cases, 73.9%); painful dysplastic hips (7 cases, 9.5%); osteoarthritis (5 cases, 6.8%); synovitis (3 cases, 4.1%); ligament teres tears (2 cases, 2.8%); chondromatosis (1 case, 1.4%); and avascular necrosis of the femoral head (1 case, 1.4%). With the patient in the supine position with the involved leg in traction, 2 or 3 portals (anterior, anterolateral or posterolateral) were made. Intraoperative and postoperative arthroscopic complications were recorded and prospectively analyzed.

Results: The average operative time was 67 minutes (range, 30-190 minutes) and the average traction time was 58 minutes (range, 30-150 minutes). During surgery, 12 of 73 (16.4%) patients had mild scope trauma to the femoral head, which did not affect their excellent outcomes. Five (7%) patients had transient sciatic nerve neuropraxia and achieved complete recovery within 2 weeks after surgery.

Conclusion: No major complications of hip arthroscopy were noted in this series. The most frequent complication was mild scope trauma to the femoral head. With experience in the technique and good hip arthroscopic instrumentation, hip arthroscopy complications can be minimized. We suggest that hip arthroscopy is a safe technique, providing an additional valuable tool for hip surgery.

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Key words: complication, hip joint, arthroscopy.

Hip arthroscopy is considered a highly effective means of treating hip disorders.^(1,2) Burman first

developed the technique of hip arthroscopy in 1931,⁽³⁾ but not until the 1980s did it become widely

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accepted as an effective treatment modality. The usual indications of modern orthopaedic procedures are diagnostic, therapeutic, and therapeutic-assisted. With improved understanding of hip anatomy and safe use of well-known portals,^(2,4,5) arthroscopy has been established as a standard technique in hip surgery for children and adults.^(2,6-11) Table 1 presents a list of indications for arthroscopy combined with those identified by the authors of this study. The most significant advantage of this minimally invasive procedure complementing conventional open arthrotomy is that it avoids the need for hip dislocation.^(1,12,13)

Numerous complications of hip arthroscopy are associated with traction-related nerve injury, including neurovascular traction injury (pudendal, sciatic, femoral nerve or femoral artery).^(6,8,9,14) Reported complications in hip arthroscopy include compression injury to the perineum inducing soft tissue pressure necrosis⁽⁶⁾ and scope trauma.^(8,14) This study presents the experience at Chang Gung Memorial Hospital and complications in 73 cases, and discusses prevention of potential complications. This is the first large-series study describing the complications of hip arthroscopy in Taiwan.

METHODS

Between June 2002 and September 2004, 72 patients (73 hips) with severe hip pain were enrolled in this prospective study. Twenty-four patients were

Table 1. Surgical Indications for Hip Arthroscopy

- Undiagnosed hip pain
- Irrigation for bacterial infection of the joint (coxitis)
- Synovectomy (rheumatoid arthritis, chondromatosis)
- Removal of loose bodies
- Removal of foreign objects (cement after total hip replacement, etc)
- Assessment of pathology of the acetabular rim and labrum
- Impingement of the ligamentum capitis femoris
- Ruptured ligamentum teres
- Intraoperative control of osteotomy or epiphysiolysis
- Debridement of osteoarthritis
- AVNFH staging of the surface cartilage
- Painful THR with tight components
- Tumor excision such as osteoid osteoma
- Biopsy for suggested pathological condition

Abbreviations: AVNFH: avascular necrosis of the femoral head; THR: total hip replacement.

men and 48 were women (age range, 22-61 years; mean age, 43 years). Each patient provided informed written consent. This study was approved by the Medical Research Committee of Chang Gung Memorial Hospital. All patients had intraarticular hip pain of unknown etiology, raising the possibility of intraarticular pathology of the hip joint. Clinical signs and symptoms of an intraarticular process included pain with ambulation, a clicking sensation with hip range of motion, and pain with rotation of the hip in flexion. A physical examination was done with the patient in a supine position and the hip flexed at 90°. Pain was elicited with internal or external rotation of the hip. All patients had standard plain radiographs and magnetic resonance (MR) arthrograms. All patients had undergone failed conservative treatment prior to arthroscopy, including nonsteroidal anti-inflammatory therapy, physical therapy, and partial weight bearing with crutches. Surgical indications for hip arthroscopy in this study are listed in Table 2.

Hip arthroscopic procedure

Arthroscopy was performed with patients in a supine position as described by Byrd.^(7,9) Traction was applied to the operative extremity. Hip joint distraction was confirmed by fluoroscopic examination. During surgery, the hip joint was distended by traction with the patient in a supine position on the fracture table.^(7,9) C-arm fluoroscopy with sterilized drapes was positioned at 90° to the hip joint. All operations were performed under general anesthesia. The anterior and anterolateral (anterior trochanteric) portals were used as standard approaches. These have been adapted from Glick's description in 1987.⁽²⁾ In some cases, the posterolateral (posterior

Table 2. Surgical Indications for 73 Hips in this Study

Diagnosis	No. of patients (%)
Labral tear	54 (73.9)
Painful dysplastic hip	7 (9.5)
Minor advanced osteoarthritis with mechanical symptoms	5 (6.8)
Painful synovitis	3 (4.2)
Ligament teres tear	2 (2.8)
Chondromatosis	1 (1.4)
AVNFH Ficat Stage 2	1 (1.4)

Abbreviation: AVNFH: avascular necrosis of the femoral head.

trochanteric) portal was utilized to provide better visualization of the posterior aspect of the hip joint or improve access for instruments. The arthroscopy and arthroscopic instruments were introduced into the joint under fluoroscopic monitoring. Assessment of intra-articular structures was performed under direct arthroscopic control with an arthroscopic probe introduced through an accessory portal to accurately isolate and measure the lesion. All surgery was performed by the same surgeon (Y.S.C.). The operative traction time was recorded. Operative and postoperative complications were recorded and analyzed.

RESULTS

The average age of the patients was 43 years (range, 22-61 years). The average follow-up period was 16 months (range, 12-36 months). The average operative time was 67 minutes (range, 30-190 minutes) and the average time in traction was 59 minutes (range, 30-150 minutes). No major complications or complications related to portals were noted. Intraoperative and postoperative complications totalled 17 (Table 3). During surgery, 12 of the 73 (16.4%) patients had mild scope trauma to the femoral head. However, the labrum was not damaged during portal placement in any case. No posttraumatic osteoarthritis developed in any hips in this series. Early in this series, five (7%) patients developed transient sciatic nerve neuropraxia as a result of continuous traction during surgery. The average traction time in the five patients with traction injuries was 132 minutes (range, 110 to 150). These neuropraxias were characterized by decreased sensation in the dorsum of the feet, all of which resolved spontaneously within 2 weeks after surgery. This minor complication did not recur after we began using intermittent traction during surgery. However, no traction tensometer was available in the study and traction force data could not be analyzed.

DISCUSSION

Few papers in the English literature have reported on complications of hip arthroscopy.^(8,9,14,15) Table 4 lists the theoretical and recognized complications cited in the literature. Funke reported 3 complications in 19 hip arthroscopies (15.8%): 1 patient had

pubdental nerve neuropraxia for 3 weeks with full recovery; 1 had a hematoma at the labia majora; and 1 had acute-onset abdominal pain during surgery (regional anesthesia).⁽¹⁾ Villar had only 1 (2.5%) complication in 40 patients undergoing hip arthroscopy, a transient femoral nerve palsy that resolved postoperatively within 6 hours.⁽⁸⁾ Glick reported a complication rate of 3.1% with 8 cases of neuropraxia (4 pudental nerve, 4 sciatic nerve) and 1 case of instrument failure in a series of 290 patients.^(14,15) Byrd, in a series of 38 patients, reported 2 (5.2%) cases of transient pudental nerve neuropraxias.⁽⁹⁾ Other reports mentioned cases of dysesthesia of the lateral femoral cutaneous nerve resulting from an anterolateral approach.⁽⁶⁾

In this series, two complication types, scope trauma and nerve traction injury, were encountered. Twelve patients had mild scope trauma to the femoral head. The most common complication, likely underreported in the current literature, is scope trauma.⁽¹⁶⁾ The dense soft tissue envelops the hip, limiting instrument maneuverability, and the hip is tightly contained by the joint. The convex articular surface of the femoral head is particularly vulnerable to injury. This injury can occur during portal placement or subsequent instrumentation, and consequently, a very careful approach is required when performing operative hip arthroscopy. Damage to the labrum during portal placement is also a concern. This damage is most likely to occur when employing a cephalad position when penetrating the capsule in an attempt to avoid the articular surface of the femoral head. In the authors' experience, avoiding scope trauma is best achieved by a low approach under the labrum and then directing the scope upward or lifting up to stay off the articular surface of the femoral head. The safe range by joint distraction is 10-15 mm. After follow-ups of more than 2 years, our patients with scope trauma experienced significant pain relief compared to that experienced preoperatively. Radiographic images demonstrated no post-traumatic osteoarthritis related to scope trauma at the last follow-up.

Another common complication in this series was transient sciatic nerve neuropraxia, which occurred early in the series, when continuous traction was utilized during surgery. This neuropraxia resolved spontaneously within 2 weeks after surgery. Traction injury to neurovascular structures associated

Table 3. Data for 17 Patients with Complications from Hip Arthroscopy

Case (operation order)	Age (years)	Gender	Hip	Duration of pain (months)	Plain Radiography	Surgical indications	Operative traction time (minutes)	Follow-up period (months)	Complications	Clinical result of the complication
1	23	Male	R	12	Normal	Right anterosuperior labral tear	90	36	Femoral head chondral injury, 5x3x2 mm	Normal radiography at final follow-up
3	50	Female	R	2	Normal	Right anterosuperior labral tear	150	35	Transient sciatic nerve neuropraxia	Spontaneous recovery 14 days postoperatively
4	60	Male	R	12	Normal	Right anterosuperior labral tear	70	35	Femoral head chondral injury, 4x3x1 mm	Normal radiography at final follow-up
7	43	Female	R	18	Normal	Right anterosuperior labral tear	60	32	Femoral head chondral injury, 7x5x2 mm	Normal radiography at final follow-up
11	50	Female	R	24	Normal	Right anterosuperior labral tear	120	30	Transient sciatic nerve neuropraxia	Spontaneous recovery 9 days postoperatively
12	52	Female	R	12	Normal	Right anterosuperior labral tear	72	30	Femoral head chondral injury, 5x3x2 mm	Normal radiography at final follow-up
15	25	Female	R	24	Bilateral acetabular dysplasia	R't dysplastic hip with antero- superior labral tears	130	29	Transient sciatic nerve neuropraxia	Spontaneous recovery 7 days postoperatively
17	48	Male	R	15	Normal	Right anterosuperior labral tear	70	28	Femoral head chondral injury, 4x3x1 mm	Normal radiography at final follow-up
18	20	Female	L	48	Normal	Left anterosuperior labral tear	55	28	Femoral head chondral injury, 2x3x1 mm	Normal radiography at final follow-up
21	41	Female	R	6	Normal	Right anterosuperior labral tear	140	27	Transient sciatic nerve neuropraxia	Spontaneous recovery 12 days postoperatively
24	22	Male	L	6	Normal	Left anterosuperior labral tear	100	26	Femoral head chondral injury, 5x3x2 mm	Normal radiography at final follow-up
26	40	Female	R	4	Normal	Right anterosuperior labral tear	75	26	Femoral head chondral injury, 3x3x2 mm	Normal radiography at final follow-up
27	42	Female	L	3	Normal	Left anterosuperior labral tear	55	26	Femoral head chondral injury, 5x2x2 mm	Normal radiography at final follow-up
29	61	Female	R	3	Normal	Right anterosuperior labral tear	110	25	Transient sciatic nerve neuropraxia	Spontaneous recovery 14 days postoperatively
31	41	Male	R	5	Normal	Right anterosuperior labral tear	80	25	Femoral head chondral injury, 2x2x1 mm	Normal radiography at final follow-up
33	61	Male	R	9	Normal	Right anterosuperior labral tear	65	24	Femoral head chondral injury, 3x3x1 mm	Normal radiography at final follow-up
34	32	Female	L	3	Normal	Right ligament teres rupture with synovitis	80	24	Femoral head chondral injury, 5x2x2 mm	Normal radiography at final follow-up

Table 4. Potential Complications of Hip Arthroscopy (Reference)

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- Neurovascular traction injury (9,14,16)
 - Direct trauma to neurovascular structures (8,16,18)
 - Compression injury to the perineum (6,9,14,16)
 - Traction fixation device injury (16)
 - Fluid extravasation (14,16)
 - Scope trauma (1,14,16)
 - Instrument breakage (15,19)
 - Vascular insult to the femoral head (20)
 - Heterotopic ossification (16)
 - Infection (18,21)
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with distraction of the hip joint is of theoretical concern.⁽¹⁶⁾ Notably, Glick, who reported cases of transient neuropraxia of the sciatic nerve, felt it resulted from traction.^(14,15) Brumback et al., in reviewing their series of 106 patients, proposed that this complication was caused by high traction forces.⁽¹⁷⁾ They noted that high distraction forces (> 50 kgw) were safe when applied for short periods only, whereas application for long periods (> 1 hour with > 73.3 kgw force) led to nerve palsy. In our series the average traction time in the five patients with transient sciatic nerve neuropraxia was 132 minutes (range, 110 to 150). This seemed compatible with the findings from Brumback et al.⁽¹⁷⁾ Funke and Munzinger reported their experience using 10-15 mm distraction of the joint space with a mean distraction force of 15-30 kgw.⁽¹⁾ However, the required force in some cases may reach 50 kgw. Byrd demonstrated his clinical experience using typically about 50 pounds for traction force.⁽¹⁶⁾ More force may be necessary for a tight joint. Glick reported the ideal amount of traction is less than 75 pounds when using a lateral approach.⁽²⁾ In our study, we shifted the continuous traction protocol to an intermittent traction protocol. After preparing and draping the fracture table, a gentle force was applied to distract the leg until the joint space was enlarged to 1.5 times that of the original joint space under an image intensifier. Continuous traction was applied for 30 minutes and then was released for 10 minutes following another traction course. This traction procedure was used in the last 40 hip arthroscopic surgeries, and there was no any traction injury among these patients.

Most complications in this study occurred early in the developmental phase of this series as the world's leading pioneers to set up the model of hip

arthroscopy.^(1-3,6-9,14) This reflects the learning curve in the developmental phase of hip arthroscopy. After further experience with hip arthroscopy in the supine position (35 patients by June 2003) in our study, no complications occurred. Previously, reports of complications were infrequent, but not insignificant. In this series, no major complications of hip arthroscopy occurred.

We propose that the following recommendations to prevent complications of hip arthroscopy:

- The patient must be correctly positioned and padded.
- The distraction force should be minimal, using only that required to maintain sufficient space to maneuver instruments.
- The traction time should be as short as possible. Experience in our series suggests that intermittent traction (traction for 30 minutes and release for 10 minutes) is superior to continuous traction.
- Surgeons must have an excellent understanding of patient anatomy and choose the safest approaches for portal insertion.
- Indications and contraindications for hip arthroscopy should be noted. Severe osteoarthritis, large osteophytes surrounding the hip joint, arthrofibrosis, and a history of multiple open hip surgeries are contraindications.
- A detailed understanding of the entire procedure and its limits before the surgery are critical to minimizing complications.

With experience in the arthroscopic procedure and good hip instrumentation, complications in hip arthroscopy can be effectively minimized. We suggest that hip arthroscopy is a safe technique, providing an additional valuable tool for hip surgery.

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髖關節鏡手術之併發症：七十三病例分析

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背景：關節鏡手術被認為在治療髖關節疾病上是有其價值的，但是也會造成各種不同的併發症。本研究目的為分析髖關節鏡手術的併發症，進而了解該如何避免併發症產生。

方法：72 位患者，施行 73 處髖關節鏡手術，包括各種不同引起髖關節疼痛的原因。我們檢閱進行手術時的錄影、照相及術後追蹤病歷，來紀錄及分析術中和術後的併發症。

結果：平均手術時間為 67 分鐘，而平均牽引時間為 58 分鐘。術中僅有 12 例 (16.4%) 是關節鏡器械對股骨頭造成些微創傷，5 例 (7%) 術後引起暫時性坐骨神經麻木，但是術後兩週內都完全恢復。

結論：在本院的 73 病例中，並沒有發生所謂嚴重的併發症。髖關節鏡手術是一種安全的微創治療方式，經由純熟的技術以及精密的儀器使用，可以明顯地降低發生併發症的機率。

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關鍵字：併發症，髖關節，關節鏡。

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