

## Synovial Chondromatosis of the Hip: Management with Arthroscope-Assisted Synovectomy and Removal of Loose Bodies: Report of Two Cases

Chun-Yang Chen, MD; Alvin Chao-Yu Chen, MD; Yu-Han Chang, MD;  
Tsai-Sheng Fu, MD; Mel S. Lee, MD, PhD

Primary synovial chondromatosis is an uncommon disorder, and involvement of the hip joint is rare. The clinical symptoms are usually non-specific, and a clinical diagnosis of synovial chondromatosis of the hip may be difficult and delayed, especially before the ossifying nodules become evident. Loose bodies in the joint can cause secondary degenerative osteoarthritis of the hip. Currently, the recommended management is surgical removal of the loose bodies and a synovectomy without dislocation of the hip joint. Herein we report on 2 cases of synovial chondromatosis of the hip, which were managed with an arthroscope-assisted synovectomy and removal of the loose bodies. We believe this is an easy and safe method for management of this disorder. (*Chang Gung Med J* 2003;26:208-14)

**Key words:** synovial chondromatosis, hip joint, arthroscope-assisted surgery.

Synovial chondromatosis is a rare disorder in which multiple cartilaginous nodules appear in the synovium and subsynovial connective tissue. This disease is believed to be a benign metaplasia of the synovial membrane with the formation of chondral foci.<sup>(1,2)</sup> The growing nodules in the synovial membrane may become detached and enlarged, due to nourishment by synovial fluid. It can occur in any joint but usually involves large joints, such as the knee. Extra-articular involvement is rare. These nodules may calcify or ossify and occasionally appear as radiopaque loose bodies around the joint on plain radiography.

Primary synovial chondromatosis of the hip joint is rare, and the optimal treatment is still controversial.<sup>(1)</sup> Removal of the loose bodies only, a radical synovectomy, an open synovectomy with removal of the loose bodies, and an arthroscopic synovectomy

with removal of the loose bodies have been reported.<sup>(1,3-5)</sup> Hip arthroscopy has been advocated for the treatment of synovial chondromatosis.<sup>(4)</sup> However, it is a technically demanding procedure with potential complications such as neurovascular injury or iatrogenic damage to the labrum or cartilage. Herein we present 2 cases of primary synovial chondromatosis of the hip treated by a modified method using an arthroscope-assisted surgical technique.

### CASE REPORTS

#### Case 1

A 43-year-old man complained of intermittent left groin pain for years. There was no antecedent trauma history. On examination, he had a left coxalgic limp. The range of motion of the left hip was limited on flexion, abduction, and rotation as deter-

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From the Department of Orthopedic Surgery, Chang Gung Memorial Hospital, Taipei.

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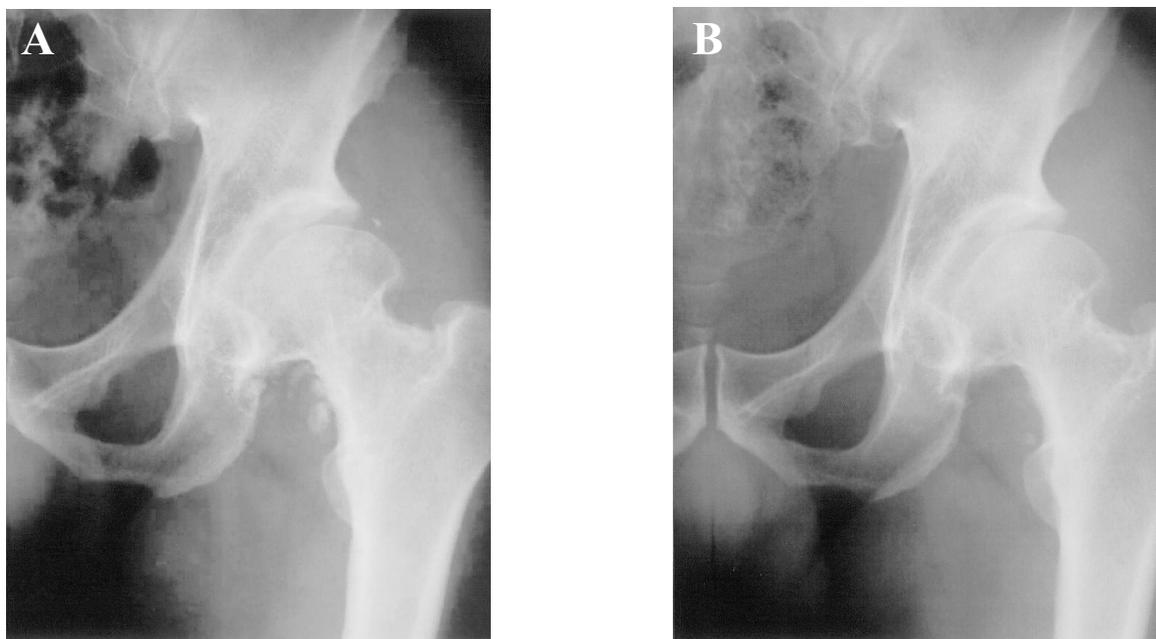
Address for reprints: Dr. Mel S. Lee, Department of Orthopedic Surgery, Chang Gung Memorial Hospital, 5, Fushing Street, Gueishan Shiang, Taoyuan, Taiwan 333, R.O.C. Tel.: 886-3-3281200 ext. 2420; Fax: 886-3-3278113

mined by the positive flexion-abduction/external rotation-extension test. Neither thigh muscle atrophy nor leg length discrepancy was found. Plain radiographs showed multiple radiopaque bodies around the left hip (Fig. 1A). Under the impression of synovial chondromatosis, surgical intervention was suggested. The operation was performed with the patient in a supine position on the operating table. An anterior approach through the intermuscular plane of the sartorius and tensor fascia lata was used, which deepened to the anterior capsule. A small anterior capsulotomy incision about 1.5 cm long was created. The femoral head was not dislocated.

At the time of the operation, numerous loose bodies were removed by arthroscopic manipulation. A synovectomy was done using a shaver blade and thermocoagulation. Following an adequate synovectomy and removal of the loose bodies, the wound was irrigated and closed after inserting a drainage tube. Microscopic examination revealed foci of chondrocytic formation in the synovial tissue with proliferating synovium. The postoperative course was uneventful, and groin pain was not noted at the 1-year follow-up examination (Fig. 1B).

### Case 2

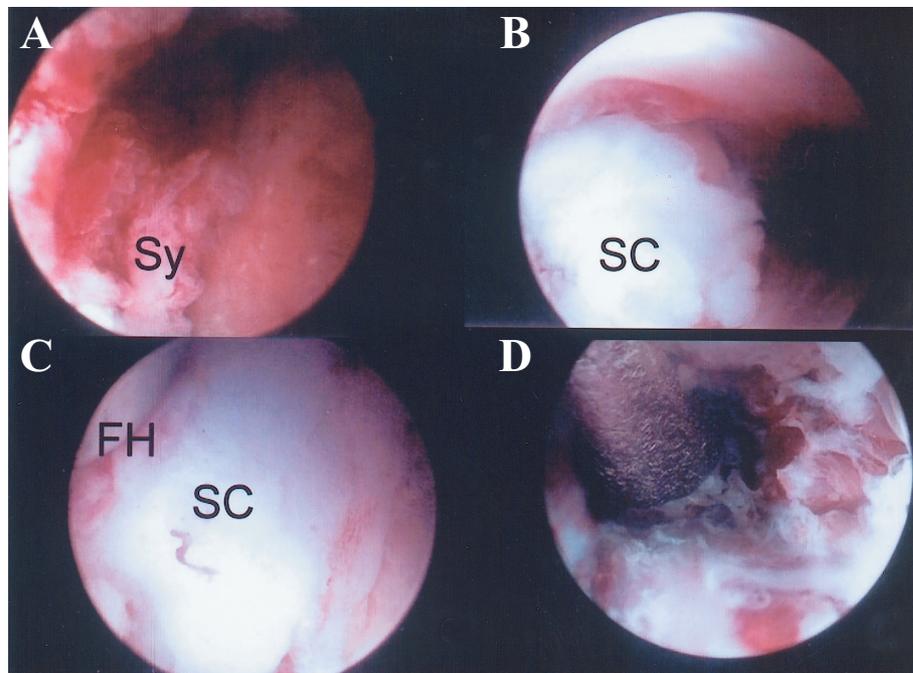
A 60-year-old man had suffered from right hip pain with limping gait for 2 years. No previous trauma history was noted. He had visited many hospitals for help, but no diagnosis had been reached. Due to exacerbated right hip pain with limited range of motion, he was referred to our hospital for help. Upon examination, atrophy of the right thigh muscle with restricted range of motion over the right hip was found. Flexion-extension was limited to 70-10°, abduction-adduction to 20-10°, and internal rotation-external rotation to 0-30°. He walked with marked pelvic obliquity to the right. Due to the ambiguous plain radiographic findings and significant clinical signs (Fig. 2A), magnetic resonance imaging was arranged to rule out soft tissue problems. The radiologic report suggested synovial hyperplasia over the right hip. However, an intra-articular lesion near the incisura acetabuli of the right hip was found (Fig. 2B). Under the impression of synovial chondromatosis or other intra-articular pathology, arthroscopy-assisted tumor excision with a synovectomy was done via an anterior approach. Synovial hypertrophy with a 2.5×1.0-cm-sized cartilaginous nodule was found during the operation (Fig. 3). A synovectomy



**Fig. 1** Case 1, stage III synovial chondromatosis. (A) Radiograph of the left hip demonstrating multiple calcified nodules in the hip joint, especially in the medial joint space. (B) Follow-up radiograph of the left hip (1 year after surgery).



**Fig. 2** Case 2. (A) Persistent right hip pain with no radiopaque lesions. However, rarefaction of the right hemipelvis with obliquity to the right was evident on a plain radiograph. (B) Magnetic resonance imaging of the right hip showing an intra-articular mass near the incisura acetabuli (arrows).



**Fig. 3** Arthroscopic findings in case 2. (A) Synovial hypertrophy (Sy) and synovitis. (B, C) Synovial chondromatosis (SC) occupying the joint space between the femoral head (FH) and acetabulum which was removed. (D) A synovectomy could be easily performed with the aid of arthroscopic instruments.

tomy was performed using a shaver blade. The pathologic examination confirmed the diagnosis of synovial chondromatosis. He felt no more discom-

fort over the right hip postoperatively and could walk with a level pelvis 9 months after surgery.

## DISCUSSION

Synovial chondromatosis or osteochondromatosis (when ossification is present), also called Reichel's syndrome, was first described by Reichel in 1900.<sup>(3)</sup> The etiology of this disorder is still unclear. Various theories such as reactivation of residual embryonal cells, traumatic initiation, or benign neoplastic disease have been advocated.<sup>(6)</sup> The generally accepted pathogenesis of the submesothelial foci of cartilaginous bodies is that they are formed by metaplasia of pluripotential cells in the synovial membrane.<sup>(7)</sup> These nodules can ossify by endochondral bone formation and attach to the synovium by a thin vascular pedicle. They may break free and become loose bodies in the joint space, and if nourished by synovial fluid, they can continue to proliferate. A recent study showed the presence of transforming growth factor-beta (TGF) and tenascin (TN) in synovial chondromatosis,<sup>(8)</sup> TGF increased the differentiation of mesenchymal cells, the production of proteoglycans, the replication of chondroblasts, and the stimulation of extracellular matrix protein production. TN is important for chondrogenesis and transformation of cartilage into bone in the extracellular matrix. Another study revealed that fibroblast growth factor receptor 3 (FGFR 3), a specific marker of mesenchymal precartilaginous stem cells, was expressed in primary synovial chondromatosis, and that elevated levels of fibroblast growth factor 9 (FGF 9), a specific ligand of FGFR 3, had been found in synovial fluids of synovial chondromatosis.<sup>(9)</sup> These are absent from normal synovium and cartilage and may explain the pathogenesis of synovial chondromatosis.

Primary synovial chondromatosis should be differentiated from cartilaginous loose bodies that are secondary to other joint diseases such as degenerative arthritis. In an immunohistochemical study of growth potential,<sup>(10)</sup> loose bodies in primary synovial chondromatosis showed plump chondrocytes and irregular calcification, and all contained proliferative cell nuclear antigen (PCNA)-positive chondrocytes. Loose bodies in secondary synovial chondromatosis showed uniform chondrocytes and annular calcification surrounding the core tissue. Only half of them showed PCNA-positive chondrocytes peripherally.

Three phases have been described for this dis-

ease.<sup>(11)</sup> In the first active phase, the disease is limited to the synovium without loose body formation; in the second transitional phase, there are both loose bodies and intrasynovial lesions; and in the third quiescent phase, there are only free loose bodies without the active intrasynovial process. The disease is most commonly seen in the 3rd to 5th decades, and there is a predominance of men to women in a ratio of about 2:1.<sup>(6)</sup> The most common joint involved is the knee, but the elbow, hip, shoulder, ankle, temporomandibular joints, and other small joints have also been described. Extra-articular involvement (bursa or tendon sheath) is extremely rare.

Synovial chondromatosis of the hip is uncommon. Mussey and Henderson found only 5 cases involving hips in their 105-case series.<sup>(12)</sup> Maurice et al. reported that 2 of 53 cases of synovial chondromatosis were in the hips.<sup>(13)</sup> Clinical symptoms are non-specific, and a clinical diagnosis of synovial chondromatosis of the hip is difficult; it may be delayed as in case 2. Pain, stiffness, limited motion, clicking, locking, or limping from the affected hip may be present. If this disorder is untreated or not recognized early, late complications such as secondary degenerative osteoarthritis, capsular constriction, subluxation of the hip, or pathologic femoral neck fracture may follow.<sup>(7,14)</sup>

Plain radiographs in the early stages are usually negative until the osseous bodies become evident in the joint. In 1/3 of cases, no radiopacity appears, although osseous particles exist. Other imaging modalities, including arthrography, ultrasound, computed tomography, or magnetic resonance imaging may demonstrate this disorder better.

Malignant transformation of synovial chondromatosis into a chondrosarcoma is unusual and has been reported only sporadically.<sup>(15,16)</sup> One clinicopathologic review of 53 cases of primary synovial chondromatosis covering a period of 30 years showed malignant change in 3 patients, representing a relative risk of 5%.<sup>(17)</sup> A cell proliferative activity study concluded that primary synovial chondromatosis appeared to occupy a position which is intermediate between benign enchondroma and malignant chondrosarcoma,<sup>(18)</sup> which may explain the occasionally aggressive clinical behavior. Clinical features are not helpful in differentiating these 2 entities. However, sudden clinical deterioration in long-stand-

ing cases, bony destruction by imaging study, or cases with recurrent synovial chondromatosis should alert the clinician to the possibility of malignant transformation.<sup>(16)</sup>

Because various recurrence rates from 0% to 15% have been reported, the optimal treatment for primary synovial chondromatosis of the hip is still controversial. Based on the pathogenesis of primary synovial chondromatosis and 1 study which revealed that a synovectomy had a significantly lower recurrence rate,<sup>(19)</sup> the recommended management is surgical removal of the loose bodies combined with a partial or complete synovectomy in most cases.<sup>(1,3,4,6)</sup> Complete removal is only possible with dislocation of the hip joint, but a synovectomy combined with dislocation of the femoral head may result in avascular necrosis of the femoral head. Therefore dislocation of the hip joint is now considered obsolete.<sup>(3)</sup>

With advances in arthroscopic surgeries, an arthroscopic operation of the hip joint with synovial chondromatosis can be a reliable procedure. But to most surgeons, hip arthroscopy may be a technically difficult procedure to perform because of the deep-seated location, relatively limited hip joint space, and few indications or infrequent opportunities to perform this procedure. To overcome these problems, we used traditional approaches to the hip joint and introduced the arthroscopic instruments through a small anterior capsulotomy incision without hip dislocation. This provides an easy and safe method for arthroscopic access to the hip joint. The procedure also decreases the complications of hip arthroscopy such as neurovascular trauma during traction or portal placement, and iatrogenic damage to the articular cartilage and acetabular labrum when introducing instruments.<sup>(20)</sup>

In conclusion, an arthroscope-assisted synovectomy with removal of the loose bodies has the following advantages over a traditional hip arthrotomy or arthroscopic hip surgery. (1) It can be easily performed by most orthopedic surgeons and is not as technically demanding as arthroscopic surgery. (2) It is performed without dislocation of the hip, which can prevent such serious complications as osteonecrosis of the femoral head. (3) Under magnification of the video system, a synovectomy can be done properly with arthroscopic instruments. In spite of the limited follow-up period of these 2 cases, we believe that this method may provide the benefits

of both arthroscopic and open procedures and may minimize complications for proper management of this disorder.

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## 以關節鏡輔助手術治療腕部滑膜軟骨瘤增生症：二例報告

陳俊仰 陳昭宇 張毓翰 傅再生 李炫昇

原發性滑膜軟骨瘤增生症是一種少見的疾病，尤其是發生在腕部更是罕見。臨床上由於無特定的症狀，因此要診斷腕部的滑膜軟骨瘤增生症通常有困難且常常會被延遲，特別是在鈣化的結節出現之前。而這些關節內游離的結節若未處理，久而久之可能會導致腕部的退化性關節病變。現今較被接受的治療方式是在腕關節不脫位的情況下手術移除關節內游離的結節及合併滑膜切除。本文報告兩例以關節鏡輔助手術去移除關節內游離結節及合併滑膜切除，用來治療腕部滑膜軟骨瘤增生症。我們相信這是一個簡單且安全的方法用於治療這類的病患。(長庚醫誌 2003;26:208-14)

**關鍵字：**滑膜軟骨瘤增生症，腕關節，關節鏡輔助手術。

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長庚紀念醫院 台北院區 骨科

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索取抽印本處：李炫昇醫師，長庚紀念醫院 骨科。桃園縣333龜山鄉復興街5號。Tel.: (03)3281200轉2420; Fax: (03)3278113