

Surgical treatment of synovial osteochondromatosis of the hip using a modified-Hardinge approach with a Z-shaped capsular incision

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Abstract

Synovial osteochondromatosis of the hip is a rare condition, and the surgical treatment approach for this condition requires complete removal of loose bodies combined with synovectomy. While these procedures are generally accepted as the optimal treatment method, this is still controversial topic. Recent studies have reported that open surgical procedures remain acceptable for synovial osteochondromatosis of the hip. These procedures include the dislocation of the femoral head, and complications such as femoral head necrosis and bursitis or great trochanter non-union due to trochanteric osteotomy have been reported. The present study reports a modified technique for surgical dislocation through a Z-shaped capsular incision without trochanteric flip osteotomy for the treatment of synovial osteochondromatosis of the hip.

Introduction

Synovial osteochondromatosis is a rare and benign proliferative disorder of the synovial lining. Though the etiology is unclear, the cells of the synovial lining are thought to undergo metaplasia forming cartilaginous and osteo-cartilaginous bodies in the capsule including the retinacula layer.^{1,2} Synovial osteochondromatosis of the hip can lead to degenerative osteoarthritis of the hip and late complications such as secondary hip subluxation or pathological fracture of the femoral neck may follow.³ The goal of the treatment for synovial osteochondromatosis is to prevent recurrence and to delay progression of the secondary osteoarthritis. Therefore, a surgical treatment approach for this condition requires complete removal of loose bodies combined with synovectomy, and these procedures are generally accepted as the optimal treatment.³

The optimal treatment of synovial osteochon-

dromatosis of the hip is controversial topic. Treatment can be performed through an open or an arthroscopic surgical approach, recent studies have described the advantages of the arthroscopic procedure, which include a shorter rehabilitation period and fewer major complications.^{4,5} However, management of the arthroscopic procedure for synovial osteochondromatosis of the hip is particularly difficult.^{3,6,7} Some of the loose bodies have shown too large of a diameter, which makes total arthroscopic removal difficult. Additionally, even modern arthroscopic techniques cannot adequately observe all pathologic lesions such as posteroinferior lesions in the acetabulum or extra-articular lesions. On the other hand, open surgical procedures remain acceptable for synovial osteochondromatosis of the hip. A surgical procedure with dislocation of the femoral head can allow full exposure of the acetabulum and femoral head, but it is infrequently performed, because there is little information on how to avoid avascular osteonecrosis of the femoral head. Ganz recently developed a surgical dislocation technique through a posterior approach with trochanteric flip osteotomy to avoid femoral head necrosis and applied this to the treatment of synovial osteochondromatosis of the hip.⁷ However, the surgical dislocation with trochanteric flip osteotomy had complications related to the greater trochanter such as failure to achieve union. The current study presents a modified technique for the surgical dislocation through a Z-shaped capsular incision without trochanteric flip osteotomy for the treatment of synovial osteochondromatosis of the hip.

Materials and Methods

We reviewed five patients diagnosed with synovial osteochondromatosis of the hip who underwent surgical treatment. The mean age at the time of the surgery was 45.6 years (range, 25 to 58 years) and the mean follow-up period was two years (range, 1 to 2.5 years). None of the patients had any previous major injury or surgery. Preoperative routine radiographs and magnetic resonance imaging (MRI) were obtained, and preoperative imaging studies established the diagnosis of synovial osteochondromatosis in each patient. The preoperative osteoarthritis grade was determined by the Kellgren and Lawrence (KL) grade scale; three patients were grade 0 and two patients were grade 2. Disease stage was classified with Milgram's criteria, and all patients were classified as phase 2 (Figures 1 and 2).

This study was approved by our institutional review board and informed consent was obtained from all patients.

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Surgical technique

Surgeries were performed using an MIS modified-Hardinge approach with a skin incision of 8 cm or less in the lateral position and trochanteric flip osteotomy was not required. The anterior one-third of the gluteus medius muscle was incised from the anterior portion of the base of the great trochanter, and the gluteus minimus tendon was divided as a single flap from its attachment to the great trochanter (Figure 3A). The anterior capsule was exposed as widely as possible and was subsequently incised with a Z-shaped capsulotomy using a knife in an inside-out manner following Ganz procedure. The capsule was first incised anteriorly along the longitudinal axis of the femoral neck. The second incision (anteroinferior incision) was made from the lateral end of the first incision to the anterosuperior portion of the lesser trochanter while the femur was externally rotated and slightly flexed. The third incision was made from the medial end of the piriformis tendon to avoid injury to the medial femoral circumflex artery (MFCA) (Figure 3B). After anterior dislocation, the acetabulum could be exposed, and debridement was performed until loose bodies and proliferative synovium were removed (Figure 3C). Additionally, an arthroscope was used to confirm any undetected loose bodies.^{2,6,7} No patients had recurrence of diseases and there were no complications such as infection, osteonecrosis of the femoral head, or progression of KL grade at the latest follow up.

Discussion

Ganz developed a surgical dislocation technique consisting of an anterior dislocation through a posterior approach with a trochanteric flip osteotomy, which provides a full 360° view of the femoral head and the acetabulum for debridement and synovectomy.⁸ They reported the clinical results using this approach for the management of femoral acetabular impingement (FAI) in 213 hips over a follow-up period of seven years, and no cases revealed avascular necrosis of the femoral head. However, some complications due to trochanteric flip osteotomy such as trochanteric fixation failure and heterotopic ossification were described.^{2,7,8} Additionally, Schoeniger and Ganz applied the surgical dislocation technique for the management of eight patients with synovial osteochondromatosis of the hip. In regards to the results, there were no patients that had recurrence of the disease and there were no notable complications nor signs of avascular necrosis of femoral head.^{2,7,8} On the other hand, Lim *et al.* proposed another open surgical approach for the treatment of synovial osteochondromatosis of the hip. They performed anterior dislocation of the femoral head without trochanteric flip osteotomy for eight patients with synovial osteochondromatosis of the hip. They also reported complications, which included avascular osteonecrosis of the femoral head in one of the eight patients.^{3,6}

In their study, an inverted T-shaped capsular incision was performed for dislocation of the femoral head. There is a possibility that this method increases the risk of MFCA injury in lesions of the piriformis tendon, and for this reason we used a Z-shaped capsular incision following the methods of Ganz procedure to avoid injury of MFCA.⁹⁻¹² There have been no papers that describe other anterior approaches for the synovial osteochondromatosis of the hip such as the Smith-Peterson or the Watson-Jones approach. Our combined procedure with a Z-shaped capsular incision and anterior dislocation through a modified-Hardinge approach could achieve fewer major complications. In addition to this, we feel that this approach could secure the wider range of the surgical field in the anterior capsule and make it easier to perform anterior dislocation in comparison to the Smith-Peterson and the Watson-Jones approach. However, a disadvantage of our procedure is that the posterior inferior part of the acetabulum was located in a blind area, and an additional arthroscopic procedure could be helpful to confirm undetected loose bodies.

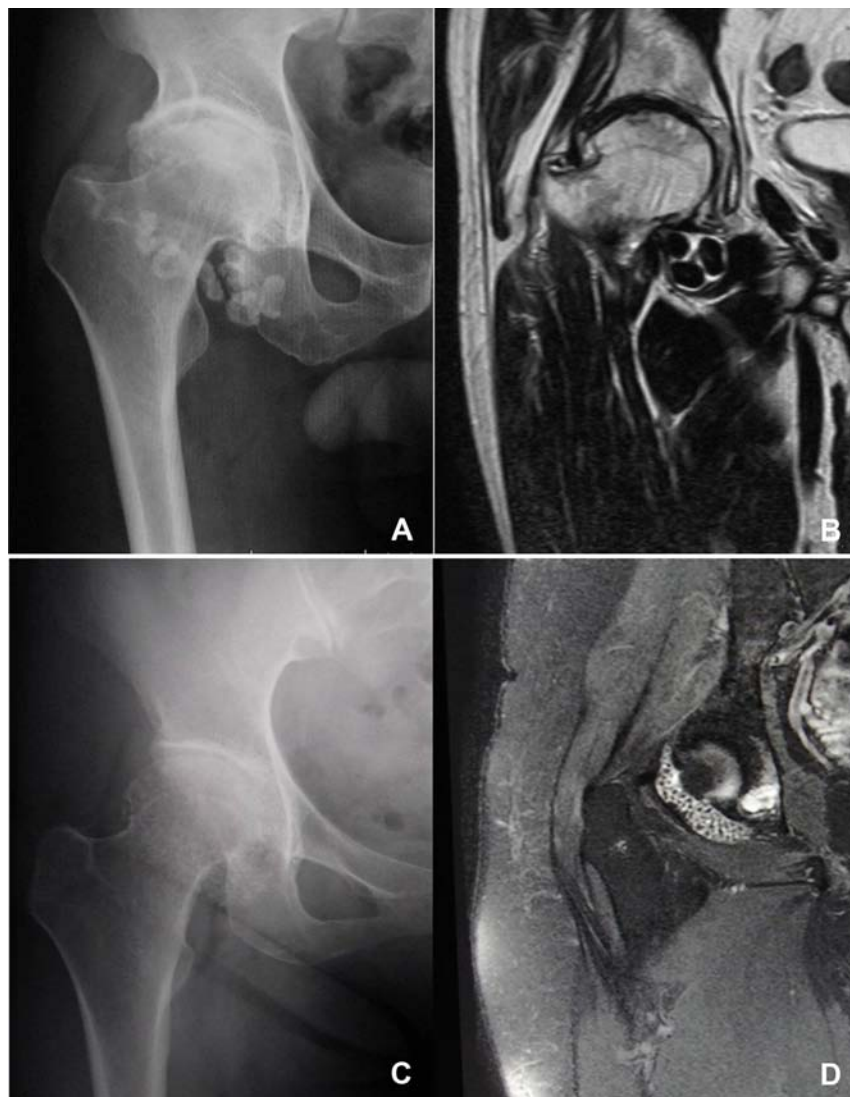


Figure 1. Primary synovial chondromatosis of the right hip in a 58-year-old woman (A,B) and in a 57-year-old man (C,D). A) Preoperative anterior-posterior radiographs demonstrates multiple calcified nodules filling around the femoral neck and joint-space narrowing the right hip joint. B) T2-weighted magnetic resonance indicates the presence of synovial thickening and multiple loose bodies with low signal intensity around the femoral neck and inferomedial portion of the capsular sac. C) Preoperative anterior-posterior radiographs indicates indistinct calcification and slight joint-space narrowing the right hip joint. D) T2-weighted magnetic resonance shows the presence of synovial proliferation and configuration of intra-articular bodies.

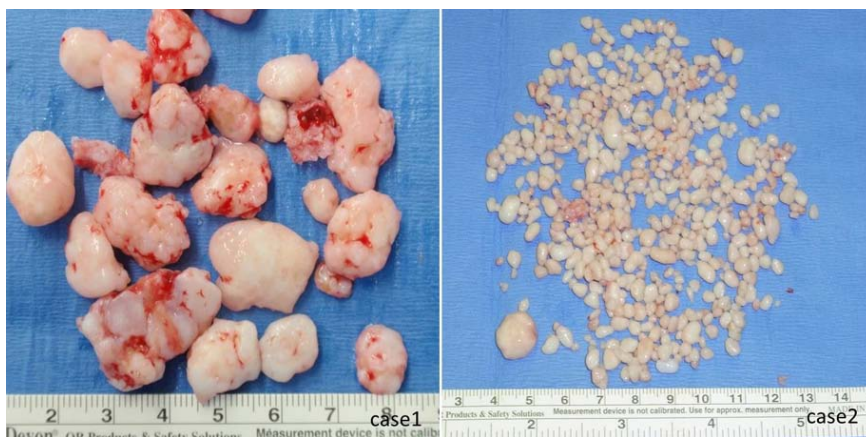


Figure 2. The gross photograph of the removed loose bodies.

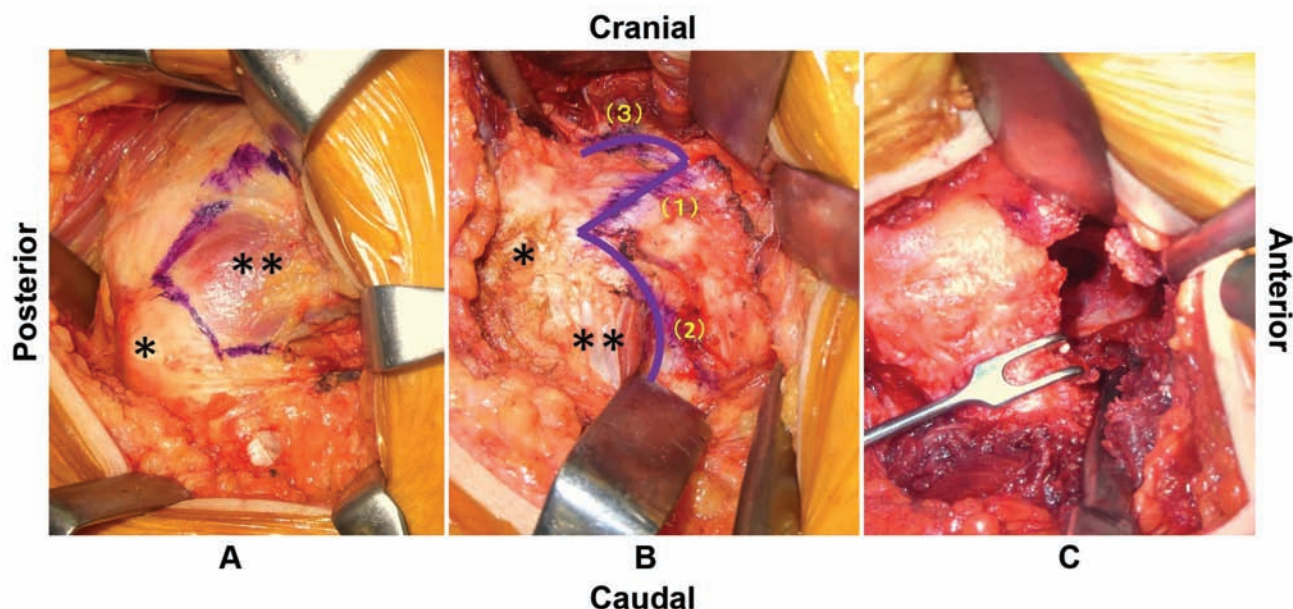


Figure 3. A) Surgical procedure 1. The anterior one-third of the gluteus medius muscle was incised from the anterior portion of the base of the great trochanter and the gluteus minimus tendon is divided as a single flap from its attachment to the greater trochanter. *The greater trochanter; **the gluteus medius muscle. B) Surgical procedure 2 (Z-shaped capsular incision). The capsule is first incised along with the longitudinal axis of the femoral neck (1). The second incision was made from lateral end of the first incision to anterosuperior on the lesser trochanter (2). The 3rd incision was made from the medial end of the first incision at acetabular rim. It was sharply turned posteriorly to the anterosuperior of the piriformis tendon (3). *The greater trochanter; **the vastus lateralis muscle. C) Surgical procedure 3. The surgical anterior dislocation was performed and the femoral head and neck retracted posteriorly.

Conclusions

Our results suggest that open debridement with a modified-Hardinge approach using a Z-shaped capsular incision combined with arthroscopy is an effective treatment method.

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