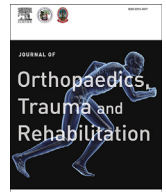




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Original Article

Acetabular Reconstruction with Reinforcement Ring and Morsellised Graft: Technique and Medium-term Result



以髖臼加強環及切碎骨來重建髖臼 - 技術及中期結果

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ABSTRACT

Background: Acetabular bone defects are commonly seen in both primary and secondary total hip arthroplasty, creating difficulties in restoring anatomical hip centres, which results in high mechanical failure rate.

Methods: Total hip arthroplasty with acetabular reinforcement rings were performed in 18 hips in 18 patients from 1996 to 2011 in United Christian Hospital. Both clinical and radiographical assessment were performed during follow-up.

Results: Eight patients died of unrelated diseases with average follow-up of 30.5 months. At the latest follow-up, none of them showed radiographic signs of loosening or migration of implants and none of them required revision surgery. The remaining 10 patients with mean age of 77.9 years (range, 65–88) at the time of operation were followed-up for an average of 67.4 months (range, 11–121). The average Harris hip score was 78.3 (range, 58.5–87). The average vertical and horizontal difference of hip centres was 1.5 mm superiorly ($p = 0.431$) and 0.4 mm medially ($p = 0.619$) respectively when postoperative hip centres were compared to their contralateral hips. The average inclination of the polyethylene cup was 47.8 degrees (range, 42–58). There was no evidence of radiographic loosening during our follow-up and none of them required revision surgery.

Conclusion: Acetabular reconstruction with the use of acetabular reinforcement rings and morsellised bone grafts showed satisfactory clinical and radiographic results at a medium-term follow-up.

中文摘要

背景: 髖臼骨缺損常見於初次及翻修全髖關節置換術, 使重建髖關節中心困難, 導致較高的機械性失敗率。方法: 在1996年至2011年間, 基督教聯合醫院共進行了18例使用髖臼加強環的全髖關節置換術。隨訪期間我們以臨床和X光片進行評估。

結果: 共8例死於無關的疾病, 其平均隨訪時間為30.5個月。他們沒有表現出鬆動或遷移的跡象, 亦沒有需要進行翻修手術。其餘10例隨訪時間平均67.4個月(範圍11–121), 平均年齡為77.9歲(範圍65–88)。

Harris 評分平均為78.3(範圍58.5–87)。相對於對側的髖關節, 術後的髖關節中心的平均垂直和水平的差異分別為上方1.5毫米($p = 0.431$)和內側0.4毫米($p = 0.619$)。聚乙烯杯中的平均傾角為47.8度(範圍42–58)。隨訪期間他們沒有表現出鬆動的跡象, 亦沒有需要進行翻修手術。

結論: 於全髖關節置換術使用髖臼加強環和切碎骨來重建髖骨在這中期研究中展現出滿意的臨床和影像學結果。

Introduction

Acetabular bone deficiency often increases the technical difficulty in performing total hip arthroplasty. It can occur in primary total hip arthroplasty such as that for acetabular protrusion. In

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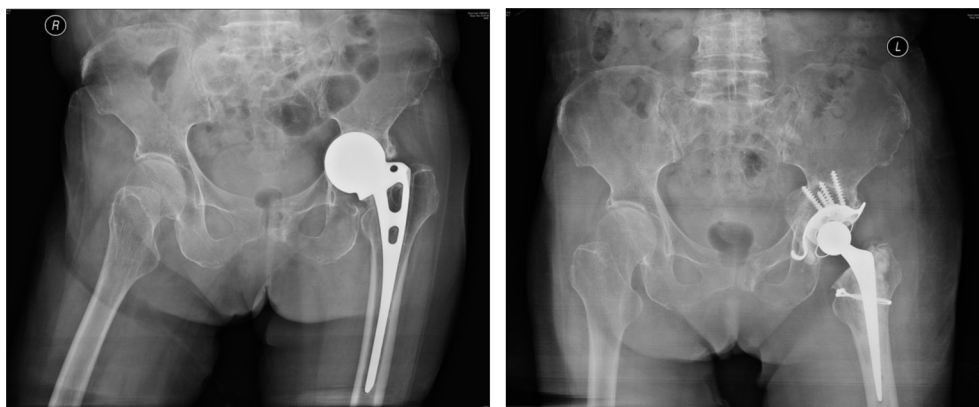


Figure 1. Austin–Moore prosthesis protrusion with acetabular American Academy of Orthopaedic Surgeons type II defect treated with Ganz ring.

revision arthroplasty, bone deficiency can be caused by loosening or migration of old implants. Bone deficiency can result in difficulty in restoring the anatomical hip centre. Failure to do so is associated with higher mechanical failure rate. Bone deficiency also poses additional difficulty to achieving a stable implant fixation.

Various methods have been proposed to deal with this situation. Acetabular revision with cement alone was not desirable. By contrast, uncemented acetabular revision has been very successful. Uncemented revision relies on the intimate contact between the bone and the implant to achieve a stable biological fixation. High hip centre and oversized jumbo cups were some of the ways that could increase the host bone contact in the presence of acetabular bone defect. The disadvantage of these two techniques is that additional bone loss would be created during the reaming process, making future revisions even more difficult. Moreover, when there is < 50% host bone contact, alternatives have to be considered.

Acetabular reinforcement rings have been used for acetabular reconstruction in the presence of bone deficiency. There are two types of ring. The Müller ring is without hook while the Ganz ring has a hook. Previous studies showed that the use of acetabular reinforcement rings was successful in restoration of hip centre and hip biomechanics.^{1–4} Moreover, they can protect the bone graft during graft incorporation and thus help to restore bone stock. The results of the acetabular reinforcement rings have been reported to be satisfactory by some authors. However, other authors have reported less satisfactory results.⁵ The difference in results may be due to a number of factors. However, technique of using these rings may be a crucial factor. The aim of our study was to evaluate the clinical and radiographic results of acetabular reconstruction with acetabular reinforcement rings and morsellised graft and highlight some of the technical details when using the acetabular reinforcement ring.

Materials and methods

Total hip arthroplasty with acetabular reinforcement rings were performed in 18 hips in 18 patients from 1996 to 2011 in our hospital. The indications of total hip arthroplasty include protrusion of Austin–Moore arthroplasty (11 patients), avascular necrosis (4 patients), protrusion of cemented Thompson arthroplasty (1 patient), osteoarthritis (1 patient), and revision total hip arthroplasty (1 patient). All operations were performed by the same specialist in joint reconstruction in our hospital. Eight patients died of unrelated diseases with average follow-up of 30.5 months. At the latest follow-up, none of them showed radiographic signs of loosening or migration of implants and none required revision surgery. Three of

them were stick walkers, two were frame walkers, and three were wheelchair bound. The remaining 10 patients (all female) with mean age of 77.9 years (range, 65–88 years) at the time of operation were followed-up for an average of 67.4 months (range, 11–121 months). This group of 10 patients was the focus of this study.

Acetabular deficiency was classified according to the American Academy of Orthopaedic Surgeons classification system based on the radiographic analysis and intraoperative findings. In our study, they were graded as type II (cavitary deficiency) with volumetric bone loss with intact rim in 17 hips (Figure 1) and type III (combined segmental and cavitary deficiencies) in one hip (Figure 2).

Surgical technique

Preoperative templating was performed in all patients. The size of the ring, the host bone contact of the ring, and the bony deficiency were estimated. If the ring with hook was to be used, the change in the hip centre was estimated. If this caused lateralization of the hip centre, the junction of the hook and the ring was bent to decrease the amount of lateralization.

All patients underwent surgery in the lateral position using the posterior approach. Membrane was removed from the acetabulum and the acetabulum was reamed with hemispherical reamers. Reaming was kept to a minimum and the aim was to create a spherical rim for the reinforcement ring to seat properly.

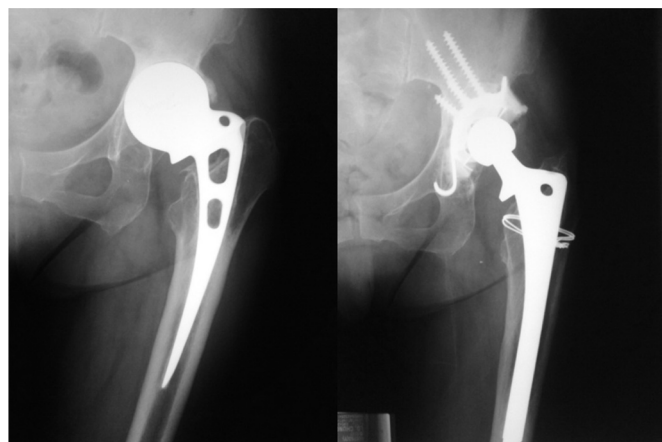


Figure 2. Austin–Moore prosthesis protrusion with acetabular American Academy of Orthopaedic Surgeons type III defect treated with Ganz ring.

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