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Case Report

Surgical Techniques of Using Direct Anterior Approach and Bridging Plate Fixation of Periprosthetic Fracture of an Arthrodesed Hip: A Case Report

通過直接前路及橋狀鋼板固定手術治療伴有髖關節融合的近端股骨人工假體周圍骨折:一病例報告

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ABSTRACT

We present a case of a 65-year-old woman with traumatic periprosthetic fracture of left proximal femur with ipsilateral arthrodesed hip and cobra plate in-situ. It imposes challenges on achievement of stable fixation for fracture management and preservation of blood supply for fracture healing. Minimally invasive plate osteosynthesis through direct anterior approach was executed with intraoperative templating. Anterior bridging plating using pre-bent reverse distal femoral locking compression plate (less invasive stabilisation system) was performed successfully. The patient had a fracture union in 10 months and returned to the previous mobility status. This technique can achieve stable fixation and preservation of blood supply for fracture healing through minimal invasive technique.

中 文 摘 要

本文報告一名六十五歲女士，患有左側近端股骨創傷性人工假體周圍骨折，同時同側有髖關節融合，並伴有眼鏡蛇鋼板。要達到穩定固定及保持血供以促進骨折癒合,實是一大挑戰。通過直接前路及術中模板，進行了微創鋼板骨折接合術。我們成功使用預設彎曲反向遠端股骨鎖定鋼板進行前面橋狀鋼板固定。患者骨折在術後十個月內癒合，她恢復了從前的活動狀態。這種技術可以通過最少侵入性技術，保存血供並把骨折穩定固定以達至骨折癒合。

Introduction

Hip arthrodesis has been a treatment option for young patients with septic arthritis of hip with joint destruction to alleviate hip pain and control infection.[1] However, arthrodesis of hip joint is an uncommon procedure nowadays as it may accelerate ipsilateral knee and lumbrosacral spine degeneration and may require conversion to total hip replacement.[2] There are only a few case reports of femoral fracture around arthrodesed or fused hips.[3–7] Periprosthetic fracture around arthrodesed hip with pre-existing implant is rare. The treatment of this condition is seldom reported in literature. There is no report of periprosthetic femoral fracture in arthrodesed hip with cobra plate. It is specially designed for hip arthrodesis.[8,9] The treatment of this rare fracture is challenging.

Case Report

A 65-year-old woman tripped and fell in the market in November 2015 resulting in left thigh pain and inability to walk. She suffered from tuberculosis of the left hip with arthrodesis performed utilising cobra plate in 2004. She also had tuberculosis of the left knee with arthroscopic lavage in 2003. Physical examination on admission showed that her left thigh was slightly swollen with marked tenderness. There was no distal neurovascular deficit. Plain radiographs revealed transverse fracture of left proximal femur just distal to the distal end of cobra plate and most distal screw with marked angulation (Figure 1).

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The left hip was fused at 30° of flexion, 5° of adduction, and 5° of external rotation according to the previous operative record.

Operative technique

The patient was operated 3 days after the injury. She received surgical intervention under general anaesthesia on traction table with legs on traction boots. Closed reduction of left proximal femoral shaft fracture was performed with slight longitudinal boot traction under fluoroscopic screening to reproduce the arthrodesed position. After the fracture alignment was corrected, the traction force was reduced to avoid distraction of the fracture site. Preparation of operative field with disinfectant and draping were performed as usual. Direct anterior approach (DAA) of hip was adopted. An incision was made over the anterolateral left thigh starting from 1 cm below and lateral to the left anterior superior iliac spine. The chance of injuring the lateral cutaneous nerve of the thigh was minimised because the skin incision was slight lateral. Careful subcutaneous dissection and deep fascia incision were in line with the skin incision. After the deep fascia incision, the tensor fascia lata muscle was right beneath and could be easily identified and retracted laterally away from sartorius muscle. The intermuscular plane between the two muscles was easily entered. Next, the ascending branch of lateral femoral circumflex artery was identified and ligated. The rectus femoris muscle was dissected and retracted medially. Anterior soft tissue was dissected off from the left anterior femoral head and neck region.

A submuscular tunnel under quadriceps muscle was created with a soft tissue retractor blade (DePuy Synthes). Malleable template was contoured along the acetabulum, anterior femoral head and neck to determine the curvature along this region. A contralateral (right) precontoured anatomical distal femoral locking compression plate (less invasive stabilisation system, LISS; DePuy Synthes) was used in a reverse manner. The length of the reverse LISS plate of contralateral limb that must be long enough for bridging from the femoral head to the distal third of left femur was determined under fluoroscopy screening. The selected plate of 13 holes was bent with a bending press in reference of malleable template's curvature (Figure 2A). The distal half of the LISS plate was bent gently to accommodate the mild anterior bowing of femur. It was then inserted into the submuscular tunnel, and eight proximal locking screws were inserted into the femoral head, neck, and proximal shaft regions. A few short skin incisions were made over the anterior left thigh for the insertion of one cortical screw and four distal locking screws (Figure 2B). The intraoperative blood loss was minimal.

Postoperatively, X-ray examination showed anatomical reduction of the fracture with stable fixation (Figure 3A). The patient was instructed for non-weight bearing walking for the first 8 weeks, and then she was allowed to have protected weight bearing. However, she had premature full weight bearing walking after 4 weeks postoperatively. Follow-up X-ray examination showed delayed union at 5 months (Figure 3B). Serial computed tomography scans were performed to monitor the healing progress. The first scan at postoperative 6 months revealed delayed union with hypertrophic changes although there was no widening of the fracture gap or loosening of the fixation construct noted (Figure 4A). She was recommended to resume protected weight bearing walking. The subsequent scan at 8 months showed some progress of fracture healing (Figure 4B). The fracture finally consolidated at 10 months postoperatively (Figure 5). In fact, she already started walking very well and unaided in the early postoperative period and the pain subsided eventually.

Discussion

Hip arthrodesis was the treatment of choice for recalcitrant tuberculosis infection.[1] However, the drawbacks of hip fusion include adjacent knee and spinal degeneration, impaired mobility and rarely, periprosthetic fractures.

A challenge on fixing a femoral fracture in the presence of arthrodesis hip and cobra plate is expected as cobra plate fixation usually requires multiple screws placement in supra-acetabular region and proximal femur that makes further augmentation fixation of periprosthetic fracture difficult without removing the preexisting implants.

The exchange of a cobra plate with another lateral plating imposes other challenges. First, it needs extensive soft tissue dissection that will jeopardise the blood supply of the fracture site. Second, there is no cobra plate that can be long enough for bridging the fracture. Third, lateral plating utilising reverse LISS plate or long dynamic hip screw cannot bridge the arthrodesed hip region in which the bone is usually osteopenic and soft. It carries a risk of stress riser at that region in all run.

Exchange of a cobra plate with intramedullary nailing, either antegrade or retrograde, may not be feasible because of

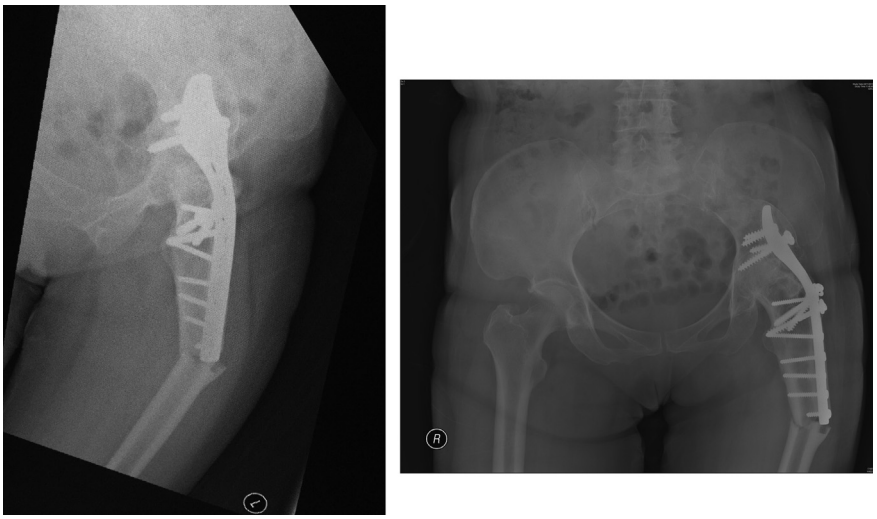

Figure 1. Pre-injury radiographs showing transverse fracture of left proximal femur just distal to cobra plate and most distal screw.