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Screw Exchange Technique Following Internal Fixation Failure in a Displaced Femoral Neck Fracture: A Case Report

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Abstract

Case: A 92-year-old man with a cardiac pacemaker and a history of unilateral nephrectomy sustained a displaced femoral neck fracture. The patient underwent internal fixation surgery using three cannulated screws. 2 years later, he complained of lateral thigh pain. Radiography revealed obvious lateral protrusion of the screws, which was considered the cause of the pain. Reoperation was performed by exchanging the screw for shorter ones, resulting in an improvement of the thigh pain.

Conclusion: Although certain conditions must be met, highly invasive reoperation with prosthetic replacement can be avoided by using shorter screws after internal fixation failure.

Keywords: Femoral neck fracture; Displaced; Elderly; Internal fixation; Screw; Reoperation

Introduction

As the elderly population increases, the incidence of femoral neck fractures is also expected to increase [1]. Once a femoral neck fracture occurs, a patient's activities of daily living are generally reduced. Surgical treatment for femoral neck fractures is broadly categorized into internal fixation and prosthetic replacement [2]. Internal fixation for displaced fractures carries a certain risk of failure and often necessitates conversion to prosthetic replacement, such as revision surgery [3]. Herein, we report a thought-provoking case in which conversion to prosthetic replacement was avoided by exchanging screws following the failure of internal fixation for a femoral neck fracture treated with cannulated cancellous screws.

Case Presentation

A 92-year-old man fell from a standing height, developed pain in his left hip joint, and was brought to the emergency department of our hospital in April, year X. Before the injury, the patient was able to walk independently using a cane. Physical examination revealed shortening of the lower limb on the affected side, and radiography showed a displaced femoral neck fracture (Garden stage IV) (Figure 1). He had a history of pacemaker implantation and unilateral nephrectomy for renal cell carcinoma.

Considering the patient's frail general condition, we opted for internal fixation with three cannulated cancellous screws instead of initial prosthesis replacement, which is more invasive. The first internal fixation surgery was performed 3 days after the injury; the fracture was successfully reduced, and the implants were appropriately inserted (Figure 2). The postoperative course was uneventful, and the patient was able to ambulate independently using a cane or walker. He was discharged home 2 months after surgery. At the time of discharge, radiography revealed some shortening at the fracture site and mild lateral protrusion of the screws, but the patient reported no pain (Figure 3). He was able to walk independently at home with a cane and remained asymptomatic.

In May, year X+1, the patient developed pain in the lateral part of the left thigh, and walking with a cane gradually became difficult. Radiography revealed progressive shortening at the fracture site and further lateral protrusion of the screws, which was considered the cause of the thigh pain (Figure 4). In April, year X+2, the patient opted to undergo reoperation. Given his high surgical risk, revision prosthetic replacement was deemed too invasive. Computed tomography imaging showed partial bone union at the fracture site and no radiolucent zones around the screws (Figure 5); therefore, we decided to remove the original screws and replace them with shorter ones (Figure 6). Following the revision surgery, the lateral thigh pain resolved, and the patient's ambulatory function improved, enabling him to walk indoors with a cane. The modified Harris Hip Score improved from 39.6 points before surgery to 59.4 after revision. There was no postoperative progression of surgical site failure, and the patient expressed satisfaction with his ambulatory status.

Figure 1: Radiograph of the hip joint at the first visit.
Radiograph of a 92-year-old man showing a displaced femoral neck fracture (Garden stage IV) following injury to the left hip, in April, year X.

Figure 2: Radiograph after initial operation.
Internal fixation using three cannulated cancellous screws performed in place of a more invasive initial prosthesis replacement, in April year X.

Figure 3: Radiograph at discharge after initial operation. Radiograph showing shortening at the fracture site and mild lateral protrusion; no pain was reported, in June, year X.

Figure 4: Radiograph 1 year after the initial operation. Radiograph showing progressive fracture site shortening and further lateral screw protrusion, corresponding with new-onset lateral thigh pain, in May, year X+1.

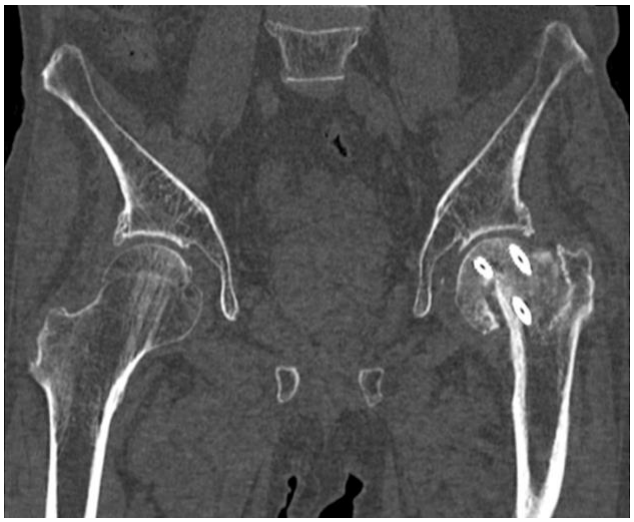

Figure 5: CT scan before revision surgery. CT scan showing partial bone union at the fracture site with no radiolucent zone around the screw, in February, year X+2. **Abbreviation:** CT: Computed Tomography.

Figure 6: Radiograph after revision surgery. Revision surgery 2 years after the initial operation involved removal of the original screws and replacement with shorter ones, in April year X+2.

Discussion

Surgical treatment of displaced femoral neck fractures is broadly categorized into internal fixation and prosthetic replacement [2]. Although the choice between these two approaches has been widely discussed, it remains controversial [2]. Internal fixation is less invasive and associated with reduced blood loss; however, it carries a higher risk of reoperation because of complications such as nonunion, avascular necrosis of the femoral head, and implant cutout [2,4]. In contrast, prosthetic replacement generally leads to fewer reoperations but is highly invasive and carries the risk of postoperative dislocation [2]. The risk of reoperation is particularly higher in displaced fractures than in stable ones [3]. Nonetheless, internal fixation may still be a suitable treatment option for patients who are physically frail or at high surgical risk [5]. Prosthetic replacement is often used as a revision procedure following failed internal fixation [6], but in some patients with poor general health, such reoperation may be too invasive [7].

In the present case, the patient had a history of cardiac pacemaker implantation and unilateral nephrectomy, indicating high surgical risk. Therefore, we initially selected internal fixation over prosthesis replacement. We believe the lateral thigh pain was caused by impingement due to lateral protrusion of the screw. Partial bone union was observed, and no radiolucent zone was present around the screw, prompting us to replace the protruding screw with a shorter one instead of performing arthroplasty. As the removal of the screw without replacement could increase the risk of refracture [8], we decided to reinsert a screw of the same type to support the fracture site. Ultimately, the patient regained satisfactory ambulatory function following the revision surgery.

Regarding similar reoperations for pain following internal fixation of proximal femoral fractures, a case series describing lag screw exchange after intramedullary nailing for trochanteric femoral fractures has been published [9]. However, to our knowledge, there are no comprehensive reports on screw replacement after failure of internal fixation for femoral neck fractures, as in the present case.

Although vascularized bone grafts have been reported as a revision option for failed internal fixation of femoral neck fractures [10], this approach is highly invasive and may not be suitable for patients with poor general health. In the present case, bone union was deemed necessary, and the bone around the screw remained stable. Therefore, reoperation was performed using a minimally invasive technique by simply replacing the screw, resulting in a favorable postoperative outcome.

Although certain conditions must be met, highly invasive reoperation with prosthetic replacement may be avoidable by using shorter screws after internal fixation failure. This technique could serve as a viable revision option for patients at high physical risk following failed internal fixation for femoral neck fractures. However, further long-term follow-up is needed to assess the durability of this improvement.

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