CASE REPORT

Subluxation after internal fixation of a femoral neck fracture in the presence of hip dysplasia: A case report

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Introduction

Although subluxation of the hip due to cerebral palsy or other paralytic disorders has been described previously, this complication after open reduction and internal fixation of a femoral neck fracture is very rare. However, we report such an occurrence following osteosynthesis for a femoral neck fracture.

Case report

A 46-year-old woman fell while walking, sustained a left femoral neck fracture and subsequently presented to our hospital. She was found to have comorbid hip dysplasia, and had undergone a varus osteotomy of the left femur in childhood. She also had a schizophrenic disorder. There was nothing specifically relevant in her family history. The fracture was type 31-B2.3 according to AO classification (Fig. 1). On the day after the injury, osteosynthesis was performed with a dynamic hip screw (DHS; Synthes, Paoli, PA, USA) and an additional antirotational screw (Fig. 2a).

Although we instructed the woman to avoid bearing weight on the left extremity for at least 8 weeks after surgery, she was non-compliant and started postoperative uncontrolled weight bearing immediately. Radiographs at 2 weeks after the surgery identified telescoping and, at 3 months after surgery, severe shortening of the femoral neck (Fig. 2b and c). At 5 months after surgery, lateralisation of the femoral head, incongruity of the joint and further severe shortening of the femoral neck were observed and subluxation was diagnosed (Fig. 2d). Pain in the affected hip increased, resulting in difficulty in walking at 8 months after surgery (Fig. 2e). The range of the hip motion was limited, and the Harris Hip Score was 21.9 points.

The implant was removed and a cementless total hip arthroplasty (THA) performed (Fig. 3). There was no evidence of infection in the intraoperative histological findings and culture, and there was no inclusion such as haematoma or scar tissue between the acetabular floor and the femoral head. Bony union was achieved at the fracture site without penetration of screws from the cartilage of the femoral head. At 15 months after THA, the woman was able to walk without any support and had no pain or symptoms.

Discussion

There have been only a few reports describing dislocation or subluxation after osteosynthesis for fracture of the proximal femur. The causes of dislocation include infection, intra-articular haematoma, articular contracture and joint instability due to soft-tissue injury, such as rupture of the joint capsule.3–5 In our case, intraoperative histology and

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culture discovered no infection, nor was any intra-articular inclusion or soft-tissue injury detected. In addition, because the range of motion at reoperation was not limited, joint contracture was not the cause of subluxation.

Preoperative and postoperative factors that are specific to this case include acetabular dysplasia and shortening of the femoral neck. Acetabular dysplasia can cause subluxation, but this does not explain how the centripetal portion was lost within such a short period. We believe that in this case subluxation developed rapidly because of the shortening of the femoral neck combined with hip abductor weakness, and changes in the application of stress.

Was treatment problematic therefore? Regarding factors affecting secondary displacement after surgery for femoral neck fracture, Stankewich et al. have mentioned the influence of fracture angle and moment arm distance (Fig. 4a). In this case, the fracture angle was 24°, so the woman had a high risk for failure caused by excessive shearing force. In such a case, the choice of fixation procedure is particularly important, and we selected a technique in which antirotation screws were attached to the DHS. In a comparative strength test of cannulated cancellous hip screws and DHS for shear fractures of the femoral neck, DHS had demonstrated better initial fixation strength. Generally, DHS with

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**Figure 1**  (a) Anteroposterior radiograph of the hip joint showing a displaced basal neck fracture on the left. (b) Backward bending of the femoral head was identified in the lateral view.

**Figure 2**  (a) Radiograph after open reduction and internal fixation, using a compression hip screw and antirotational screw, reveals good fixation of the hip joint with slightly valgus positioning. (b) Anteroposterior radiograph at 2 weeks after surgery shows slight shortening of the femoral neck. Anteroposterior radiographs at (c) 3 months and (d) 5 months show gradual lateralisation of the femoral head, and (e) at 8 months reveal subluxation of the left hip joint.
an antirotational screw is indicated for the unstable type of femoral neck fracture, and thus we believe that our choice of surgical technique was appropriate. However, in this case problems developed during subsequent follow-up treatment.

Instruction was given to the woman, who was in the prime of life, to avoid weight bearing on the affected leg for at least 8 weeks after surgery. However, she was non-compliant and started uncontrolled full weight bearing immediately after operation. We believe that this resulted in excessive telescoping, which led to shortening of the femoral neck and changes in muscle balance around hip. We deduce that this further accelerated the outward shift of the femoral head. Moreover, although the moment arm distance was 28 mm, it was predicted that the effective moment arm distance would greater because of the comorbid acetabular dysplasia (Fig. 4b), which also resulted in a smaller contact area between the femoral head and the acetabulum. It was considered that, because of the concentration of stress, a higher axial pressure than normal on the femoral head also affected the shortening of the femoral neck.

In shearing fractures of the femoral neck, a careful follow-up to check for any shortening of the neck is important. The selection of internal fixation methods and detailed postoperative care, including long-term avoidance of weight bearing and continuous strengthening of the abductor muscles, are also important. If a shortening tendency of the femoral neck is identified, clear instructions must be offered to patients, for example to avoid weight bearing.

**Conclusion**

In the treatment of femoral neck fracture in the presence of acetabular dysplasia, selection of the appropriate fixation method and careful postoperative treatment and follow-up are particularly important.
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