Successful Treatment of Concomitant Ipsilateral Intracapsular and Extracapsular Hip Fractures

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Femoral neck fractures and intertrochanteric fractures often occur in elderly patients, but simultaneous ipsilateral intra- and extracapsular hip fractures are rare. Either osteosynthesis or femoral head prosthesis is performed, but careful rehabilitation is necessary because of the instability of the fracture, even postoperatively.

This article describes a 76-year-old man who fell and sustained concomitant ipsilateral intra- and extracapsular hip fractures. The patient was treated with a femoral head prosthesis with a polished cemented stem combined with locking plate osteosynthesis. Weight-bearing gait was possible 1 day postoperatively, and bone union was achieved at postoperative week 8. The locking plate had excellent angular stability, even when the screw fixation was monocortical, leading to a reduced risk of intraoperative redislocation without disturbing stem insertion.

Sufficient fixation was obtained as a result of the molding effect of the cement stem and the tension band function of the plate. These effects collectively made it possible to achieve full weight-bearing gait immediately postoperatively. Although the intramedullary blood circulation was disturbed by the cement, periosteal blood circulation was retained by the virtue of the locking plate, which facilitated early bone union.
Femoral neck fractures and intertrochanteric fractures often occur in elderly patients, but simultaneous ipsilateral intra- and extracapsular hip fractures are rare.\textsuperscript{1–5} Either osteosynthesis or femoral head prosthesis is performed, but careful rehabilitation is required in both cases because this fracture is unstable, even postoperatively.\textsuperscript{1–5} This article describes the case of an elderly man who was treated for this type of fracture with a cemented femoral head prosthesis combined with locking plate osteosynthesis. Full weight-bearing gait and bone union were achieved early postoperatively.

**Case Report**

A 76-year-old man fell into a gully and presented to the emergency department with pain and swelling of the left hip and right wrist pain. Radiographs showed a left hip fracture (Figure 1A) and a right distal radius fracture. The right wrist was immobilized with a cast. The authors added traction force to the left lower limb and obtained additional radiographs; consequently, they suspected concomitant ipsilateral intra- and extracapsular hip fractures (Figure 1B). Computed tomography was performed, and a definitive diagnosis was obtained. Three-dimensional reconstructed images showed that the medial and anterior cortices of the proximal femur were crushed, whereas the lateral cortex of the subtrochanteric fracture was not crushed (Figure 2).

The patient underwent femoral head prosthesis implantation with a polished cemented stem combined with locking plate osteosynthesis. The femur was exposed after making a posterolateral skin incision of the hip and performing reduction of the uncrushed lateral femoral cortex manually and temporarily fixing it with a Kirschner wire. The trochanter and diaphysis were fixed with a Limited Contact-Locking Compression Plate (LC-LCP, 4.5/5.0 Broad 8-hole, Synthes, West Chester, Pennsylvania) molded to the shape of the bone surface. A locking screw 5 mm in diameter was inserted through the plate hole unicovertically to avoid interference with the stem. Sufficient fixation with the locking plate was obtained to retain the reduction position intraoperatively. Next, a posterior T-shaped capsule incision was made to isolate the femoral head. The authors formed the femoral neck with a chisel and then prepared the medullary canal by gently reaming and broaching it. After irrigation and medullary canal drying, the cement was inserted using a cement gun followed by placement of a Collarless Polished Tapered Femoral Stem (Zimmer, Warsaw, Indiana). Adequate fixation was obtained with the locking plate and hardened cement.

Postoperative radiographs confirmed an excellent fracture reduction, adequately fulfilled cement around the stem, and correct stem position (Figure 3). No blood transfusion was needed, and full weight bearing was possible 1 day postoperatively; the patient was discharged on foot without assistance on postoperative day 34 after the cast on the right wrist was removed. Radiographs obtained at postoperative week 8 confirmed bone fusion of the femoral trochanter. Only a trochanteric click was observed at that time.
which was considered to be due to irritation by the plate, and the patient reported no walking pain. By postoperative month 6, the trochanteric click had improved.

**Discussion**

Simultaneous ipsilateral intra- and extracapsular hip fractures rarely occur. The literature has reported this fracture to occur after high-energy trauma in young patients and low-energy trauma in elderly patients with osteoporosis.1-5 Radiographs alone may result in the misdiagnosis of femoral intertrochanteric fractures, and concomitant femoral neck fractures may be overlooked.1-3 In the current case, diagnosing this fracture type was difficult with radiographs, but 3-dimensional reconstructed computed tomography scans enabled an accurate diagnosis.

In this type of fracture, osteosynthesis is generally selected when the patient is young or the femoral neck fracture displacement is mild, whereas femoral head prosthesis is performed when the patient is elderly or the femoral neck fracture displacement is severe.1-5 However, careful rehabilitation is required in both cases because this fracture is unstable, even postoperatively.1-5 The current patient was elderly, and support from the upper limbs was not possible because of the complication of a fracture of the right distal radius. Thus, greater stability was required to enable early weight bearing. Three-dimensional reconstructed computed tomography scans showed crushed proximal medial and anterior femoral cortexes; therefore, it was likely that osteosynthesis alone would not have been adequate to allow early weight bearing, even if favorable reduction was achieved. The fracture line of the proximal femoral cortex extended to the site above the lesser trochanter, and that of the lateral femoral cortex was situated near the subtrochanteric area. Therefore, achieving sufficient initial fixation using uncremented proximal fixed type stem was thought to be difficult.

However, a fracture line on the lateral femoral cortex was not crushed, so reduction at this site was considered easy. In general, a cable-grip system or cerclage wires are used for the osteosynthesis of fractures around a total hip prosthesis, but these materials disturb bone union because of greater intraoperative invasion of the soft tissue and obstruction of the periosteal blood flow by the materials.6 Furthermore, these materials cannot acquire sufficient fixation due to the lack of angle stability between the plate, screw, and cable.7 The plate set with the cable-grip system is bulky at the greater trochanter and is likely to cause pain. However, a locking plate possesses angle stability, so the authors rationalized that intraoperative reduction between the trochanter and the femoral diaphysis would be maintained even if the screws were inserted unicoically. It would also function as a tension band postoperatively against the tension of the gluteus medius muscle. The plate used in the patient was advantageous for bone union because invasion of the soft tissue was relatively minor during implantation and did not disturb the periosteal flow.7,8 In addition, this plate can be bent to match the femoral shape, which helped to avoid irritating the soft tissue.

An excellent long-term clinical result was previously demonstrated for the collarless, polished, double-tapered femoral stem.9 The tapered stem allows for a sufficient cement mantle, making it easier to avoid interference with the locking plate screw. Being cemented, it also reduces the risk of redislocation at the fracture site associated with stem insertion. After cement fixation, the stem is sufficiently fixed at the distal portion over an intramedullary mold and contributes to the stability of the fracture site, so the combination of the stem and cement fulfills the role of a custom-made intramedullary femoral nail. Excellent stability would be achieved for a trochanter fracture by the mould effect of the cemented stem and the tension band effect of the plate. Favorable bone union was achieved possibly because adequate periosteal blood circulation was retained by virtue of the locking plate, despite blockage of the intramedullary blood circulation by the cemented stem. To preserve the periosteal blood circulation, invasion of the soft tissue around the fracture site should be minimal, and sufficient reduction is necessary to prevent effusion of the inserted cement through the gaps in fractured bones.

**Conclusion**

Using a cemented femoral head prosthesis combined with locking plate osteosynthesis may be an effective surgical method for unstable proximal femur fractures in elderly patients.

**References**