Removal of the well-bonded distal part of a non-cylindrical broken femoral stem (Autophor 900S) with hollow trephine reamers—report of two cases

George C Babis, John Tsarouchas, Petros J Boscainos, George P Tzagarakis and Theodore Pantazopoulos

1st Orthopaedic Department of Athens University, KAT General Hospital, 2 Nikis Str., GR-14561 Athens, Greece. E-mail: gbabis@cc.uoa.gr
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The Autophor 900S femoral stem is entirely porous-coated with Endocast particles 200–300 μm in size and a pore size of 150–200 μm that allows bone ingrowth. The proximal part of the stem has two fenestrations for better anchoring, weight bearing ribs and recesses. Distally, the stem has a quadrilateral (subconcave) transverse section.

Case 1

A 61-year-old man, who had had bilateral total hip arthroplasties 9 years ago, was referred with a fatigue fracture of the left femoral stem. Using a transtrochanteric approach, we easily removed the loose proximal part. We used a motorized 14 mm hollow trephine reamer (DePuy, Warsaw, Indiana) to extract the distal part of the stem. Reaming lasted for 30 minutes and we had to use 2 trephines because of wear of the cutting heads. We cooled the area with saline irrigation to avoid heat damage to bone. The distal part was finally extracted, impacted within the trephine. Radiographs after implantation of a new stem showed no substantial bone loss (Figure 1).

Case 2

A 67-year-old woman sustained a stem fracture after 11 years. We used the same procedure as in case 1 to remove the distal stem. Extraction reaming was arduous and lasted for 40 minutes. After removing the distal part of the stem, we detected a 1.5 × 4 cm defect at the posterior femoral cortex. We ascribed the defect to posterior inclination of the stem, which guided the trephine posteriorly. We did not use an image intensifier during the pro-

Figure 1. A 61-year-old man with bilateral total hip arthroplasties and a fracture in the middle of the left Autophor 900S femoral stem (a). The distal part is centralized in the femoral canal and radiographically well-fixed while the proximal part is grossly loose. After revision (b) of the left ceramic total hip with a hybrid total hip arthroplasty. No femoral bone deficiency can be detected.

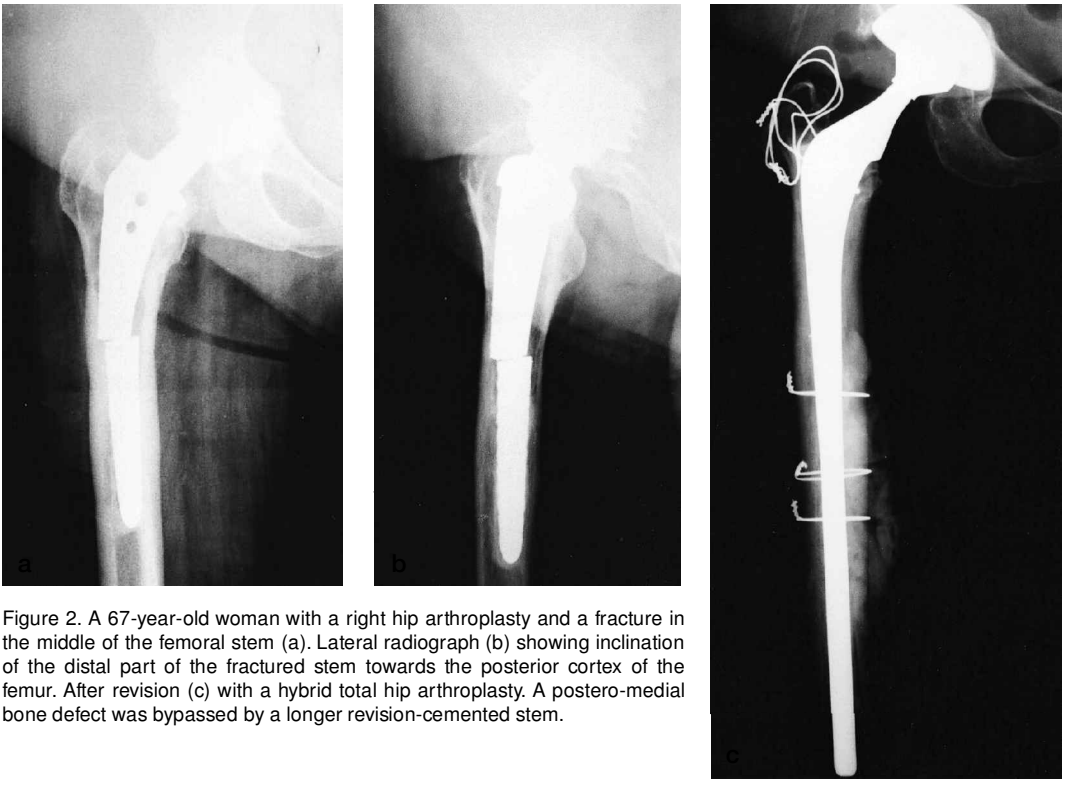

Figure 2. A 67-year-old woman with a right hip arthroplasty and a fracture in the middle of the femoral stem (a). Lateral radiograph (b) showing inclination of the distal part of the fractured stem towards the posterior cortex of the femur. After revision (c) with a hybrid total hip arthroplasty. A postero-medial bone defect was bypassed by a longer revision-cemented stem.

cedure. The defect was covered with cortical bone from the posterior femoral cortex using cerclage wires and morselized fresh frozen bone allografts. A longer femoral stem was inserted with cement to bypass the defect (Figure 2).

In both cases, marble-like bone or dense mineralized fibrous tissue was firmly attached to the distal portion of the fractured stem (Figure 3).

Figure 3. The marble-like appearance of the bone firmly attached to the distal part of both broken stems.

Discussion

Heisel and Schmitt (1987) reported 0.13% stem fractures among 2356 Autophor stems. The cause of failure was loss of proximal support, creating cantilever-bending forces which gradually resulted in a fatigue fracture.

Many surgical techniques have been described for distal stem extraction, but all have caused some bone deficit (Harris et al. 1981, Moreland et al. 1986, Callaghan et al. 1988). Extremely porous-coated implants like the Autophor 900S femoral stem can be very difficult to remove. Osteotomes are usually ineffective, and risky since the region of greatest bone in-growth in many cases is at the distal part of the porous coating. In addition, use of osteotomes for extraction of a femoral stem with a quadrilateral (subconcave) transverse section at its distal part, like the Autophor 900S, increases the risk of femoral fracture. Glassman and Engh (1992) described a technique for extracting cylindrical stems with trephine reamers. We have shown that the same technique can be used for extracting

non-cylindrical entirely porous-coated stems like the Autophor 900S.

To avoid unnecessary bone loss, we recommend the following routine: 1) Preoperative planning for estimation of the level of fracture and the required length and diameter of the trephine. The position of the tip of the stem in the femoral canal on anteroposterior and lateral radiographs should be taken into account. 2) Availability of more than one trephine due to quick wear of the trephine's cutting edge. 3) Trochanteric osteotomy for adequate femoral canal exposure. 4) Continuous irrigation of the femoral canal to prevent heat-induced bone necrosis. 5) Use of fluoroscopy to prevent distal femoral perforation, especially in cases with noncentralized femoral components in both anteroposterior and/or lateral planes.

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