

Fracture of an Exeter stem-a case report

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Abstract

The Exeter femoral stem is a collarless, polished, tapered stem with an excellent track record. It is designed to subside into the cement mantle by creep and plastic deformation of the cement thereby tightening its fit. We present the case of a 121 kilogram 68 year old male patient who had previously undergone bilateral cemented total hip arthroplasty using the Exeter system (Howmedica, Stryker) for underlying osteoarthritis of the hips. He presented 9 years after surgery with catastrophic failure of the left femoral stem, following a mechanical fall from a standing height. We believe this unusual case of stem fracture has not been previously documented in the English literature with the current design of stem.

CASE REPORT

A 68 year old gentleman who weighed 121 kilograms, and who had previously undergone bilateral cemented Exeter total hip arthroplasty, presented to the emergency department at our hospital following a simple mechanical fall from a standing height. On presentation he complained of pain in his left groin and proximal thigh and had a short and externally rotated left lower limb. Plain radiographs of the pelvis revealed a fracture of the left Exeter femoral prosthesis at the neck-shaft junction. The cement mantle in the femur and acetabular component appeared to be intact (Figures 1 & 2). The patient subsequently underwent revision surgery.

Figure 1

Figure 1



Figure 2

Figure 2



At the time of surgery the acetabular component showed no signs of wear and was well fixed. The fractured stem was removed and examined. The femoral cement mantle was intact. A cement-in-cement revision was subsequently carried out using an Exeter short femoral revision stem with a 44 mm offset (Figure 3). The patient went on to make a good post-operative recovery.

Figure 3

Figure 3



DISCUSSION

The Exeter stem was initially introduced as a collarless, polished, tapered femoral stem in 1970 for use as part of a cemented total hip arthroplasty. The first 20 year follow-up of a series of 433 patients revealed a stem fracture rate of 3 percent. Stem design and low yield strength of stainless steel were thought to be responsible for these failures. In an attempt to increase the strength of the stem a matte finish was introduced in 1976. Between 1976 and 1984, 5000 such stems were inserted which reduced the fracture rate to 0.22 percent at the cost of increased endosteal lysis resulting from particulate debris produced from the rough matte surface. In 1986 the material was changed from 316L stainless steel to wrought high nitrogen stainless steel (Orthinox). At the same time the polished finish was reintroduced due to the high incidence of aseptic loosening seen with the matte finish. A prosthesis with similar geometry and design, the collarless, polished, tapered (CPT) stem (Zimmer, Warsaw, Indiana) was made from high strength material (forged cobalt-chromium) to avoid the stem fracture rate seen with the

Exeter stem. There have been documented CPT stem fractures in the literature in association with revision total hip arthroplasty and impaction bone-grafting.

To the best of our knowledge, there has been only one documented Exeter stem fracture (Jacco van Doorn et al. 2002) since this change. This had occurred 3.4 years after a third revision total hip arthroplasty in a 52 year old 70 kg female patient. Absence of a good medial calcar and good distal fixation of the stem resulted in a large moment arm that exerted its force on the slender part of the stem resulting in catastrophic failure.

Femoral stem fractures can be due to a combination of factors such as: 1) high stresses in the femoral stem from increased level of activity, patient weight, or relatively undersized prosthesis; 2) varus alignment of the stem; 3) calcar deficiency resulting in poor proximal bone support or fixation; 4) cantilever bending from good distal stem fixation in the presence of inadequate proximal cement mantle; and finally 5) material defects in the stem itself.

There is no doubt that our patient was overweight, and had a traumatic fall that contributed to failure of the implant. There is no documented patient weight limit from the manufacturers (Howmedica, Stryker) for either their standard, or cement-in-cement revision stems.

References

1. Jacco van Doorn W, van Biezen FC, Prendergast PJ, Verhaar JAN: Fracture of an Exeter stem 3 years after impaction allografting-a case report. *Acta Orthop Scand* 2002; 73 (1):111-113.
2. Rokkum M, Bye K, Hetland KR, Reigstad A: Stem fracture with the Exeter prosthesis- 3 of 27 hips followed for 10 years. *Acta Orthop Scand* 1995; 66 (5):435-439.
3. Jazrawi LM, Della Valle CJ, Kummer FJ, Adler EM, Di Cesare PE: Catastrophic failure of a cemented, collarless, polished, tapered cobalt-chromium femoral stem used with impaction bone-grafting. A report of two cases. *J Bone Joint Surg (Am)* 1999; 81 (6): 844-7.
4. Gie GA, Ling RS, Timperley AJ: Stem fracture with the Exeter prosthesis. *Acta Orthop Scand* 1996; 67 (2): 206-7.

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