Case Report

Difficulties associated with the variable geometry of different-offset Exeter long stems in cement-in-cement technique: A case report

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ABSTRACT

Although the cement in cement technique is a simple method for exchanging cemented stems, it may be technical demanding. The different geometry of different-offset Exeter long stems can be a problem with this technique. We describe a case revision hip surgery as a consequence of neglected bipolar hemiarthroplasty dislocation in which a 44 mm offset long stem was exchanged by a shorter and smaller size 37.5 mm offset stem. The implications of the procedure and the surgical pitfalls are discussed.

1. Introduction

Femoral cement-in-cement technique consists on re-cementing a new stem when the mantle of cement is well-fixed to the host bone.¹ It has a variety of indications that include revision of a damaged/broken stem (or with incompatible taper), modification of the implant version in cases of instability² and treatment of periprosthetic fractures in selected cases.^{3,4}

Although the cement in cement technique is a simple method for exchanging cemented stems, it may be technical demanding when downsizing the offset of long Exeter stems. The aim of this technical note is to warn against this fact in cement-in-cement technique.

2. Description of the case

We describe a case of a 78 year-old lady with body mass index of 25, medical history of Lewy body dementia, Parkinson's disease symptoms and very low physical demands who presented to the clinic with shortening and internal rotation deformity in her right hip without traumatic history. The patient had been operated for femoral neck fracture one month ago with implantation of bipolar hemiarthroplasty. Due to intraoperative perforation of the diaphysis, a 44 mm offset 220 mm in-length Exeter[®] stem (Stryker Howmedica Osteonics) had been employed to by-pass the area of perforation as well as cerclages and a bipolar cup. The family of the patient referred a decrease in the

patient activity about one week ago.

The x-ray showed dislocation of the hemiarthroplasty and bone fragments around the joint that suggested trochanteric gluteus avulsion (Fig. 1).

The diagnosis was neglected hemiarthroplasty posterior dislocation (7–10 days) with impaired abductor mechanism. In an attempt to perform closed reduction of the prosthesis, the patient was carried to the operating room under general anesthesia, but it was impossible to achieve.

A revision hip surgery was performed a few days later. The planification for surgery included the use of a constrained cup due to the abductor mechanism deficiency in a patient with low physical demand and dementia. It also included the exchange of the long femoral stem by other with less offset, in order to decrease the mechanical loading to the constrained liner and to reproduce the original offset. Besides, to allow reduction and leg length discrepancy, the planned stem had to be shorter and of a smaller size to allow the setting in a deeper situation.

A posterolateral approach was performed with the patient in lateral decubitus position. Gluteus maximus distal insertion was transected to facilitate the surgery. Avulsion fracture of the greater trochanter was assessed during surgery. In order to check stability, an attempt to reduce the dislocated bipolar hemiarthroplasty was done without success.

The cement of the proximal lateral part of the femur (over the shoulder of the stem) was removed by using a chisel. The stem was easily removed by using an extractor device. Re-cutting of the

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Fig. 1. radiological image showing hemiarthroplasty dislocation.

remaining femoral neck was done in order to place the stem in a deeper position.

A tripolar Trident® acetabular cup (Stryker Howmedica Osteonics)

was inserted press-fit and reinforced with 3 screws. A 205 mm in-length 37.5 mm offset Exeter stem (fully tapered) was the implant of choice for revision of the femoral component. When the stem was tested by manual insertion it didn't fit into the mould of the host cement, being completely blocked for insertion, leaving about 6 cm-length outside. Progressive diameter intramedullary reamers were used to widen the cement cavity to allow insertion of the new stem. When enough space was obtained, the canal was prepared for cement-in-cement technique following the principles of the Exeter team² and the new stem was inserted. As the removed stem anteversion was correct, no modification at the proximal part of the mantle of cement was done. Reduction was achieved without problems. As the muscles were completely retracted, no attempt of reattachment to the greater trochanter was done. No intraoperative complications occurred at the time of the surgery. The postoperative x-ray showed a satisfactory result, with adequate cement mantle and restoration of original femoral offset (Fig. 2).

The postoperative blood test revealed a low level of hemoglobin (8.4 g/dl), so the patient received transfusion of 2 packed red blood cells. The postoperative protocol consisted on weight bearing protection of the operated extremity for 4 weeks, and progressive limb loading assisted by a walking frame afterwards.

One month after the surgery the patient had no pain and the x-ray showed no mobilization of implants (Fig. 3).

3. Discussion

The femoral cement-in-cement technique (also called cement-within-cement technique) is a common procedure and can be performed without difficulties as the explanted stem comes out easily and the new one is inserted with a small amount of cement. Before the application of the new mantle of cement, rasping and drying is recommended. The mechanical properties of the new mantle of cement obtained by this technique have been tested in the laboratory, observing only a decrease of 6% in shear strength at the created interface if compared with a uniform layer of cement.¹ The good clinical results have been validated by a number of reports.^{5–7}

Fig. 2. postoperative x-ray (A: AP view; B: cross-table view).

Fig. 3. radiological image 1 month after surgery.

Although cement-in-cement technique is usually a simple procedure for exchanging cemented stems, some authors suggest that the cement mantle can seldom be left without some degree of preparation for the new inserted stem. It has been found in vitro that the Exeter system can be problematic in that way, not only for long stems.⁸

The Exeter team has developed the short 125 mm in-length stems that facilitate the procedure by its small length and distal section. This type of implants was not chosen for our case in order to avoid weakening of the femur by placing an excessive volume of cement at the site of a damaged femoral canal. At the time of the surgery, we found the cement reshaping procedure complex and time consuming.

The long Exeter stems of different offset have a specific geometry: the 37.5 mm offset long stem is fully tapered, while the 44 mm offset long stem has a proximal tapered part and a distal cylindrical part (Fig. 4). This fact can be problematic, so the cement mantle of a 44 mm-offset stem after removal have a narrow isthmus cavity that blocks the entrance of a 37.5 mm-offset stem, even if this is of a smaller size (Fig. 5).

The consequences of aggressive reaming inside the mantle of cement can be adverse. There is a possibility of excessive or eccentric reaming, which is not desirable as it may weaken or even provoke a fracture of the remaining mantle of cement. It may also be a source of complications such as intraoperative periprosthetic fracture. We recommend to make a rigorous preoperative planification that may include the consultation of the stem compatibility for in-cement revision,⁸ and adequate instrumentation to be prepared for reshaping the cement mantle, not only for insertion but to change the version of the new stem in cases when it was necessary.

4. Conclusion

Cement-in-cement technique with different-offset Exeter long stems can be a demanding technique, so meticulous preoperative planning

Fig. 4. picture showing the different geometry of long stems (A: 44 mm offset; B: 37.5 mm offset).

and operative instruments for reshaping the canal are advisable.

Conflict of interest

None.

Fig. 5. schematic representation of 37.5 offset long stem (A), 44 mm offset long stem (B), sagittal section of femur with the cement mould after removal of a 44 mm offset stem (C) and blocking effect of the cement to the entrance of the 37.5 mm offset stem (D) due to the narrow isthmus area (double-headed arrow).

References

- Greenwald AS, Narten NC, Wilde AH. Points in the technique of recementing in the revision of an implant arthroplasty. *J Bone Jt Surg Br.* 1978;60(1):107–110.
- Hubble MJW, Whittaker JP, Blake SM, Briant-Evans T. Cement in cement revision. In: Ling RSM, Princess Elizabeth Orthopaedic Hospital Exeter Hip Ueds. *The Exeter hip: 40 years of innovation in total hip arthroplasty.* Exeter: Exeter Hip Publishing; 2010:283–293.
- Briant-Evans TW, Veeramootoo D, Tsiridis E, Hubble MJ. Cement-in-cement stem revision for vancouver type B periprosthetic femoral fractures after total hip arthroplasty. A 3-year follow-up of 23 cases. *Acta Orthop.* 2009;80(5):548–552.
- Richards CJ, Duncan CP, Crawford RW. Cement-in-cement femoral revision for the treatment of highly selected vancouver B2 periprosthetic fractures. *J Arthroplasty.* 2011;26(2):335–337.
- Duncan WW, Hubble MJ, Howell JR, Whitehouse SL, Timperley AJ, Gie GA. Revision of the cemented femoral stem using a cement-in-cement technique: a five- to 15-year review. *J Bone Jt Surg Br.* 2009;91(5):577–582.
- Young J, Vallamshetla VR, Lawrence T. The polished tri-tapered stem for cement-in-cement revision hip arthroplasty, a reliable and reproducible technique? *Hip Int.* 2008;18(4):272–277.
- Mandziak DG, Howie DW, Neale SD, McGee MA. Cement-within-cement stem exchange using the collarless polished double-taper stem. *J Arthroplasty.* 2007;22(7):1000–1006.
- Berstock JR, Torrie PA, Smith JR, Webb JC, Baker RP. Stem compatibility for cement-in-cement femoral revision: an in vitro study. *Hip Int.* 2014;24(5):434–441.