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Recurrent implant fractures in total hip arthroplasty: a yes-you-yan case report

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This case report describes a single patient with recurrent implant fractures of his left total hip replacement. According to our knowledge this is the first patient in literature with recurrent implant fractures. This is a rare phenomenon as reason for revision. Risk factors for implant failure of total hip replacement include a lack of proximal support, a distally well fixed stem with proximal debonding, malalignment of the stem and raised BMI.

Keywords: hip arthroplasty, implant failure, hip replacement, hip revision.

INTRODUCTION

Implant failure after a total hip replacement (THR) is a rare phenomenon. A revision is always necessary if the patient is physically able to whitstand this. However, these revisions have their own surgical challenges. This case report describes a single patient with recurrent implant fractures of his left THR. The patient gave informed consent for this case-report.

CASE

A 73 year old male attended our Accident and Emergency (A&E) department early in 2022. His medical history noted a left primary THR for osteoarthritis in 2001. An Exeter stem (Stryker, Kalamazoo, Michigan, United States of America) and uncemented Exceed ABT cup (Zimmer Biomet, Warsaw, Indiana, United States of America) with two screws and a ceramic on polyethylene bearing were used (Figure 1). For the next 14 years he was very satisfied with his hip replacement.

By the end of 2015 he started to experience some left hip and thigh pain, which subsequently evolved in an acute setting when an implant fracture of the stem occured (Figure 2). During surgery a defect anterior in the proximal femur and a fracture of the calcar were found. After removal of the proximal part of the stem and proximal cement mantle intramedullary core reamers were used to explant the distal part of the stem. Unfortunately this was unsuccesful after multiple attemps. Three protective Dall Miles cables

Figure 1. — Primary THR with a cemented Exeter-stem (2001).

were placed. A small femoral window was created to knock the stem out from distal to proximal and the core reamers were used for the distal cement plug. For reimplantation the cemented C-Stem AMT High Offset Size 1 (DePuy, Synthes, Johnson & Johnson, Raynham, Massachusetts, United States of America) was chosen with a ceramic femoral head 28mm +8.5mm neck (Figure 3 & 4).

In the years after, the otherwise fit, healthy and normal weight patient returned to his regular cycling and walking, but nothing extraordinarily. He was not performing high intensity activities. Early in 2022 he attended our A&E after a walk in the woods where he experienced more and more pain during the walk. On

Figure 2. — Implant failure of the cemented Exeter-stem (2015).

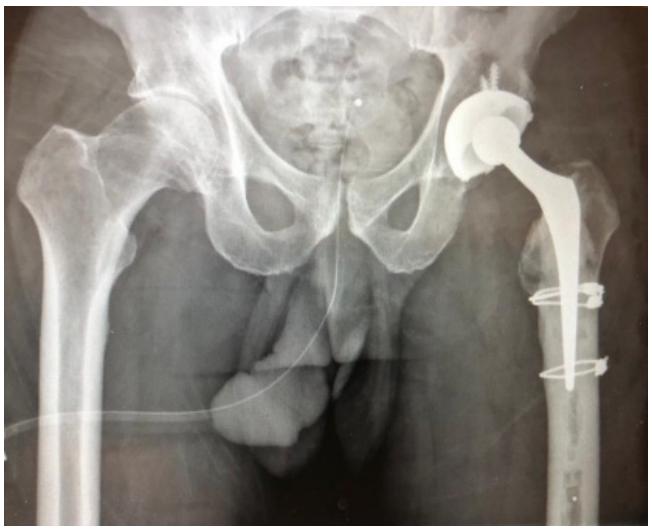

Figure 3. — Anteroposterior view after the first stem revision using a cemented C-stem and three protective Dall Miles cables (2015).

returning to his car he was unable to weightbear and knew there was something wrong. He was diagnosed with a recurrent implant fracture of his left THR (Figure 5).

We performed a posterolateral approach for the 3th time. The acetabular cup showed a good position and the polyethyelene did not show any signs of wear. The proximal end of the cement mantle and the proximal part of the stem were removed without any problems. The distal part of the stem was removed with the use of the ultra-burr pencil, osteotomes, curettes and intramedullary core reamers. This was complicated by a small false route on the anterolateral side of the femur at height of the broken stem. Cement was

Figure 4. — Lateral view after the first stem revision (2015).

Figure 5. — Implant failure of the cemented C-stem (2022).

Figure 6. — Anteroposterior view after re-revision with an uncemented modular stem (Restoration)(2022).

Figure 7. — Lateral view after re-revision of the stem (2022).

taking out using distal and cement reamers, retrograde hooks and the Oscar bone cement removal system. Reimplantation was performed with the Restoration stem ((Stryker, Kalamazoo, Michigan, United States of America) aiming for distal fit (Figure 6 & 7).

Similar to his previous procedures the patient returned to his daily routine without complaints.

DISCUSSION

This case report describes a single patient with recurrent implant fractures of his left THR. According to our knowledge this is the first patient in literature with recurrent implant fractures. Femoral implant fractures might occur as head-neck fractures, an example of gross trunnion failure related to the modular connection, neck-shoulder fractures and more distal implant fractures like the current case[1].

An implant fracture as reason for revision is rare. The 18th Annual Report of The National Joint Registry (NJR) reports on 37.444 first revision procedures, linked to a previous primary THR recorded in the registry between 2003 and 2020. For all cases, both cemented and uncemented and with any kind of articulation, the number of revisions per 1,000 prosthesis-year was found to be 0.14 (0.14-0.15) for implant fracture[2]. Sadoghi et al. performed a structured literature search and used national arthroplasty registrers as reference data to address the topic of implant fractures after THR. They found that a considerable portion of implants fractures could be related to ceramic-on-ceramic bearings. The incidence of stem fractures ranged from 0.2 to 25.71 revisions per 100 observed component year. Evaluation of all clinical studies (23) showed an average fracture rate of 0.43% (CI 0.40-0.47) for all arthroplasty components with reference to the patient's lifetime. Registry data showed an absolute frequency of risk after a primary THR of 1/323[3].

Literature reported different risk factors for femoral stem fractures: stress on the middle part of the femoral stem due to poor proximal support leading to a cantilever-bending, a distally well-fixed stem in combination with proximal debonding at the cement-implant interface, a raised BMI and a physical active patient with poor proximal support of the femoral stem[4-8]. In addition malalignment of the femoral stem (in varus or valgus), undersizing of the femoral stem and inadequate cementing techniques are all reported risk factors for femoral stem fractures[9,10]. With regards to the patient reported in the current report we believe the primary femoral stem was undersized and in varus. It could have been inserted more lateral. Preoperative templating is beneficial in THR and the surgeon should act to this peroperative. The index revision was performed with a small femoral stem (cement-in-cement revision) with inadequate proximal support. The patient was normally active, without high-intensity activities. The benefit of regular activity is well known and inactivity is considered a major risk factor for a number of adverse health outcomes, for this reason we believe regular non-high impact activities should not be forbidden.

CONCLUSION

This is the first study reporting on a single patient who sustained recurrent femoral implant fractures. This is a rare phenomenon as reason for revision. Risk factors include a lack of proximal support, a distally well fixed stem with proximal debonding, malalignment of the stem and raised BMI.

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