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A Rare Case of a Fractured Exeter V40 Stem in Revision Hip Arthroplasty

Ahmed Daoub[1,2], Mohammed Kaif Qayum[1], Khalid Ahmed Al-Hashimi[1], Darren Clark[1]

Learning Point of the Article:

The case is rare, at the time of writing there are only a handful of published papers detailing a fracture through an Exeter stem implant. In patients having undergone arthroplasty and especially those reporting pain, we urge clinicians to consider the possibility of Exeter stem implant fracture.

Abstract

Introduction: The Exeter stem by Stryker is a polished, double wedge, tapered,and stainless steel cemented implant that is known to have high mechanical strength, and therefore can carry a significant load.

Case Report: Due to the rare nature of fractures of this type of implant, its success and effectiveness within hip arthroplasty, the Exeter stem has become one of the most commonly used surgical treatment regimens for hip fractures. At present, there are only a handful of published papers detailing a fracture through an Exeter stem implant.

Conclusion: The current case report documents a rare case of a fractured Exeter V40 stem and its subsequent treatment.

Keywords: Revision arthroplasty, Exeter stem, Implant failure.

Introduction

Fractures of first-generation femoral stems are relatively common, with incidence as high as 4.1% within some designs; and when they do occur can be the most problematic complication following primary hip arthroplasty[1]. More recently significant alterations to the materials used to make stems, as well as their design and the surgical procedures utilized have meant that stem failures have become a rare occurrence.

The Exeter stem is a polished, double wedge, tapered cemented implant made with stainless steel. Although originally manufactured using polished ductile stainless steel, issues with subsidence meant the stem began to be made with a matte surface with 316L stainless steel, which was later changed to wrought high nitrogen Orthniox – a material known to have increased fatigue strength[1]. This change in material meant a reduction in the production of material debris around the interface of the implant and cement that could result in endosteal osteolysis, but increased rates of stem loosening. Despite this, it was found that controlled subsidence was beneficial, and the stem returned to being manufactured in polished material. Scheerlinck and Casteleyn noted that the Exeter implant utilizes a loaded-taper model within which the stem includes two or three tapered planes and reduces stress, in both the proximal and distal cement mantle, by the wedge of the stem becoming lodged in the cement mantle during the process of axial loading[2].

The current case report details a single incidence of a revision Exeter stem fracture within an elderly patient. Our hope is that this information can be used by surgeons to inform their decisions and improve patient outcomes.

Case Report

An 83-year-old gentleman (90kg, 178cm, body mass index:

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Author's Photo Gallery

Dr. Ahmed Daoub

[1]Department of Orthopaedic Surgery, Hereford County Hospital, Wye Valley NHS Trust, Hereford, United Kingdom,
[2]The Robert Jones and Agnes Hunt Specialist Orthopaedic Hospital, Oswestry, United Kingdom.

Address of Correspondence:
Dr. Ahmed Daoub,
Department of Orthopaedic Surgery, Hereford County Hospital, Wye Valley NHS Trust, Hereford, United Kingdom, The Robert Jones and Agnes Hunt Specialist Orthopaedic Hospital, Oswestry, United Kingdom.
E-mail: ahmed.daoub@nhs.net

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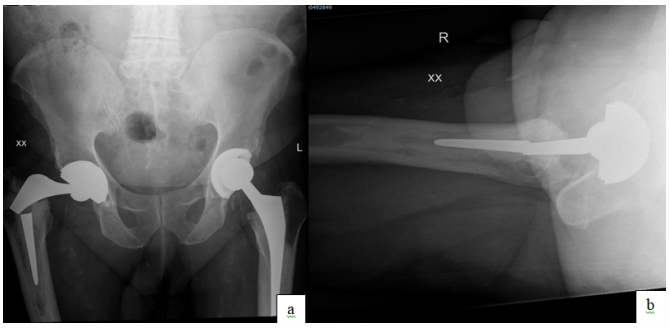

Figure 1: (a and b) AP and Lateral radiographs showing a fracture through proximal and middle third of V40 Exeter stem.

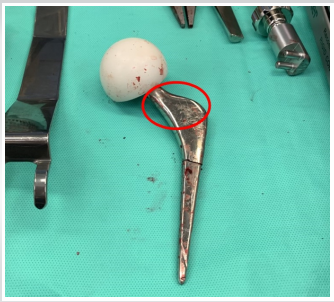

Figure 2: Demonstrating fractured retrieved V40 Exeter stem

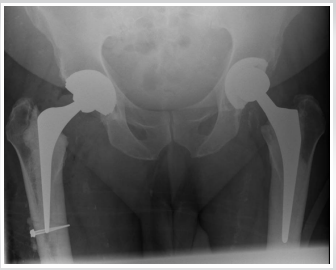

Figure 3: Postoperative AP hip andpelvis radiographs showing a V40 Exeter revision stem (44 offset 125mm) with cerclage wire.

28.4kg/m2) presented with a 10 day history of pain in the right hip and a 4 day history of inability to fully weight bear following a fall. He originally had a right uncemented total hip replacement for osteoarthritis performed in May 2009. Due to aseptic loosening, the original replacement failed and was revised to a cemented Exeter V40 stem in 2012. A further revision was performed in 2017 for dislocation. On examination, his right leg was short and externally rotated. There was also tenderness in the right groin. Radiographs showed the hip still in joint and a fracture of the Exeter stem (Fig. 1).

The patient had revision surgery through the posterior approach utilizing the old incision. Before this, he underwent aspiration of this right hip to exclude infection. Prophylactic antibiotics and tranexamic acid were administered at induction as per hospital protocol. Following dislocation of the hip, the acetabular component was found to be well fixed and was left in situ. The proximal fragment of the Exeter stem was removed with ease. The distal fragment was removed with difficulty following a 1cm × 3cm osteotomy distal to the tip of the stem, a drill to penetrate the cement mantle and explanted using a punch (Fig. 2). There was no overt sign of infection and the tissues looked healthy macroscopically. Five tissue samples were sent to microbiology for culture and sensitivity. Subsequently, the femur was prepared for a V40 Exeter revision stem (44 offset and 125mm length) after trial reduction. A 1.5 mixture of Palacos cement with gentamicin was used. The hip was reduced with a Dual mobility bearing using a 28mm Biolox Delta head and a 28/52mm X3 insert for modular dual mobility. Intraoperatively, the hip was stable and leg length restored.

Post-operative care included routine observations, a further three doses of antibiotics, bloods, Venous thromboembolism prophylaxis and a check X-ray (Fig. 3). The patient was mobile with a frame day 1 postoperatively. At 6 week follow-up, he was fully weight bearing independently with full range of motion in the hip. We plan to review him again in 6 months' time.

Discussion

At present, the Exeter stem is used within 64% of all cemented hip replacements in the UK [1]. The Exeter stem has been found to produce survivorship of a minimum of 20 years among younger patients. In a study utilizing a mean follow-up of 22 years, only one broken Exeter stem was reported among 130 hip arthroplasties and [3], among older patients, stem fractures are incredibly rare. Within the latest V40 version of the Exeter stem fractures are rare – Facek et al. found a small number reported in the peer-reviewed literature, with most occurring in earlier versions of the stem that utilized inferior designs or materials [4]. Revision surgery for femoral stems, as a result of metalwork fracture, is also rare –Samra et al. found 80 reported cases out of 800,000 between 1991 and 2008, globally 6].

The most common reasons for revision surgery are aseptic loosening, osteolysis, infection, and dislocation. Within the body, the greatest amount of stress is placed on the middle third of the stem, and this is where fractures most commonly occur. In vivo, cantilever bending, stress placed on the stem, and stress concentration can lead to fracture [1]. The factors associated with increased risk of metalwork fracture relate to the patient (e.g., increased BMI and reduced bone stock)are biological (e.g., osteolysis and inadequate proximal osseous support),and relate to the implant (e.g., undersizing and material defects) [5].

Conclusion

Within the current report, we present a case of a failed Exeter stem in an elderly patient with previous revision hip arthroplasty. Although rare, given the aging population and associated increased need for hip replacements, it is likely that more fractures of this nature will be reported. Therefore, clinicians must have as much information as is available, in order to understand the factors associated with failures, its complications and to improve patient outcomes. In patients having undergone arthroplasty, and especially those reporting pain, we urge clinicians to consider the possibility of Exeter stem implant fracture.

Clinical Message

The case is rare, at the time of writing there are only a handful of published papers detailing a fracture through an Exeter stem implant. Our hope is that this information can be used by surgeons to inform their decisions and improve patient outcomes.

Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

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