

# Broken prosthetic distal inter-locking modular femur stem: a case report of rare implant type failure

## Abstract

A 79-year old female presented with broken REEF™ stem (Depuy) femur prosthesis. She had three hip surgeries for trauma, followed by primary hip replacement (15 years before presenting) and later fifth surgery (seven years before presenting) for periprosthetic subtrochanteric femur fracture with a Depuy REEF™ stem system. The non-union at left femur subtrochanteric region fracture landed in this implant failure. The complex medical comorbidities and multiple hip surgeries made this a high-risk scenario. Patient recuperated satisfactorily but passed away 2 years post-operatively with urosepsis. Conclusion is that no prosthetic stem can be completely immune to failure.

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## Introduction

While broken femur stem prosthesis in total hip replacement, have been reported since long time, REEF™ stem<sup>1</sup> is a modular revision femoral prosthesis with one reported case of fatigue fracture.<sup>2</sup> Search was done using Google scholar, EMBASE, PubMed central and Cochrane database by keywords “Fracture, REEF, Femur, Stem.” Prosthetic femur stem failure with a fracture rate quoted to 0.30 % in a recent case control analysis for coated uncemented stems (2020).<sup>3</sup> REEF™ stem is suited with type IIIa, IIIb and type IV bone loss in proximal femur as per Paprosky classification.<sup>1,4</sup> It provides metaphyseal -diaphyseal engagement and distal locking support in the femur shaft. Factors contributing to the failure of prosthetic femur stems - lack of proximal cement bonding to the prosthesis (risk for fatigue fracture), Varus positioning, inadequate proximal bone stock, fracture non-unions and lack of calcar support in femur.<sup>1,2,5-9</sup> The evidence suggests possible preservation of viable bone stock during revision hip arthroplasty.<sup>10</sup>

## Case report

This was a 79-year old wheelchair bound lady who presented after a fall off her wheelchair with broken left femur REEF™ stem in-situ (done 7 years before the fall) with a non-union of closed subtrochanteric fracture in left femur. There was no distal neurovascular deficit in the affected leg. She had five surgical procedures on the same hip before she presented to our hospital. She lived alone at home with care givers.

Surgical challenges – multiple previous surgeries, lost tissue planes and loss of anatomical bony architecture, weak bone stock. Medical challenges were comorbidities like Diabetes mellitus, previous history of deep vein thrombosis, peripheral vascular disease, spinal stenosis, rheumatoid arthritis, right above knee amputation.

## Investigations

- i. Radiograph- sufficient to arrive at the diagnosis in this case (Figure 1)
- ii. A CT (computed tomography) scan with 3D reconstruction -for surgical planning

- iii. Routine blood tests (Full blood count, blood group liver function and renal function tests), chest radiograph, electrocardiogram, echocardiogram and arranging 4 units of cross matched blood were done as part of the detailed pre-anaesthetic work up and consent including the patient as well as the next of kin. This also involved discussion regarding “Do Not Resuscitate” decision that was appropriately taken.



**Figure 1** Pre-operative (above) and post-operative (below) images.

## Treatment

Detailed consent involving risk to life and discussion with family members was done as an essential part of surgical pre-operative planning. The patient underwent a complex hip arthroplasty revision via previous scar and posterior-lateral approach to the hip using a RECLAIM™ Stem system (Depuy) along with plate (as added strut support) and cable fixation. This prosthesis recommended in severe metaphyseal bone loss (Paprosky III and IV) where fixation is needed

at or beyond the diaphysis alone.<sup>11</sup> The proximal part of prosthesis was carefully with use of thin Mooreland's osteotomes. The distal part at isthmus was difficult to extract whilst preserving the bone stock and hence a bone window was created with narrow blade saw that was later restored and supported with the strict (plate) and cables. It showed good healing over 1 year follow up. As a part of pre-operative planning, proximal femur replacement prosthesis and instrument set were kept on stand-by in case of excess bone damage or poor quality of bone to withhold the RECLAIM™ stem.

### Follow up

- i. Superficial wound infection post-surgery- managed with intravenous and oral antibiotics successfully over 6 weeks
- ii. Satisfactory post-operative radiographs- fracture union seen (Figure 1)
- iii. Followed up to 1 and half year post operatively
- iv. Could stand with a walking frame with assistance
- v. Right above knee amputation for peripheral vascular disease 1 year after this hip surgery; passed away of urosepsis at 81 years.

### Discussion

The patient was discharged with an ongoing healing wound and no further complications. She was able to stand herself with support and had started using a wheeled walker frame. The distal most end of her wound was appreciated to be healed well, on her first clinic follow up at 6 weeks from discharge. She had peripheral vascular disease that worsened affecting her contralateral leg and hence planned for amputation. This limited her mobility to a great extent and made her practically wheelchair bound.

The biomechanical analysis of each individual hip is important and essential criteria both pre-operatively as well post-operatively. A CT scan often helps in planning in relation to the bone loss that is pre-existing in a revision arthroplasty of implant failure. It is observed that most case reports utilize the on-site methods available and detailed retrieval method of a planned case of revision hip for failed stem is often not available.<sup>12,13</sup>

The common factors observed for a failing femoral stem are excess neck offset, extralong head and both where applied. Other significant risk factors were male sex, high body mass index, low neck segments and straight component design.<sup>3</sup> Due to the limitation of word limit the detailed related literature discussion is currently not possible here, however we plan to continue our retrospective analysis aim to publish a detailed series of failed stems in the near future. We acknowledge the limitations as in any case report like selection bias, surgeon related factors and bias, reporting bias and lack of generalisability.

### Learning outcomes

- i. Prosthetic femur stems are not immune to failure
- ii. Salvage situation must be kept in mind while planning complex revision hip arthroplasty
- iii. Comorbidities pose challenges in pre-surgery optimisation and rehabilitation

- iv. A diaphyseal loading revision hip arthroplasty system was a bailout option in this particular case
- v. Mortality risk increases after hip fracture (four percent yearly increase<sup>14</sup>)

### Statement of consent

The patient was duly informed and aware that the case report may be published while hiding the identity.

### Acknowledgments

None.

### Conflicts of interest

The author declares no conflicts of interest.

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