

# FEMORAL COMPONENT BREAKAGE IN PRIMARY REVERSE HYBRID HIP REPLACEMENT - A CASE REPORT

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**Abstract:** Reverse hybrid hip replacement represents a combination of a cemented polyethylene cup and an uncemented femoral stem. Breakage of the femoral component is a rare complication in total hip replacement compared to loosening, periprosthetic fractures or infections. There are some methods described in literature used for removing the fractured femoral stems. Retrograde removing of the fractured prosthetic stem using a rigid femoral reamer introduced through a standard retrograde nailing approach can be helpful and it seems to be more effective compared with other methods, by preserving the proximal part of the femur leading to a superior stability of the new implanted prosthetic stem and early mobilization of the patient.

**Key words:** femoral stem breakage, revision surgery.

## 1. Introduction

Reverse hybrid hip replacement represents a combination of a cemented polyethylene cup and an uncemented femoral stem. Breakage of the femoral component is a rare mode of failure for total hip replacement compared to loosening, periprosthetic fractures or infections [5]. In case of femoral component failure some causes that could contribute to breakage are described: large size of patients, valgus positioning or metallurgical inadequacies of the prosthetic stem [4]. There are some methods described in literature used for removing fractured femoral stems: the femoral trephine technique, femoral cortical window technique, extended femoral osteotomy procedure and retrograde nail

impaction via the knee joint [1].

The aim of the present study is to highlight the possibility of this condition in patients with reverse total hip replacement and the method used for revision surgery.

## 2. Materials and Methods

We report a case of a 70-year-old male who underwent reverse left total hip replacement for osteoarthritis of the hip in September 2014. The patient was doing very well with the hip till March 2016, when after a forward leaning movement, he complained of pain in his left hip, difficulty to bear weight and impossibility to walk without crutches. A day after, he presented himself in our clinic where after an X-ray exam of the hip he was

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diagnosed with fracture of the prosthetic stem Fig. 1 and he was programmed for hip replacement revision surgery.

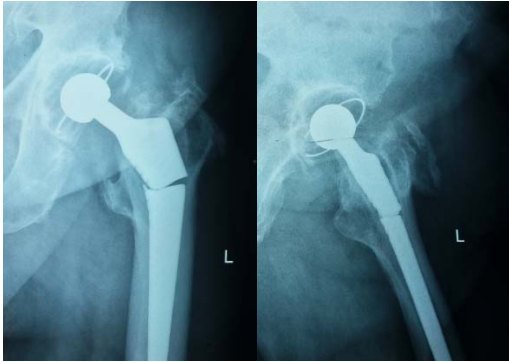


Fig. 1. *Preoperative hip X-ray.*

The surgery was performed in supine position and the hip was approached through a lateral modified Hardinge approach. The periprosthetic fibrous tissue was removed and the hip joint was exposed. After dislocating the prosthesis, the proximal part of the broken stem was extracted out without any difficulties and the distal part of the well-fixed stem was removed using a retrograde rigid femoral reamer passed through the knee joint, using a standard retrograde nailing approach. Fig. 2.

A long osteotome was used first to create a space between the bone and the broken femoral component, in the proximal part, to release the adhesions to the bone. The rest of the stem was pushed out proximally through the reamer using a hammer and was extracted through the proximal part of the femur.



Fig. 2. *Broken extracted femoral stem.*

The PE cup was left in place because of the good intraoperative stability. Following this, the proximal femur was rereamed and a new cementless prosthetic stem and ceramic head were implanted. The hip dislocation was reduced proving to be very stable. After this, gluteus medius and minimus tendons were repaired and the closure followed in layers. Written informed consent was obtained from our patient regarding personal information's presented in this case report.

### 3. Results and Discussion

Beginning with the second postoperative day the patient was able to bear weight using a static walking frame without any difficulties and 3 weeks after surgery he began walking with two crutches. Muscle strengthening began from the day of surgery and was continued up to 3 months after surgery. No postoperative wound complications were encountered. The postoperative X-ray showed a very good implanted stem proved to be very stable. Fig. 3.

At the six months follow-up the patient regained full range of motion of his operated hip joint, and was able to walk without any difficulty. The knee joint was free of pain with normal ROM.

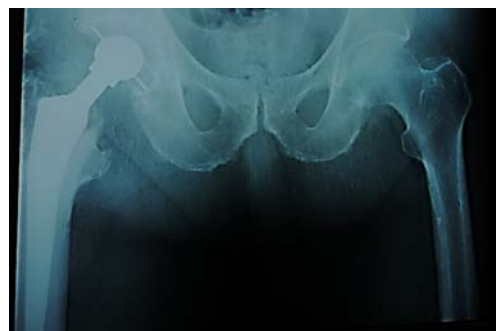


Fig. 3. *Postoperative X-ray.*

Femoral stem fracture is a rare complication that can be encountered after total hip replacement and can be challenging for surgeon. The incidence is

very low compared to other complications and is reported to be 0,27% for cemented and cemented less prosthetic stems [6]. In Romania the rate of implants breakage was of 0,8% in the past 14 years [7]. Metal failure has been advocated to be the most often cause of breakage and take place typically in the middle third of the prosthetic stem [6].

Metallurgical analysis of the broken femoral stems showed that gas porosity, non-metallic inclusions and interdendritic shrinkage can cause stems failure which occur after an average of 6,7 years [3].

Microscopic studies of the fractured femoral stems highlighted numerous defects in material structure: pores and emptiness, located on the outskirts of the stems. A clear correlation between the grain size of the steel and its hardness was advocated. [8].

Other factors involved in stem failure are either valgus or varus malposition, retroversion, obesity (patients with BMI>30), active patients, poor metaphyseal bone support, component diameter <13.5 mm, under dimensioning of the femoral components or stems that are well-fixed distally into the shaft with poor fixation proximally [14].

Removal of fractured femoral stems especially in case of well-fixed stems continues to be a very difficult procedure.

Normally, the proximal part of the prosthetic stem can be easy removed but sometimes it is very difficult to remove the distal part which can be very well fixed and stable.

There are several methods described for extraction each with its advantages and disadvantages.

Cortical window technique is technically much easier than the metal drilling technique and doesn't require special instrumentation. The technique can also be useful as a back-up procedure when metal drilling procedures fail [9].

Extended femoral osteotomy technique offers a very good exposure of the broken stem, preservation of soft tissue attachments to bone, it facilitates an accurate distal cement removal in case of cemented stems, but the osteotomy site must be repaired with cerclage wires or cables and this can extend the recovery period of the patient and weaken the stability of the new implanted stem [13]. The osteotomy starts eight to 20 cm below the tip of the greater trochanter and ranges in length from 12 cm to 14 cm and sometimes is extend further along the distal part of the femur. A longer stem must be implanted at least 6 cm distal to the lower end of the lateral cut off the osteotomy which results in considerable additional compromise of the femoral bone stock. Complications like: non-union, fracture of the osteotomy fragment and subsidence of the stem were reported. [5].

Some cadaver experiments showed that the window technique significantly weakens resistance of femur against rotation under compression forces, this weakening does not occur in case of retrograde removal technique. Biomechanical resistance of the femur against compression and torsion forces is greatly decreased in case of cortical window technique compared with the retrograde removing technique, which shows no significant change. The method can be easy used for both cemented and uncemented stems [11].

Although this method seems to be safe, cortical fracture at the apex of the stem was reported, especially in case of cemented stems due to the contour of the cement mantle at the tip of the stem [10].

The trephine technique seems to be more complex and technically pretentious compared to other methods with risk of perforation into posterior cortex of the femur [2].

## 5. Conclusions

Retrograde removing of the fractured prosthetic stem using a rigid femoral reamer introduced through a standard retrograde nailing approach can be helpful and it seems to be more effective compared with other methods, like femoral cortical window technique or extended femoral osteotomy procedure, by preserving the proximal part of the femur, leading to a superior stability of the new implanted prosthetic stem and early mobilization of the patient. In our case the patient was able to walk beginning with the second postoperative day with walking frame with full weight bearing. The recovery period was shorter compared to other hip revision surgery. The only disadvantage of this method compared to others is related to the knee arthrotomy and its risks. Anyway, a longer follow-up time and further studies on larger number of patients are required to confirm the benefits of this procedure compared to other methods.

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