Case Report | Journal of Orthopaedic Case Reports 2022 October:12(10):Page 61-65

Wedge Episiotomy for Long Cemented Femoral Stem Removal and Reconstruction. A Case Report on One-Stage Revision for Failed Bipolar for Proximal Femur Giant Cell Tumor

Kalaivanan Kanniyan[1], K Manivannun[2]

Learning Point of the Article:

A novel osteotomy around femur during revision hip arthroplasty for femoral stem extraction with bone preservation.

Abstract

Introduction: Osteotomy around proximal femur provides excellent exposure and helps in revision of both cemented and uncemented femoral stem. Hereby, describing our case report on wedge episiotomy, a new surgical technique for removal of distal fitting cemented or uncemented femoral stem in conditions were extended trochanteric osteotomy (ETO) becomes inappropriate and episiotomy becomes inadequate.

Case Report: A 35-year-old lady presented with painful right hip and difficulty in walking. Her X-rays showed a dissociated bipolar head and long cemented femoral stem prosthesis. She gave history of proximal femur giant cell tumor operated with cemented bipolar which failed in 4 months (Figs. 1, 2, 3). There were no signs of active infection such as discharging sinus and elevated blood infection markers. Hence, she was planned for one-stage revision of the femoral stem and conversion into total hip arthroplasty.

Surgical Technique: A small trochanter fragment, along with the abductor and vastus lateralis continuity, was preserved and mobilized away augmenting hip exposure. The long femoral stem was found well fixed with a cement mantle all around in an unacceptable retroversion. There was metallosis with no macroscopic signs of infection. Taking in consideration of her young age and the long femoral prosthesis with cement mantle, the idea of ETO was considered inappropriate and more iatrogenic.

Initially, an episiotomy was done along the lateral border of femur with an oscillating saw to interrupt the radio compressive force of the bone along the cement mantle and stem. However, the lateral episiotomy was not sufficient to loosen up the tight fit between bone and cement interface. Hence, a small wedge episiotomy was done along the full length lateral border of the femur (Figs. 5 and 6). A lateral wedge of 5 mm bone was removed increasing the exposure of bone cement interface with intact 3/4th cortical rim. This exposure allowed 2 mm K-wire, drill bit, flexible osteotome, and micro saw to go in between the bone and cement mantle to dissociate it. A 240 x 14 mm long uncemented femoral stem was fixed using bone cement extending along the entire femur length, With utmost care, all the cement mantle and implant were removed. The wound was soaked with three minutes of hydrogen peroxide and betadine solution and washed with high jet pulse lavage. A long 305 × 18 mm Wagner-SL revision uncemented stem was placed with adequate axial and rotational stability (Fig. 7). The long straight stem of 4 mm wider than the extracted was passed along the anterior femoral bowing augmenting the axial fit and the wagner fins helped in getting the much need rotational stability (Fig. 8). The acetabular socket was prepared with uncemented cup size of 46 mm with a posterior lip liner poly and 32 mm metal head was used. The wedge of bone was kept back along the lateral border and help with 5-ethibond sutures. Intraoperative histopathology sampling did not show any evidence of giant cell tumor recurrence, ALVAL score of 5 and microbiology culture grew negative. The

Access this article online

Website: www.jocr.co.in

DOI: 10.13107/jocr.2022.v12.i10.3368

Author's Photo Gallery

Dr. Kalaivanan Kanniyan

Dr. K Manivannun

[1]Department of Arthroplasty and Oncology, Asian Institute of Orthopaedics, SIMS Hospitals, Chennai, Tamil Nadu, India,
[2]Director, Department of Orthopaedics, Manisundaram Medical Mission, Vellore, Tamil Nadu, India.

Address of Correspondence:
Dr. Kalaivanan Kanniyan,
Department of Arthroplasty and Oncology, Asian Institute of Orthopaedics, SIMS Hospitals, Chennai, Tamil Nadu, India.
E-mail: drkkbriyan@gmail.com

Submitted: 09/07/2022; Review: 27/08/2022; Accepted: September 2022; Published: October 2022

DOI:10.13107/jocr.2022.v12.i10.3368

physiotherapy protocol included non-weight-bearing walking for 3 months, later then partial loading was started and complete loading was done by end of fourth month. The patient had no complication such as tumor recurrence, periprosthetic joint infection (PJI) and implant failure at end of 2 years (Fig. 9).

Keywords: Wedge episiotomy, revision total hip arthroplasty, giant cell tumor, extended trochanteric osteotomy, episiotomy.

Introduction

Revision total hip arthroplasty (THA) requires several osteotomy as a part of the approach for additional exposure for implant retrieval and reconstruction. These osteotomies are aimed to avoid iatrogenic bone loss and help in bone preservation. They allow a safe and efficient method for cemented and uncemented femoral stem revision [1].

Pre-operative planning

A complete clinical history and examination of the previous scar area was done to rule out chances of PJI. Blood investigation included C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), D-dimer and Procalcitonin to rule out PJI. Radiological examination included study of serial x-rays to rule out immediate subsidence and late aseptic loosening. Fresh x-rays included pelvis with both hip joint to assess acetabular bone stock and full length femur x-ray to study the available distal bone stock.

Requirements of surgery

Instrumentation plays a vital role in revision arthroplasty. The revision set including thin flexible osteotome, oscillating saw, long thick K-wires, long drill bits, cement extractor, image intensifier, pulse lavage were the essential requirements.

Indications and contraindications

Wedge episiotomy is considered where extended trochanteric osteotomy (ETO) is considered to be inappropriate and episiotomy is inadequate. A distal fitting stems length > 20 cm either cemented or uncemented are classical indications.

Wedge episiotomy is contraindicated when distal condylar portion of femur is involved and where ETO is appropriate for removal of distal fitting stems length <20 cm.

Surgical anatomy

The lateral border of femur below the greater trochanter and above the distal condylar region has limited muscle origin and insertion, causing less soft-tissue damage. The posterior approach gives a good global view of the entire femur length, helps in easy isolating and protecting of sciatic nerve with least vascular injury. The thick linea aspera along the posterior border and the medial cortex support is preserved. The iliotibial band force along the lateral border of femur favors the wedge osteotome and dissipates the force.

Case Report

Pre-operative planning included proper history taking. A 35-year-old lady with painful right hip and difficulty in walking attended our clinic. Her radiological evaluation showed a dissociated bipolar prosthesis and long cemented femoral stem. She gave past history of giant cell tumor, for which she underwent cemented bipolar and failed within 4 months (Fig. 1, 2, 3). The skin scar was health with no sinus or discharge. Her blood reports did not show any signs of peri-prosthetic joint infection (CRP = 12, ESR = 28). Radiological examination included pelvis with both hip joint and long length femur anteroposterior and lateral views. Serial X-ray study was done to note subsidence. Her bone scan did not reveal any other distant metastasis. She was planned for revision of the femoral stem and conversion into THA.

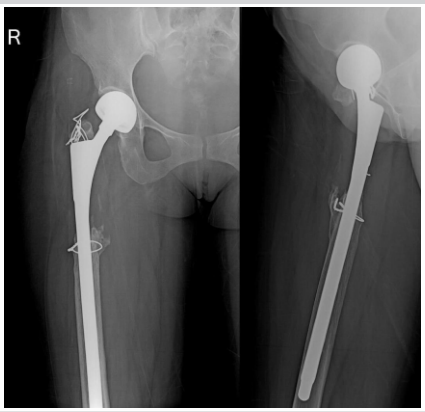

Figure 1: Bipolar with long cemented femur stem.

Figure 2: Failed bipolar prosthesis.

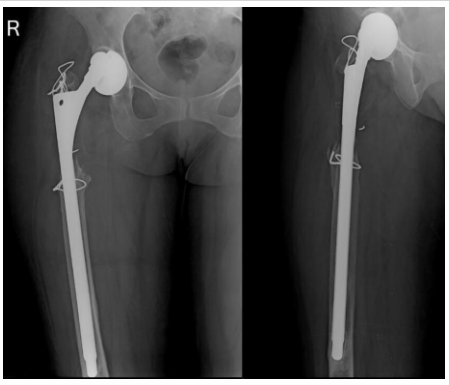

Figure 3: Failed bipolar prosthesis with long cemented femoral stem.

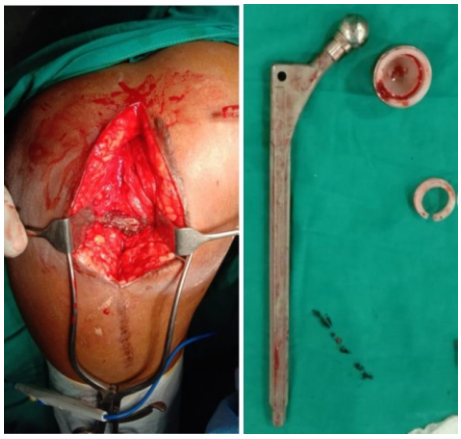

Figure 4: Metallosis and extracted implant.

Figure 5: Wedge osteotomy along the lateral border saw bone demo.

Figure 6: Diagrammatic representation of wedge osteotomy along the lateral border.

Surgical technique

This procedure was performed with patient in lateral position and conventional posterior approach. Hip was exposed in layers along the old scar. Metallosis was seen all around with no frank pus (Fig. 4). The old metal wires around greater trochanter were removed along with loose fragments. A small trochanter fragment along with the abductor and vastus lateralis continuity was preserved and mobilized away augmenting hip exposure. The long femoral stem was found well fixed with a cement mantle all around in an unacceptable retroversion. There was metallosis with no macroscopic signs of infection. Taking in consideration of her young age and the long femoral prosthesis with cement mantle, the idea of ETO was considered inappropriate and more iatrogenic.

Initially, an episiotomy was done along the lateral border of the femur with an oscillating saw to interrupt the radio compressive force of the bone along the cement mantle and stem. However, the lateral episiotomy was not sufficient to loosen up the tight fit between bone and cement interface. Hence, a small wedge episiotomy was done along the lateral border of the femur (Fig. 5, 6). A wedge of 5 mm bone along the lateral aspect was removed increasing the exposure of bone cement interface and still keeping the rest of cortical rim intact. This exposure allowed our 2 mm K-wire, drill bit, flexible osteotome, and micro saw to go in between the bone and cement mantle to dissociate it. With utmost care, all the cement mantle and implant were removed. The femoral stem removed was basically an uncemented design 240 × 14 mm fixed with cement all the way down the distal femur. The wound was washed with hydrogen peroxide and betadine solution with high jet pulse lavage and the wound was redraped. A long 305 × 18 mm wagner revision uncemented stem was

Figure 7: Intraoperative picture showing implantation after wedge osteotomy.

Figure 8:Immediate post-operative..

Figure 9: Two-year follow-up image.

placed with adequate axial and rotational stability (Fig. 7). The long straight stem of 4 mm wider than the extracted was passed along the anterior femoral bowing augmenting the axial fit and the wagner fins helped in getting the much need rotational stability. The acetabular socket was prepared with uncemented cup size of 46 mm with a posterior lip liner poly and 32 mm metal head was used. The wedge of bone was kept back along the lateral border and help with 5-ethibond sutures. Intraoperative histopathology sampling did not show any evidence of giant cell tumor recurrence and microbiology report was negative. The fill length X-ray was found satisfactory (Fig. 8). The patient was kept in non-weight bearing walking for a month of 3 months, and then, complete loading was started in the end of 4th month. The patient had no complication at end of 2 years and is in regular follow-up (Fig. 9).

Discussion

Sliding osteotomy, ETO, Wagner osteotomy, and episiotomy are some of the osteotomy described around proximal femur in revision THA. Steel wire, cable fixation, cable plate fixation, polymer cable plate fixation, polyethylene fiber cable, and suture fixation are some of the methods for reconstruction of the osteotomy site in both septic and aseptic revision THA [2, 3].

ETO is considered to be the workhorse osteotomy. It gives greater bone cement interface exposure and helps in cement mantle removal and implant extraction with minimal bone loss both cemented and uncemented. ETO helps in realignment of proximal femoral varus and retroversion remodeling with bone preservation. It is also used in cases with severe trochanteric osteolysis, periprosthetic joint infection revision, and periprosthetic fracture fixation [1, 4].

Taylor and Rorabeck, in 1999, found that ETO is in appropriate in certain conditions and did a longitudinal split called episiotomy down the anterior cortex to relieve tension of femur holding the implant and help in exposure of bone cement interval facilitating implant disimpaction [5]. Bauze et al. described episiotomy along the posterior longitudinal split for a removal of stable femoral stems with stable fibrous ingrowth and bony in growth [6]. Banuls et al. described episiotomy along the lateral aspect of femur which proved to be simpler in exposure with good results in removing uncemented well-fixed femoral stems [7]. The length of the ETO should be based on the type of uncemented femoral stem; it should be the length of the stem in case of macroporous, 3–4 cm shorter to its entire length in case of microporous or to the size of the coating portion [8]. The extraction instruments can be either intra canal or peridiaphyseal to remove the bone cement, ultrasound-guided heat to remove the cement plug with less iatrogenic fracture, and bone preservation [9]. The patient should be aware of the complications following extraction technique either intramedullary or extramedullary of cemented and uncemented femoral stems with or without ETO [10].

Post-operative management

The physiotherapy protocol included non-weight-bearing walking for 3 months, later then partial loading was started and complete loading was done by end of fourth month after follow-up X-ray. Knee brace was used for first two weeks to avoid knee buckling and hip dislocation. Chest physiotherapy, Static quadriceps, hamstring exercise, and ankle pumps along with pelvic floor muscles are started from day one. Knee range of motion was increased slowly and steadily after two weeks.

Tips and tricks

Posterior approach with global view of surgical site, episiotomy to begin with so it can be extended to wedge episiotomy.

Pitfalls

The wedge episiotomy once decided and performed cannot be reversed back to our traditional ETO. It should be less than or equal to 5 mm to ensure a cortical grip.

Complications

Iatrogenic fracture along the femoral mid shaft or distal third will no longer fit for a long distal fitting stem and may require high profile stems like REEF with distal locking or even total femur prosthesis.

Results and Conclusion

The episiotomy along the lateral border is considered safe with less soft-tissue muscle damage. When the episiotomy is found inadequate, it is expanded into a wedge episiotomy to increase the exposure facilitating implant removal. The cortical rim fit is more affordable in wedge episiotomy in comparison with the ETO. The removed wedge of bone can be placed back and used as graft along with bone graft substitutes and held with ethibond sutures or described fixation techniques.

Clinical Message

The first described "wedge episiotomy" is an innovative easy technique which can be applied, where ETO is considered inappropriate and episiotomy inadequate. It guarantees an adequate exposure of bone cement interface allowing the flexible osteotome, oscillating saw, midus burr, drill bit, and K-wire to work on the bone cement mantle removal. It helps in removing the long cemented and uncemented femoral stems without much iatrogenic fracture.

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

References

1. Melnic CM, Paprosky WG. Extended trochanteric osteotomy: Component retrieval and repair. Semin Arthroplast 2016;27:264-7.
2. Glassman AH. Exposure for revision: Total hip replacement. Clin Orthop Relat Res 2004;420:39-47.
3. Sundaram K, Siddiqi A, Kamath AF, Higuera-Rueda CA. Trochanteric osteotomy in revision total hip arthroplasty. EFORT Open Rev 2020;5:477-85.
4. Levine BR, Valle CJ, Lewis P, Berger RA, Sporer SM, Paprosky W. Extended trochanteric osteotomy for the treatment of vancouver B2/B3 periprosthetic fractures of the femur. J Arthroplasty 2008;23:527-33.
5. Taylor JW, Rorabeck CH. Hip revision arthroplasty approach to the femoral side. Clin Orthop Relat Res 1999;369:208-22.
6. Bauze AJ, Charity J, Tsiridis E, Timperley AJ, Gie GA. Posterior longitudinal split osteotomy for femoral component extraction in revision total hip arthroplasty. J Arthroplasty 2008;23:86-9.
7. Bañuls M, Crawshaw C. Lateral femoral split: An alternative for uncemented femoral stem revision surgery. Orthopedics 2000;23:676-8.
8. Meek RM, Greidanus NV, Garbuz DS, Masri BA, Duncan CP. Extended trochanteric osteotomy: Planning, surgical technique, and pitfalls. Instr Course Lect 2004;53:119-30.
9. Fletcher M, Jennings GJ, Warren PJ. Ultrasonically driven instruments in the transfemoral approach-an aid to preservation of bone stock and reduction of implant length. Arch Orthop Trauma Surg 2000;120:559-61.
10. Laffosse JM. Removal of well-fixed fixed femoral stems. Orthop Traumatol Surg Res 2016;102:S177-87.

Conflict of Interest: Nil
Source of Support: Nil

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

How to Cite this Article

Kalaivanan K, Manivannun K. Wedge Episiotomy for Long Cemented Femoral Stem Removal and Reconstruction. A Case Report on One-Stage Revision for Failed Bipolar for Proximal Femur Giant Cell Tumor. Journal of Orthopaedic Case Reports 2022 October;12(10): 61-65.