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Case Report Open Access

Revision Total Hip and Total Knee Arthroplasty for Massive Bone Loss and Periprosthetic Fracture Using a Total Femur Prosthesis: A Case Report

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Abstract

The number of complex total joint arthroplasties being performed each year is continually rising. Patients are undergoing primary and revision total joint arthroplasties at a relatively younger age and face a greater possibility of multiple revision procedures during their lifetime. Surgeons are often faced with significant osteolysis and bone loss and must find ways novel ways to deal with this difficult problem. Total femur arthroplasty using a megaprosthesis is a rare procedure and has been mainly described in the orthopaedic oncological literature, however it has not been described in aseptic, non-tumour related, revision procedures addressing massive bone loss, component loosening and periprosthetic fracture involving ipsilateral hip and knee joints. We present the case of a simultaneous revision total hip and total knee arthroplasty for massive femoral bone loss, aseptic loosening, periprosthetic fracture and functional leg length discrepancy using total femur megaprosthesis. We will briefly review the relevant literature, present the clinical presentation, imaging and surgical procedure as well as the early post-operative course. To our knowledge, total femur replacement for this indication has not been previously described.

Keywords: Total joint arthroplasty; Total knee arthroplasty; Total hip arthroplasty; Total femur arthroplasty; Megaprosthesis; Periprosthetic fracture

Abbreviations: TJA: Total Joint Arthroplasty; THA: Total Hip Arthroplasty; TKA: Total Knee Arthroplasty; TFR: Total Femoral Replacement; ADLs: Activities of daily living

Introduction

Extensive bone loss and osteolysis is a common problem faced by arthroplasty surgeons [1-3]. In the majority of cases, defects can be filled or bridged with cement, autologous bone graft, impaction graft, allografts, various types of revision implanted hardware and many more [4-6]. However, in certain circumstances, the bone loss can be so extensive that none of these methods would allow for proper implant fixation, restoration of alignment or leg length. In these situations, joint and femoral replacements using megaprosthesis can become necessary. The first report describing TFR using a prosthesis was in 1965 [7] and since then case series have been published predominantly in the surgical oncology literature [8-10] and smaller series of TFR performed for limb salvage after infection and periprosthetic fracture [11-13]. We describe the case of a 56 year old woman who presented with several months of severe groin, leg and knee pain and an inability to bear weight and transfer secondary to left femoral bone loss, THA and TKR periprosthetic fractures and severe functional leg length discrepancy. There have been no published reports describing TFR for such an indication.

Case Report

Patient MG is a 59 year old woman with multiple medical comorbidities which include psoriatic arthritis, recurrent deep vein thrombosis, asthma, previous left total knee (1998) and hip (2006) replacements. She presented to Kingston General Hospital, a tertiary care center in Kingston, Ontario with a suspected left hip fracture and bilateral pneumonias. She was found to be deconditioned, edematous in her lower extremities and ischial pressure ulcers were noted. Further history revealed several months of severe left groin, leg and knee pain, an inability to ambulate or transfer, an inability to manage simple ADLs and progressive respiratory and functional deterioration. She was admitted to the intensive care unit for respiratory support and eventually stabilized. Physical exam demonstrated a deconditioned woman, appearing older than her stated age with significant left leg muscular atrophy and deformity (Figures 1-3). Anteroposterior and lateral radiographs as well as computer tomography scan of her left hip, femur and knee leg were performed and showed massive femoral bone loss, loosening of the femoral component and periprosthetic fracture of the knee (Figures 4-6). Preoperative work-up was negative for infection and after clearance by the anesthetic service, the orthopedic service recommended surgical intervention to allow the patient to transfer, mobilize and for pain control.

Following the administration of 2 grams Cefazolin, a standard posterior approach to the hip was developed and we performed a greater trochanteric slide preserving the abductors for later repair. The lateral femur was exposed in its entirety. The bone was extremely soft and fractured with minimal handling. The gluteus maximus and iliopsoas insertions were dissected and tagged for later repair. As this was not a tumour case, the medial femoral cortex with adductor insertion was preserved for later repair. Early on, we moved our attention to the tibial reconstruction in order to recreate the joint line of the knee on which we could then build our proximal construct. The femur could not be removed en bloc (Figures 7-9) which made determining femoral implant length challenging. Following the removal of all implants, we sent tissue samples for white cell count per high power field which returned as normal. Final repairs included the medial femoral cortex with retained adductors (Figure 10-12), the iliopsoas was repaired to the inferior capsule and proximal femoral stem, the greater trochanter with the abductors was repaired to the stem and finally the abductors were reinforced with the gluteus maximus tendon.

Postoperatively, radiographs were performed and showed no

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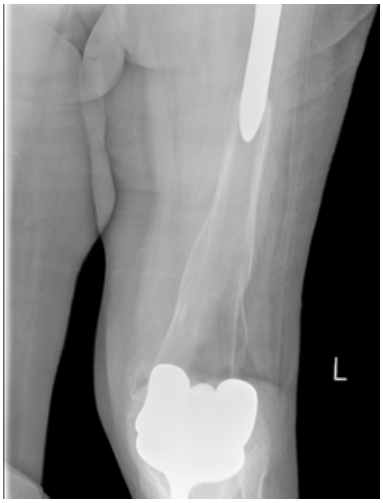
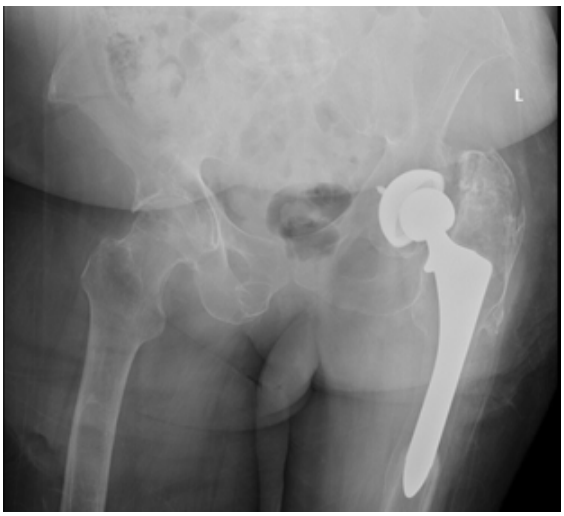
Figures 1: Left hip apparent leg length discrepancy of 4cm. True leg length discrepancy as measured radiographically from ischial spine to lesser trochanter was 5.5 cm.

Figures 2: acture. The left knee had a healed midline incision, range of motion was flexion to 95 degrees and a 10 degree flexion contracture.

Figures 3: Hip showed a healed posterior incision, hip flexion to 85 degrees and 45 degrees flexion contracture. The left knee had a healed midline incision, range of motion was flexion to 95 degrees and a 10 degree flexion contracture.



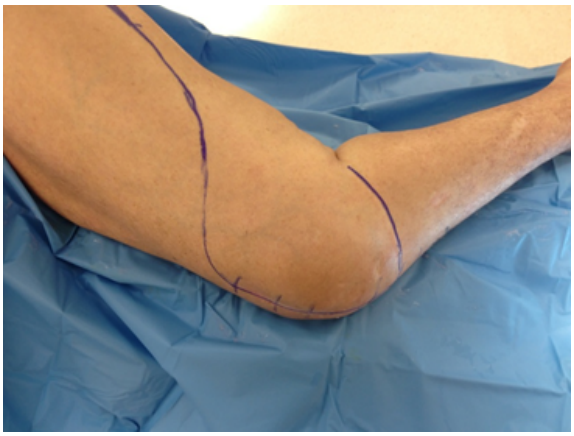
Figures 4: Pre-operative anteroposterior radiographs and CT scan



Figures 5: Pre-operative anteroposterior radiographs and CT scan

Figures 6: Pre-operative anteroposterior radiographs and CT scan

Figures 7: A curvilinear incision was made to facilitate a posterior approach to the hip joint, a lateral approach to the thigh and anterior approach to the knee utilizing her previous incisions.



Figures 8: A curvilinear incision was made to facilitate a posterior approach to the hip joint, a lateral approach to the thigh and anterior approach to the knee utilizing her previous incisions.

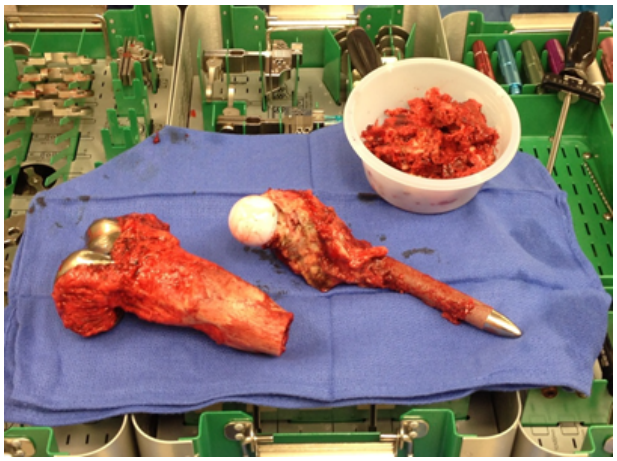


Figure 9: Proximal and distal femoral components with intervening bone

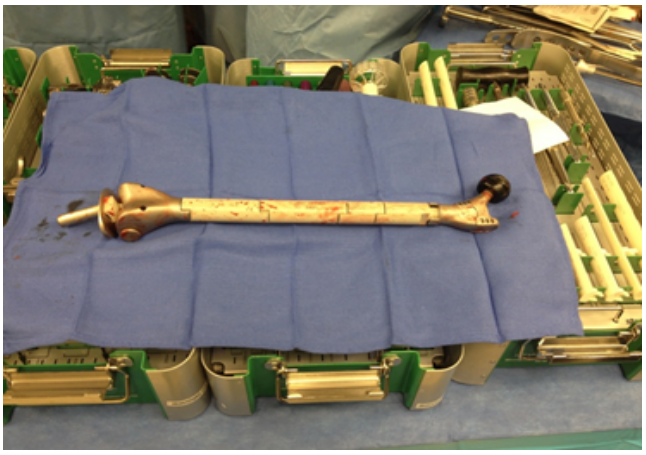


Figure 10: Stryker Global Modular Replacement (GMRS)™ Trial.

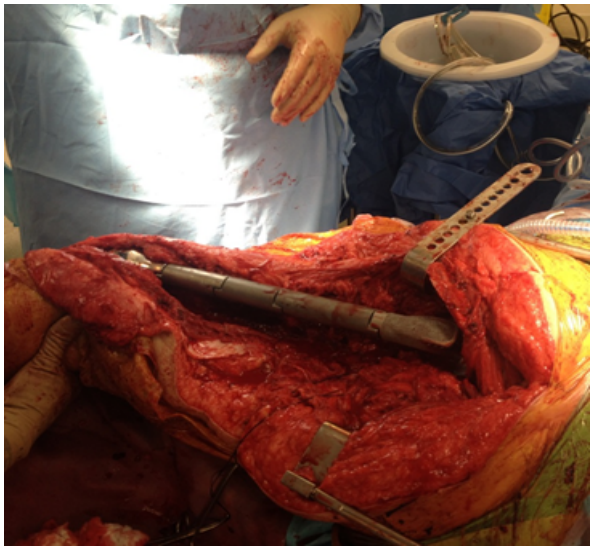


Figure 11: Trialing with the Stryker Global Modular Replacement System (GMRS) ™ to gauge stability, alignment and length

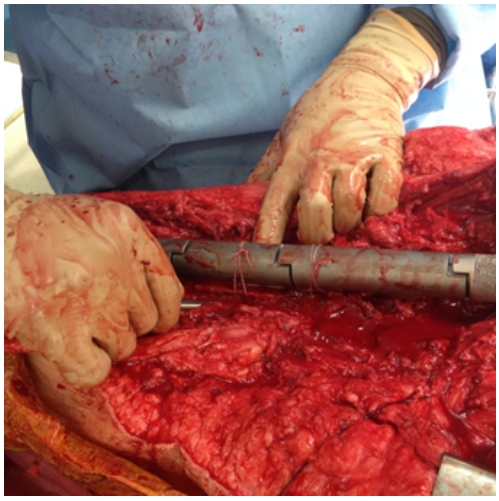
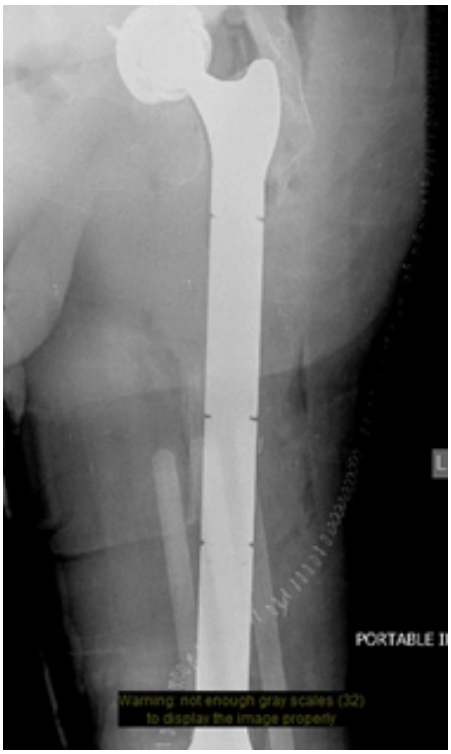


Figure 12: Medial femoral cortex with adductor repaired to stem.

immediate complications (fracture and dislocation) and appropriate alignment (Figures 13 and 14). The patient was transferred from the step-down surgical unit on post-operative day 6 and was fitted with an abduction brace and began mobilizing with a walker with the help of nursing staff and physiotherapy. She progressed well and was discharged to a local rehabilitation facility on post-operative day 21. Three months postoperatively, the patient is clinically well and ambulating with the help of a walker.

Figures 13: Post-operative radiographs



Figures 14: Post-operative radiographs

Discussion

Total femur replacement using megaprosthesis is an uncommon procedure. Careful preoperative planning, including imaging, component availability and salvage plans, is paramount. Meticulous dissection, tissue handling and hemostasis are important as the procedure is associated with significant blood loss (requiring cell saver in this case and 2 units transfused post-operatively). In cases not involving malignancy, bone stock and soft tissue preservation, when possible, is of the utmost importance. Patient will often require step down or ICU post operatively for cardiovascular and respiratory monitoring as well as pain control. Post operatively, patients should be kept in an abduction brace and made to weight bear as tolerated with assistance. Post-operatively, significant improvement in pain, mobility and function have been reported [12-14] but complications are common and include infections, dislocations, deep vein thrombosis, anemia and periprosthetic fracture [12,13]. Although uncommon the use of megaprosthesis, can be a viable option in patients presenting with massive femoral bone defects and implant failure.

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