Journal of Orthopaedics 15 (2018) 610–614

Contents lists available at ScienceDirect

Journal of Orthopaedics

journal homepage: www.elsevier.com/locate/jor

Case Report

Distal tibial metaphyseal allograft cone for proximal tibial bone loss in revision knee arthroplasty – A novel technique

Rajesh Malhotra[a], Vijay Kumar Jain[b], Deepak Gautam[a,*]

[a] Department of Orthopaedics, All India Institute of Medical Sciences, New Delhi, India
[b] Department of Orthopaedics, PGIMER, Dr Ram Manohar Lohia Hospital, New Delhi, India

ARTICLE INFO

Keywords:
Bone defect
Metaphysis
Tibia
Allograft
Revision total knee arthroplasty

ABSTRACT

Large bone defects in femur or tibia are common at the setting of revision knee arthroplasty. Filling up the defect remains a challenging problem to the orthopaedic surgeons. A variety of options are available to fill up these defects depending upon the type of defect. We report a case of large contained defect in proximal tibia managed with distal tibial metaphyseal allograft cone. We also discuss the operative details and the advantages of using the allograft.

1. Introduction

Large bone defects in femur and tibia are common after removal of the prosthesis and debridement of the bony surfaces in revision Total Knee Arthroplasty (TKA). The outcome in such cases often depends on the management of this bone deficiency. Filling up of large osseous defects remains a difficult and challenging problem not only for orthopaedic surgeons but also an additional financial burden for patients.[1] There are a variety of options available to fill these defects which include natural (autologous or allogenous bone graft) and artificial (bone graft substitutes, Polymethylmethacrylate Cement and metal augments).[2–4] Recently Trabecular Metal™ implant has been used to fill bony defects. These are biologically inert and highly porous 3D structure similar to that of trabecular bone.[5] These augments are available in different sizes and shapes and get perfectly incorporated into the host bone. However, disadvantages of these augments include their cost and limited availability in low resource settings. Harvesting autologous bone graft for large defects requires additional surgery, blood loss and related complications which increases morbidity. Allograft bone is a good option to fill large bony defects because of its perfect shape and size.[6] A structural allograft can provide a stable and durable reconstruction of bone deficiency.[7] Herein we describe a technique in which a structural allograft from distal tibia has been used to reconstruct a proximal tibial bone defect encountered at the time of the revision TKA.

2. Case history

A 43-year-old female patient was operated for fracture of left distal femur with plating 9 years back which not only failed to unite at one year, but also developed osteoarthritis of knee. Total Knee Arthroplasty was done with megaprosthesis (Adler's knee prosthesis) after removal of the plate (Fig. 1A & B). She remained asymptomatic till 9 years then after when she presented to our institute with complaints of pain, swelling and inability to bear weight on left lower limb for 4 months. On examination, the knee joint was diffusely swollen and tender with normal temperature. Anteroposterior radiograph of left knee showed a loose prosthesis. On investigation, the ESR was raised (55 mm in first hour), C reactive protein (CRP) level was within normal limit (1.8 mg/L). Magnetic resonance imaging could not be performed because of metal prosthesis in-situ. A clinical diagnosis of infection was suspected and aspiration of joint fluid was performed. However, the aspirated fluid did not reveal any bacteria and culture was sterile on microbiological evaluation. The patient was planned for revision surgery. In view of anticipated massive bone defect and yet possibility of low grade infection, the patient was counselled and taken for two stage revision surgery.

Operative procedure stage 1: The knee was approached through one of the previous incision and arthrotomy done via medial para-patellar incision. Intraoperatively, dense black tissue was seen all around the joint with synovial proliferation (Fig. 1C). The implant was found to be loose. On examination, link of the prosthesis was worn-out and we suspect the same to be the source of metallosis. Prosthetic components were extracted and the bone ends and surfaces were debrided. The

* Corresponding author.
E-mail address: cmcdeepak@yahoo.com (D. Gautam).

https://doi.org/10.1016/j.jor.2018.05.026
Received 23 March 2018; Accepted 6 May 2018
Available online 07 May 2018

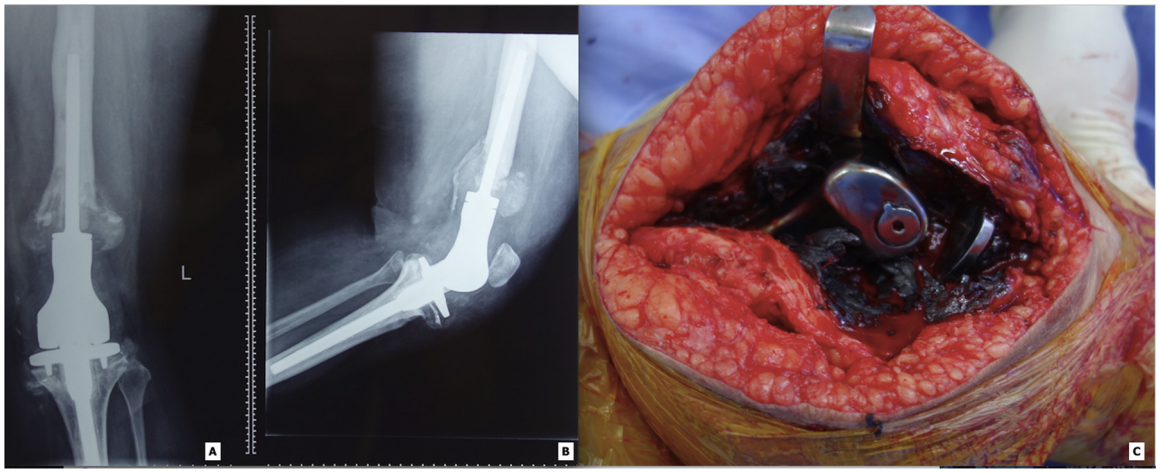

Fig. 1. X-ray of left knee in Anteroposterior view [A] and Lateral view [B] showing the failed megaprosthesis in situ. Intraoperative picture [C] of the same knee showing severe metallosis around the knee joint. The capsule was thickened with hypertrophied synovium densely tinged with black metallic particles.

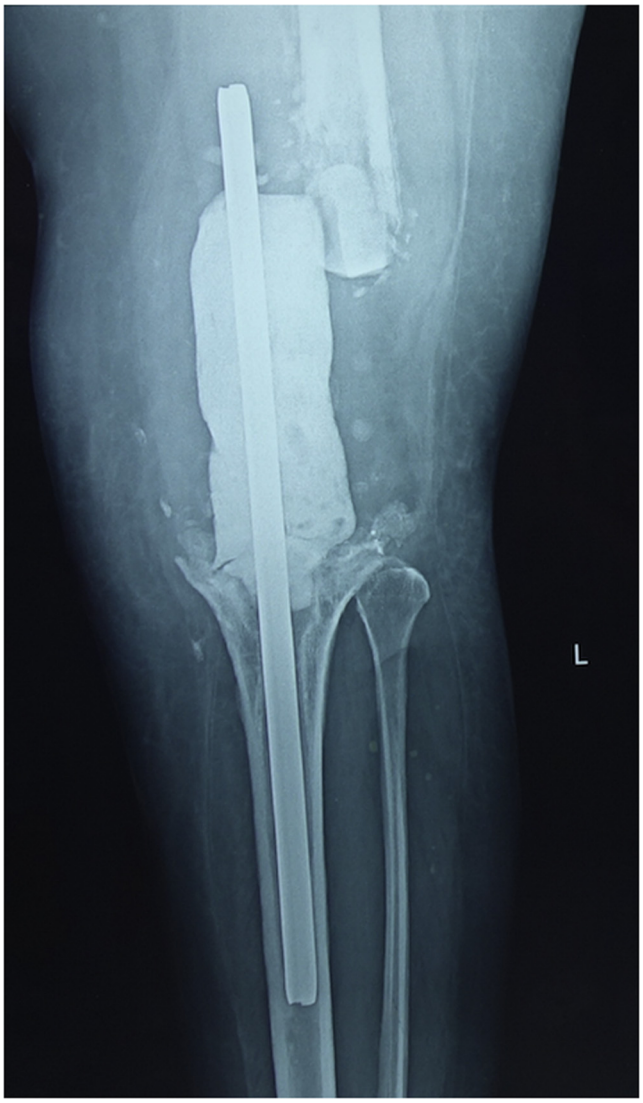

Fig. 2. X-ray of the knee following first stage debridement. Note the cement spacer nail in situ. The proximal end of the nail had cut out of the distal end of femur which was seen before the second stage surgery.

intramedullary debris was removed by curette and reamers. Care was taken to preserve as much bone as possible. The wound was thoroughly washed with pulsatile lavage. A static cement spacer over a K-nail was bridged across the distal end of femur and proximal end of tibia (Fig. 2). Patient was kept under follow-up. Histological evaluation of specimens retrieved at revision surgery demonstrated metallosis. The extracted implant was sent for sonication and did not grow any organism.

Operative procedure stage 2: After 6 months of the first stage surgery, the patient was planned for stage 2 revision. The knee was approached through previous incision and the K nail with cement spacer was removed. The bones were prepared for femoral and tibial components with stem. Large defects were seen in the distal femur as well as the proximal tibia (Fig. 3). There was a large segment defect in the distal femur which we had anticipated preoperatively. In addition, there was a large contained defect in tibia surrounding the keel of the prosthesis classified as type 3 According to Anderson Orthopaedic Research Institute classification. As the collaterals were absent, we planned to reconstruct the knee with following:

a) Structural distal femoral allograft [Fig. 4A]
b) Distal tibial allograft to manage the bone defect in proximal tibia (Fig. 4B & C)
c) Constrained Rotating Hinge Prosthesis (Zimmer®, Warsaw, IN)

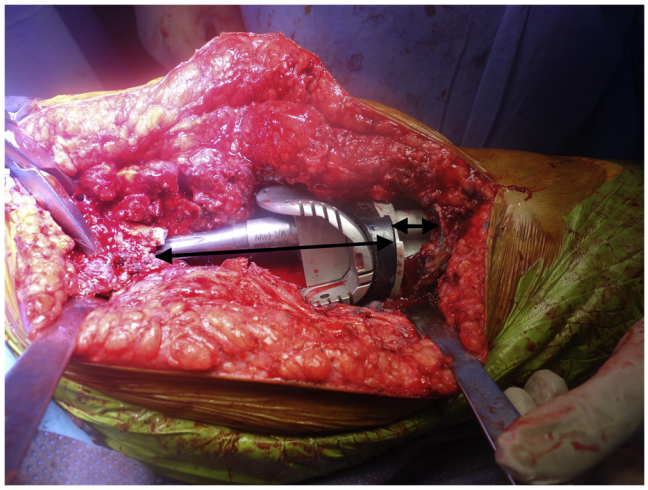

Fig. 3. Intraoperative picture showing trial implants in situ. Arrows showing the bone defect in the distal femur and well as proximal tibia.