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Case Report

Management of Bone Defects in Primary Knee Arthroplasty: A Case Report

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Abstract
A 66-year-old man presented to our clinic with chronic pain, varus deformity, and significant functional limitation in his right knee. He was clinically diagnosed with knee osteoarthritis, confirmed by standard frontal and lateral radiographs. Intraoperatively, we found a bone defect on the posteromedial aspect of the tibia that was filled with a bone graft and stabilised with a screw. Postoperative radiographs confirmed the stability of the prosthesis and consolidation of the bone graft. No major complications were observed during the follow-up period.
Keywords: Knee Osteoarthritis, Arthroplasty, Bone Graft, Screw.

Introduction

Knee osteoarthritis is a common joint condition characterized by the degeneration of articular cartilage. Severe deformity in osteoarthritis is often associated with uncontained tibial bone loss (Gaudon *et al.,* 2018). Bone defects can compromise the durability, support, or stabilization of implants and create a significant challenge for surgeons in primary knee arthroplasty (Ozcan *et al.,* 2021). There are several options to treat tibial bone defects during total knee arthroplasty (Gaudon *et al.,* 2018). Generally, bone defects less than 5 mm deep are filled with bone cement, while defects of 5 to 10 mm deep are treated with bone grafts. When defects are ≥ 10 mm deep, management can be difficult. So plaining is very important (Iwase *et al.,* 2022).

Observation

A 66-year-old man presented to our clinic with chronic pain, varus deformity, and significant functional limitation in his right knee. He was clinically diagnosed with knee osteoarthritis, confirmed by standard frontal and lateral radiographs. After a comprehensive evaluation of the patient, a decision was made to proceed with total knee arthroplasty. The procedure was done under local regional anaesthesia. The approach was midline medial parapatellar. Soft tissue release was done. There was a defect on the posteromedial aspect of the tibia ±10mm, distal femur and proximal tibia cut done. Tibia cut was done, keeping flush to lowest point of the defect. Defect in the posterior tibia could not be filled with bone cement only. All cut were completed. The tibia defect was filled with bone graft and stabilised with screw. The final implantation of cemented total knee replacement was completed.

The patient was followed up long-term after surgery, with regular evaluations of joint function, pain, and radiographs. Clinical outcomes showed a significant improvement in pain and joint function. Postoperative radiographs confirmed the stability of the prosthesis and consolidation of the bone graft. No major complications were observed during the follow-up period.

Discussion

Treating bone defects associated with knee osteoarthritis poses a challenge for orthopedic surgeons. There are two types of bone defects in the proximal medial tibia:

- ✓ Contained defects, where preservation of the cortical rim can support the tibial prosthesis.

- ✓ Uncontained defects, without the cortical rim, which cannot support the prosthesis. These are often observed in patients with severe varus deformities or during revision arthroplastie (Dorr *et al.,* 2006; Ozcan *et al.,* 2021; Iwase *et al.,* 2022).

In our case, we had a 66-year-old patient with a severe varus deformity, and x-ray showing an uncontained defects. CT scan wasn't done preoperatively. Several studies have demonstrated the advantages of bone grafting in treating bone defects associated with total knee arthroplasty. Bone grafting helps fill the bone defects, improve prosthesis fixation, and promote bone regeneration (Gaudon *et al.,* 2018; Ozcan *et al.,* 2021; Iwase *et al.,* 2022). Dorr *et al.,* (2006) found that repairing bone defects with bone cement was inadequate and encouraged the use of bone grafting as a useful treatment method (Iwase *et al.,* 2022). Métal augment could have been used as an option as well but metal augment doesn't promote bone regeneration and the cost and availability could be prohibitive. In our case, we had a bone defect >10 mm, and the patient had a varus deformity.

The literature describes that the management of the proximal medial tibial bone defect in varus knees undergoing primary total knee arthroplasty can be done through cement augmentation, metallic wedges, and autogenous bone grafting (Iwase *et al.,* 2022). In our case, we had a patient with a severe varus knee, who had a bone defect >10 mm, and we filled the bone defect with autogenous bone grafting and stabilized the graft with screw fixation. We then restored the joint with a cemented total knee prosthesis. The technique of bone cement with screw augmentation was initially introduced by Freeman *et al.,* (1982) for managing tibial bone defects encountered during total knee arthroplasty, before being popularized by Ritter in 1986.

Relevant scientific references support the effectiveness of this treatment approach, offering significant improvement in pain and joint function. Long-term follow-up is essential to assess the stability of the achieved results (Gaudon *et al.,* 2018; Ozcan *et al.,* 2021). In our case, the patient was followed up long-term after surgery, with regular evaluations of joint function, pain, and radiographs. Clinical outcomes showed a significant improvement in pain and joint function. Postoperative radiographs confirmed the stability of the prosthesis and consolidation of the bone graft. No major complications were observed during the follow-up period. Even though the concern is about bone resorption before incorporation, this did not occur so far in our case report.

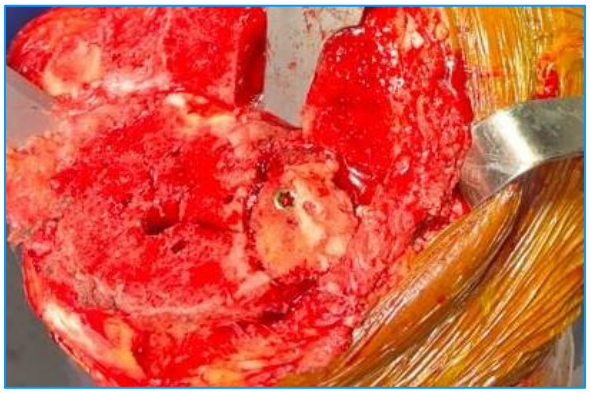

Figure 1. Bone grafting and screw fixation.

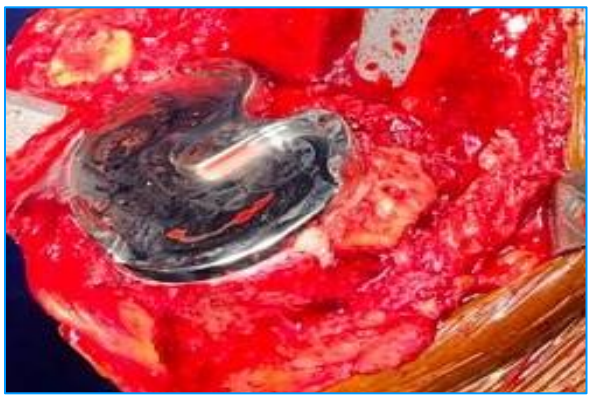

Figure 2. Tibial implant replacement.

Figure 3. Placement of a total knee prosthesis.

Figure 4. Post-operative x-rays.

Conclusion

Total knee arthroplasty with bone grafting and screw fixation can be an effective option for treating bone defects associated with knee osteoarthritis as long as it is a small defect. This surgical approach improves stability, joint function, and quality of life for patients.

Declarations

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Research Content: The research content of manuscript is original and has not been published elsewhere.

References

1. Dorr, L.D., Ranawat, C.S., Sculo, T.A., McKaskill, B. and Orisek, B.S. 2006. Bone graft for tibial defects in total knee arthroplasty. Clinical Orthopaedics and Related Research, 205: 153-165.
2. Freeman, M.A., Bradley, G.W. and Revell, P.A. 1982. Observations upon the interface between bone and polymethylmethacrylate cement. The Journal of Bone and Joint Surgery British Volume, 64(4): 489-493.
3. Gaudin, G., Butcher, C., Lustig, S., Darwish, N. and Neyret, P. 2018. Screw and cement augmentation of tibial defects in primary total knee arthroplasty: satisfactory midterm outcomes. Journal of ISAKOS, 3(3): 134-139.
4. Iwase, D., Metoki, Y., Kusumoto, Y., Aikawa, J., Fukushima, K., et al. 2022. Using allogenous structural bone graft for uncontained tibial bone defects ≥10 mm in depth in primary total knee arthroplasty. BMC Musculoskeletal Disorders, 23: 528.
5. Özcan, Ö., Yeşil, M., Yüzügüldü, U. and Kaya, F. 2021. Bone cement with screw augmentation technique for the management of moderate tibial bone defects in primary knee arthroplasty patients with high body mass index. Joint Diseases and Related Surgery, 32(1): 28-34.
6. Ritter, M.A. 1986. Screw and cement fixation of large defects in total knee arthroplasty. The Journal of Arthroplasty, 1(2): 125-129.

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