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(Case Report)

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RECONSTRUCTION OF AN 11-CM FEMORAL DEFECT NONUNION USING STRUCTURAL FIBULAR AUTOGRAFT AND LOCKING PLATE FIXATION: A CASE REPORT

Mohamed Amine Lamris *, Abdessamed Rajaallah, Achraf Lahjouji, Abdeljabbar Messoudi, Mohammed Rahmi and Mohammed Rafai

Department of Orthopedic Surgery and Traumatology, Pavillon 32, Ibn Rochd University Hospital Center, Faculty of Medicine and Pharmacy, Hassan II University of Casablanca, Casablanca, Morocco.

* Corresponding Author

ORCID Details
Mohamed Amine Lamris: https://orcid.org/0000-0001-5257-0193

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ABSTRACT

Introduction and importance: Femoral diaphyseal nonunion with a large segmental defect is a demanding reconstructive problem, particularly after multiple operations and previous infection. Restoring both biology and mechanical stability is essential when infection has become quiescent.

Case presentation: A 33-year-old woman presented with severe functional impairment of the left lower limb after a road traffic accident in 2007 and multiple subsequent procedures, including intramedullary nailing, plate fixation, external fixation, implant removal, and treatment of recurrent infection. At presentation, there were multiple scars, an antalgic gait requiring crutches, pelvic tilt, and an 8-cm limb-length discrepancy. Laboratory inflammatory markers were within normal limits, and imaging demonstrated an atrophic femoral nonunion with an 11-cm interfragmentary defect. After debridement and restoration of the medullary canal, a 15-cm structural fibular autograft harvested from the ipsilateral leg was inserted across the defect. Additional allograft from two femoral heads was placed around the reconstruction, which was stabilized with a 14-hole locking plate.

Clinical discussion: Large femoral defect nonunion requires simultaneous control of infection risk, restoration of the biological environment, and durable fixation. A structural fibular autograft provides cortical support across the defect, while supplementary allograft increases graft volume and locking plate fixation provides mechanical stability. In this patient, serial clinical and radiographic follow-up showed progressive bone healing without clinical evidence of recurrent infection and with improved functional mobility.

Conclusion: Structural fibular autografting combined with allograft augmentation and locking plate fixation can be considered a reconstructive option for selected large femoral defect nonunions after infection has been excluded or controlled.

Keywords: Femoral Nonunion; Segmental Bone Defect; Fibular Autograft; Locking Plate; Bone Grafting; Case Report

1 INTRODUCTION

Femoral nonunion remains a difficult complication of fracture care. The challenge is amplified by repeated previous surgery, compromised soft tissues, a history of infection, and segmental bone loss. Successful reconstruction requires adequate debridement, restoration of a biologically favorable environment, and stable fixation. The broader literature on aseptic long-bone nonunion describes external fixation, internal fixation, biological augmentation, and other reconstructive strategies, with treatment individualized to the mechanical and biological characteristics of each case [1-3].

We report the reconstruction of an 11-cm femoral defect nonunion in a young adult with a long history of repeated fixation procedures and recurrent infection. The reconstruction combined a structural non-vascularized fibular autograft harvested from the ipsilateral leg, allograft augmentation, and locking plate fixation. The case was prepared in accordance with established surgical case-reporting principles.

2 CASE PRESENTATION

A 33-year-old woman sustained multiple fractures of the left lower limb in a road traffic accident in 2007. Over the following years, the femoral fracture was treated by several procedures, including intramedullary nailing, plate osteosynthesis, implant removal, and external fixation. The clinical course was complicated by recurrent episodes of infection and repeated surgical interventions (Figure 1).

Figure 1: Sequential radiographs illustrating the history of repeated femoral fixation procedures before definitive reconstruction (A-D).

At the time of referral for definitive reconstruction, she walked with crutches and had an antalgic gait. Examination showed multiple surgical scars with skin retraction but no local inflammatory signs or active drainage. Standing examination demonstrated pelvic tilt, and supine measurement showed approximately 8 cm of shortening of the left lower limb. Hip motion was preserved, and distal vascular and neurological examinations were normal (Figure 2).

Figure 2: Clinical appearance of the left thigh showing multiple previous surgical scars and soft-tissue retraction.

Standard radiographs demonstrated a chronic femoral diaphyseal nonunion with sequelae of previous fixation. Computed tomography confirmed a large interfragmentary defect with extensive surrounding fibrosis. The preoperative infectious assessment included complete blood count, C-reactive protein, erythrocyte sedimentation rate, and procalcitonin; all were within normal limits, with no clinical evidence of active infection (Figure 3).

Figure 3: Preoperative imaging. (A) Standard radiograph demonstrating femoral diaphyseal nonunion and previous fixation sequelae. (B-C) Computed tomography images showing the defect nonunion and the extent of bone loss.

3 SURGICAL TECHNIQUE

Under general anesthesia and antibiotic prophylaxis, the patient was positioned in right lateral decubitus. The previous lateral thigh approach was used. Extensive fibrotic tissue was excised, the nonunion site was thoroughly debrided, the bone ends were refreshed, and the medullary canal was reopened. After preparation, the interfragmentary defect measured 11 cm.

A 15-cm segment of fibula was harvested from the ipsilateral leg as a structural non-vascularized autograft. The graft was positioned across the femoral defect and incorporated into the reconstruction. Additional allograft obtained from two femoral heads from the bone bank was placed around the reconstruction to augment the biological environment. Mechanical stabilization was achieved with a 14-hole locking plate; four 3.5-mm screws engaged the fibular graft (Figure 4).

A suction drain was placed at closure. Postoperative surveillance focused on wound status, recurrent infection, graft incorporation, and progression of union. Serial clinical and radiographic assessments demonstrated progressive healing and improved functional mobility without clinical evidence of recurrent infection. The postoperative construct is shown in Figure 5.

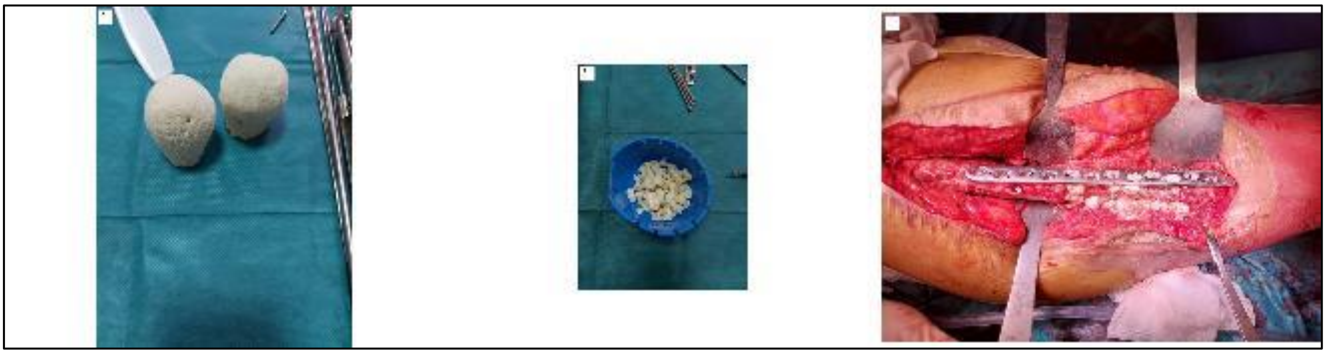

Figure 4: Intraoperative reconstruction. (A) Structural fibular autograft positioned across the femoral defect and stabilized with the plate. (B) Prepared femoral-head allograft. (C) Allograft augmentation around the reconstruction.

Figure 5: Postoperative radiograph showing reconstruction of the femoral defect with structural fibular autograft, graft augmentation, and locking plate fixation.

4 DISCUSSION

This case illustrates the combined biological and mechanical problems encountered in chronic femoral nonunion after multiple operations. A previous history of infection is particularly important: definitive internal reconstruction should be undertaken only after careful clinical and laboratory assessment and adequate debridement. In the present case, there were no clinical inflammatory signs and the available inflammatory markers were within normal limits at the time of reconstruction.

The 11-cm defect represented a major reconstructive challenge. The literature on complex aseptic long-bone nonunion describes several reconstructive approaches, including Ilizarov-based external fixation and bone transport, internal fixation with biological stimulation, and graft-based strategies [1,3,6,7,9,10]. These reports emphasize that treatment must be adapted to defect size, local biology, soft-tissue condition, previous procedures, and infection history. In the present case, a structural fibular autograft was selected to bridge the defect and provide cortical support, while additional graft material was used to improve the biological environment.

Locking plate fixation was selected to provide a long, stable construct spanning the reconstructed segment. The published experience with aseptic nonunion supports the central importance of adequate debridement, stable fixation, and biological augmentation, although techniques vary according to the bone involved and the characteristics of the nonunion [2,3,5,7]. In our patient, the fibular strut bridged the defect, while femoral-head allograft increased graft volume around the reconstruction. The use of additional biological augmentation is consistent with the broader reconstructive principles discussed in the literature, including graft- and cell-based approaches [4,8]. The principal strength of this strategy was the combination of structural support, biological augmentation, and stable fixation in a single definitive reconstruction.

The main limitations of this report are its single-patient design and the absence of a standardized functional outcome score in the available clinical record. In addition, normal inflammatory markers reduce but do not by themselves eliminate the possibility of indolent infection. Consequently, this case should be interpreted as a technical experience rather than evidence of superiority over bone transport, vascularized grafting, or induced-membrane techniques.

5 CONCLUSION

Reconstruction of a large femoral defect nonunion after multiple previous procedures requires careful exclusion or control of infection, aggressive preparation of the nonunion site, restoration of biology, and durable mechanical stability. In this selected case, a structural fibular autograft harvested from the ipsilateral leg, supplemented with allograft and stabilized with a locking plate, provided a practical solution for an 11-cm femoral defect and was associated with progressive healing and functional improvement.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of ethical approval

This case report is exempt from formal ethical approval at our institution.

Statement of informed consent

Written informed consent was obtained from the patient for publication of this case report and the accompanying images. A copy of the written consent is available for review by the Editor-in-Chief on request.

REFERENCES

[1] Gupta, D., Kushwaha, N.K., & Gupta, V. (2021). A prospective study of aseptic nonunion treatment of tibia with Ilizarov ring fixator in a tertiary care hospital. Journal of Orthopaedic Research, 2021.

[2] Soumare, B. (2017). The Pseudarthrosis Oh Fe Humerus: Surgical Treatment, Functional Results and Perspectives. EC Orthopaedics, 2017.

[3] Habbab, M., Naell, A., Nassiri, M., Madhar, M., & Chafik, R. (2024). Aseptic Diaphyseal Pseudarthrosis of the Forearm Initially Treated with Target Plate: Risk Factors and Management. SAS Journal of Surgery, 2024.

[4] Chaverri, D., Gallardo-Villares, S., Pinto, J.A., & Rodríguez, L. (2024). Treatment of non-hypertrophic pseudoarthrosis of long bones with a Tissue Engineered Product loaded with autologous bone marrow-derived Mesenchymal Stem Cells. Injury, 2024.

[5] Gogoua, R.D., Traoré, M., Yépié, A., & Kouamé, M. (2017). Aseptic pseudoarthrosis of the humeral diaphysis. Epidemiological features—therapeutic assessment. Open Journal of Orthopaedics, 2017.

[6] Szelerski, Ł., Żarek, S., Górski, R., & Mochocki, K. (2020). Surgical treatment outcomes of the Ilizarov and internal osteosynthesis methods in posttraumatic pseudarthrosis of the tibia—a retrospective comparative analysis. Journal of Orthopaedic Surgery and Research, 2020.

[7] Binod, B., Nagmani, S., Bigyan, B., & Rakesh, J. (2016). Atrophic, aseptic, tibial nonunion: how effective is modified Judet's osteoperiosteal decortication technique and buttress plating? Archives of Orthopaedic and Trauma Surgery, 2016.

[8] Bastos Filho, R., Lermontov, S., & Borojevic, R. (2012). Cell therapy of pseudarthrosis. Acta Ortopedica Brasileira, 2012.

[9] Kumar, S., Sharma, N., & Singh, R. (2022). Aseptic non-union of tibia treated with Ilizarov fixator: A retrospective study. Journal of Molecular and Clinical Medicine, 2022.

[10] Layes, T., Terna, T., Pascal, C., & Sidiki, S.A. (2020). Épidémiologie et Traitement des Pseudarthroses Diaphysaires des Os Longs à l'Hôpital de Sikasso. Health Sciences and Disease, 2020.