



RECONSTRUCTION OF ULNAR BONE DEFECT USING NON-VASCULARIZED FREE FIBULAR TRANSFER (A CASE REPORT)

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ABSTRACT

This case report discusses the reconstruction of a ulnar bone defect in a child using a non-vascularized free fibula graft. The patient suffered a traumatic injury to the forearm which led to osteomyelitis of the ulna. After failed treatments at a provincial hospital, the child underwent a successful surgery at a university hospital in Rabat. The non-vascularized fibula graft was harvested from the leg and used to fill the bone defect in the forearm. The graft consolidated after 10 months, with subsequent regrowth of the fibula in the donor site. The study highlights the efficacy of non-vascularized free fibula grafting in reconstructing bone defects in the forearm, especially in pediatric cases. The discussion includes comparisons with vascularized grafts and recommendations for optimal outcomes in such procedures.

INTRODUCTION

Many causes can lead to varying degrees of bone loss: severe trauma, tumors, osteomyelitis. The vascularized or non-vascularized fibula seems to be the most suitable bone to fill these bone defects. Indeed, it allows for long grafts, has a simple vascularization, is a solid cortical bone that allows for stable fixation, and harvesting the fibula does not have any consequences on the donor site. We present the case of a child who experienced a ulnar bone defect, which was filled with a non-vascularized free fibula graft.

OBSERVATION

This is a case of a six-year-old child residing in and originating from Errachidia, who suffered a trauma to his right forearm in October 2004. The injury was traditionally treated with a traditional method called. After three months, he consulted the provincial hospital in Errachidia, where the diagnosis of osteomyelitis of his right ulna was made. He underwent two surgeries at the provincial hospital without improvement, and was then referred to the University Hospital Center (C.H.U.) in Rabat.

A standard X-ray (FIG 1) of his right forearm was performed, which showed a significant ulnar bone defect involving the entire ulna, but sparing its proximal and distal epiphyses.

It was decided to perform a graft of this ulnar bone defect using a non-vascularized free fibula graft. The donor site was chosen to be the external aspect of the leg, and the entire fibular diaphysis was harvested (FIG 3), approximately 13 centimeters in length. An internal approach was used in the forearm to position and adapt the fibula graft. Stabilization was achieved with a single 2mm intramedullary pin (FIG 2a). No additional cancellous bone graft was used at the ends of the fibula, and the graft was supplemented with posterior splint immobilization for one month.

Consolidation was achieved after 10 months (FIG 2b), and the patient started rehabilitation sessions well before this date. Progressive regrowth of the fibula in the donor site was observed, resulting in the formation of a new fibula after three years (FIG 3b, 3c). Examination of the patient after a follow-up of 7 years shows slight stiffness of the right elbow with flexion limited to 25°, but hand-to-mouth function and writing function are preserved, and the patient does not request further interventions.

ICONOGRAPHY



Figure 1(a+b): Osteomyelitis of the ulna leading to the destruction of the entire ulnar diaphysis.



B: 10-Month follow-up showing consolidation of the fibular graft.



Figure 2: Ulnar bone graft with non-vascularized free fibula and immobilization with an axial pin.



C: 18-month follow-up: good consolidation.



Figure 3: Location of the peroneal graft.

DISCUSSION

According to studies from the Mayo Clinic^[1,2], non-vascularized fibula grafting is a quick technique, but vascularized fibula grafting increases the chances of healing and reduces the risk of postoperative refracture. Vascularized fibula grafting consolidates more rapidly than non-vascularized fibula grafting, but it requires meticulous microvascular suturing and a longer operative

time, as well as specialized equipment and a skilled team.^[1,2,3] The chances of healing with non-vascularized free fibula grafting are higher in children than in adults.^[3]

Non-vascularized free fibula grafting is an alternative for patients with vascular conditions (such as malformations or arterial disease) who have bone defects.^[3,4,5] The stability of the graft is crucial for achieving proper and

rapid consolidation^[2,4,6], and in this case, a centro-medullary pin was used for stabilization. External fixation does not provide good stability and can lead to elbow stiffness, while plate fixation requires periosteal stripping, and centro-medullary nailing can result in damage to the centro-medullary vessels.

Some authors recommend the use of autogenous cancellous bone grafting to promote consolidation at the ends of the fibula.^[2,4,5,6]

Reconstruction of the donor site is not always necessary in children and is unnecessary in adolescents and adults.^[3,4]

CONCLUSION

Non-vascularized free fibula grafting is an important technique for reconstructing bone defects in the forearm. While recent studies have shown the superiority of vascularized grafts, there are certain conditions that can increase the success rate of this technique:

- Bone stability must be ensured.
- The fibula graft must be fixed at both ends.
- Whenever possible, the use of autologous cancellous bone grafts placed at both ends and along the fibular shaft allows for faster consolidation.

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