



Long-term follow-up of non-vascularized fibular autograft for diaphyseal radial reconstruction: case report and literature overview

Follow-up a lungo termine di autoinnesto fibulare non vascolarizzato per ricostruzione radiale diafisaria: case report e panoramica della letteratura

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Summary

For the treatment of important loss of bone substance, different surgical methods can be used (autologous vascularized or non-vascularized grafts, bank bone grafts or bone transports with external fixator). This article reports a case of bone loss of 10 cm radius treated with autograft from the contralateral fibula with a 35-year follow-up.

Key words: loss of bone substance, upper limb trauma, vascularized and non-vascularized autograft

Riassunto

Per il trattamento di importanti perdite di sostanza ossea, differenti metodiche chirurgiche possono essere utilizzate (innesti autologhi vascolarizzati o non vascolarizzati, innesti ossei da banca o trasporti ossei con fissatore esterno). In questo articolo è riportato un caso di perdita di sostanza ossea di radio di 10 cm, trattato con innesto autologo da perone contralaterale con un follow-up a 35 anni.

Parole chiave: perdita di sostanza ossea, trauma arto superiore, innesto autologo vascolarizzato e non vascolarizzato

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Conflitto di interessi

L'Autore dichiara di non avere alcun conflitto di interesse con l'argomento trattato nell'articolo.

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Introduction

A large diaphyseal, segmental bone defect is a challenging problem in orthopaedic practice. Several surgical methods are available for bridging such defects: bone grafting, free non-vascularized¹³ or vascularized fibular grafts⁶, or bone transport with an external fixator.

The indication for these procedures are: 1) tumor resection, congenital pseudoarthrosis; 2) severe osteomyelitis; 3) non-union bone; 4) post-traumatic bone loss^{1,2,15}.



Figure 1. Rx with FE, evident gap 10 cm (left) and (right) filled in compression with non-vascularized fibular graft.



Figure 2. Rx after 35 years.

When the amount of bone loss in the radius must be replaced the orthopaedic surgeons prefer non-vascularized or vascularized fibular autograft. A-vascularized fibula transplants should be used in large segmental defects: this technique has been shown to be effective in treatment of defects more than 6-7 cm³⁻⁶; B-non-vascularized is generally used to treat defects smaller than 6 cm, when tissue vascularisation is adequate and there is no infection risk.

This article describes a case of reconstruction of the radial diaphysis using 10 cm non-vascularized free autogenous fibular graft (at the time we did not have in our department a microsurgical team), with a much longer period of follow-up than has been previously reported (35 yrs.).

Case report

B.R., a 36-year-old-right-handed farmer, in september 1983 right forearm suffered an open fracture with large radius bone loss. After the soft tissue had healed in the radial diaphysis there was a gap of 11 cm between proximal and distal stump. The forearm kept immobilization in cast until the operation performed on 08-02 1984, when a monolateral external fixator was applied on the radius (Fig. 1) to stabilize in compression the non-vascularised contralateral fibula transposed into the gap. He continued immobilisation with FE for 6 months when radiographs showed that the fibular autograft has united with the radius (Fig. 2). His rx and clinical aspect on 2019 show an excellent appearance of the radius and forearm with 50° of supination and complete pronation and wrist almost stiff (Fig. 3). The patient refused treatment about supination. He has no pain and considers his result satisfying.

Discussion

The use of vascularized or non-vascularized fibular autograft for radius reconstruction has been described in literature. Both these procedures have been shown to be effective in treatment of segmental bone defects. The non-vascularized autograft is preferred when the gap is less than 6-7 cm, also AA. describe cases treated, with success, for radius tumors until 8-13 cm followed for 16-22 years after surgery⁷⁻⁹. Patients treated for post-traumatic bone loss have follow-up of 35 years. The main criticism for non vascularized graft is that it is associated with a higher incidence of complications as osteoporosis, progressive absorption, non-union and slow incorporation of the graft.

Vascularized free fibular transfer permits a reconstruction of large defects following trauma with better chance of success and a period to obtain radiographic bone union shorter than in free transfer non-vascularized (4,8 months-range



Figure 3. Clinical pictures after 35 years since operation. Supination 50 degrees, but deficit well tolerated. Pronation complete and wrist almost stiff

2,5-8 vs 6-8) ⁶. Disadvantages can be: 1) vascularized transfer requires a team skilled in microvascular technique; 2) a long operative time (6-10 hours); 3) requires extensive angiographic studies of the vascular pattern of the limbs and two major vessels need to be sacrificed; 4) difficulty in assessing patency of anastomosis in the immediate post-operative period (however, if free vascularized fibular graft fails, it can be work like non-vascularized!).

For this procedure there are relative contraindications as metabolic disease, drugs abuse, alcohol etc.

Although vascularized bone graft have been advocated, the non-vascularised method is a reliable biological treatment to the light of the literature and of our case. The choice of two technique is accompanied by individual advantages and/or disadvantages that should be taken into consideration during the pre-operative planning process. Swamy et al. ¹⁰ have reported a case in young people where bone defect was 13 cm: he suggests that ideal method for management should be vascularized bone because offers: many advantages over conventional bone graft as well as it usually heals quickly and fight infection. But non-vascularized fibula offers a handy side to the orthopedic surgeon, being a superficial bone, it is easy to harvest with very low donor site morbidity if peroneal nerve and vessels are protected. Stein-

lechner et al. ¹¹ also have found non-vascularized fibula graft to be a straight forward technique with a reliable results and were able to salvage the limb in all their patients. The healing rate in reports with non vascularized fibula go from 67% for gaps of 7.5-12.5 cm ¹² to 80% in pediatric age group ¹⁰ and 92% ¹⁴ for gaps 4-10 cm. El-Sayed et al. ⁸ refer 92% union in 4 months for non-vascularized transplant.

Conclusion

Non-vascularized fibular graft is a simple procedure that is still a valid option to successfully bridge bone defects in selected cases with good vascular bed and soft tissue coverage.

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