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Complications of fibular bone grafting at donor site

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Abstract
Introduction: Prospective study to determine donor site complications after autogenous fibular graft for different surgical procedures. Complications following iliac crest grafting have been studied extensively in the past but literature for complications of fibular grafting is still lacking.
Material and Methods: The study was performed at tertiary care centre after taking necessary approval from institutional ethics committee. Thirty donor sites in thirty patients were followed up for minimum one year. Patients were followed up at 3 months, 6 months, and 9 months and at the end of one year. Vascularized as well as non-vascularized grafting patients were included in the study.
Results: Thirty patients including 21 men (70%) and 9 (30%) women were included in the study. The most common indication for taking graft was post traumatic defect. The most common complication was pain and overall complication rate at the end of 1 year was 13.33%.
Conclusion: On the basis of our clinical observations, we are convinced that obtaining vascularised or non-vascularised fibular grafts is associated with a small but demonstrable clinical morbidity related to altered fibular function and localized motor weakness. The dissection and preservation of tissue and structures must be meticulous to minimise the chance of donor site complications.

Keywords: Fibular grafting, complications, donor site

Introduction
Bone grafting is used for a number of reasons. Possible reasons include situations where healing may be difficult (due to the use of nicotine which has been shown in medical studies to limit healing of the spine) or the presence of diseases such as diabetes, autoimmune deficiencies. Other possible reasons include fractures, bony diseases and a large amount of bone loss during surgery.
Different surgical situations may call for different types of bone grafting and unique bone graft materials. The bone grafts and bone grafts materials should contain properties which allow them to initiate, stimulate and facilitate bony healing [1]. Amongst all autogenous bone grafts, fibular bone graft is an ideal graft in many circumstances because the vascular inflow can be maintained if needed. A fibular bone graft has excellent strength because of its cortico-cancellous structure [2].
There are several immediate and long-term complications of free fibular bone graft at donor site. There may be presence of wound healing complications like wound infection, donor-site pain, edema, haematoma, transient peroneal nerve palsy, ankle valgus deformity, ankle instability, distal fibular osteoporosis, osteomyelitis, gait alteration, contracture, stiffness and weakness of the great toe etc. The purpose of this article is to present our clinical experience with problems related to the donor site that we encountered after these grafts had been obtained.

Materials & Methods
Thirty patients were included in the study after taking approval from the institutional ethics committee. Written & informed consent was obtained from the patient after explaining the necessity of the surgery, complications likely to occur and prognosis about the bone grafting outcome. It's a prospective study with minimum one year follow-up.
Patients with age >20 years and <70 years were included in the study. All patients were thoroughly investigated and underwent fibular grafting surgery (vascularised or non-vascularised)

for the treatment of the femoral head necrosis, defects (pathological or traumatic) of long bones, non-union, carcinoma etc. Post-operatively complications encountered were noted at regular follow-up of 3 months, 6 months, 9 months and 12 months. 7 patients were lost to follow up. The data was statistically analysed.

Results

In our study maximum no. of patients was in the age group of 20-30 years (30.0%) whereas, the least number of cases were found in 60-70 years age group. Out of the 30 cases, 70 % were men & 30 % were women, thus in this study men dominated with a M:F ratio of 2.33 : 1. (Table 1)

Table 1: Age & gender wise distribution of study subjects.

S. No	Age (years)	Men		Women		Total	
		Number	%	Number	%	Number	%
1.	20-30	07	23.33 %	02	6.66 %	09	30.00 %
2.	30-40	05	16.66 %	03	10.0 %	08	26.66 %
3.	40-50	06	20.0 %	01	3.33 %	07	23.33 %
4.	50-60	03	10.0 %	02	6.66 %	05	16.66 %
5.	60-70	--	--	01	3.33 %	01	3.33 %
	Total	21	69.99 %	09	29.98 %	30	100 %

Fibular grafting was done for various indications but the most common indication in our study is post-traumatic defect (60.0 %) followed by cases of avascular necrosis (17.0%). Remaining 23 % cases were of non-union of bones, carcinoma and miscellaneous. Post-operatively complications at donor site were noted and followed up at regular interval. At 3 months post-operatively 37 % of patients had pain and 13 % of patients had superficial infection. Only 6 % patients had motor weakness and sensory deficit each. At 6 months follow up superficial infection and pain reduced significantly. During this period 23 % of patients had pain while motor weakness and sensory deficit remained same. At 9 months post-operative follow up there was improvement in pain i.e. 20 %. At our final follow-up of 12 months the results shows that only 13.3 % of patients had post-operative complication at donor site after fibular graft (Table 3).

Table 2: Indications for Fibular Grafting

S. No	Indication	Number of patients	Percentage (%)
1.	Post-traumatic defect	18	60 %
2.	Non-union	03	10 %
3.	Avascular necrosis	05	17%
4.	Carcinoma	03	10 %
5.	Miscelleneous	01	03 %
	Total	30	100 %

Table 3: Post-Operative Complications At 12 Months.

S. No	Complications	Number of patients	Percentage (%)
1.	Pain	03	10.0 %
2.	Motor weakness	01	03.33 %
3.	Sensory deficit	---	---
4.	Superficial infection	00	---
5.	Miscellaneous	---	---

Discussion

The maximum number of patients belongs to 20-30 years of age group i.e. 30% with different indications for fibular grafting. The mean age of the patients in current study was 33 ± 13.60 SD. No significant relationship was found between the age and complications. At 3 months follow up 36.6% (n=11) of patients had pain which reduced up to 23.30% (n=7) at 6 months follow up. At 9 months follow up 20% (n=6) of patients complains of pain. 10% (n=3) of patients had pain at 12 months follow up. Ahmad Nassar and Mustafa H Khan *et al* (2009) said that 53% (n=86) of patients had pain at 3 months follow up and it reduces to 15% (n=25) at 6 months follow up [3]. While 1.2% (n=2) of patients perceive pain up to 9 months and 12 months follow up. Klaus D Wolff *et al*. (2011) observed that pain in 18.18% (n=12) of patients postoperatively [4]. These studies results were quite similar with current study. The most frequent description for pain was an aching or tired feeling after activity.

C L Tang *et al*. (2004) studied that there was muscle weakness in 37% (n=14) of patients [5]. Momoh. Adeyaza *et al*. (2007) observed that muscle weakness was present in 8% (n=13) of patients [6]. In early post-operative period the most of the patients had muscle weakness that could be attributed to inhibition due to pain. In present study, no patient had limb weakness that was greater than a mild difficulty in overcoming gravity. C. E. Zimmermann *et al*. (2002) concluded that sensory deficit was found in 76.3% (n=32) of patients [7]. Klaus D Wolff *et al* (2011) observed that sensory deficit was present in 18.18% (n=12) of patients postoperatively. In current study, sensory abnormalities could be dysesthesia or paraesthesia [4]. Patients presented with sensory deficit were segmental in fashion such as at lateral aspect of foot in one patient and lateral aspect of calf in another patient. First patient was still under follow up while the second patient improved at 6 months.

Momoh. Adeyaza *et al*. (2007) concluded that 19% (n=30) of patients had superficial infection in early post-operative days [6]. Ahmad Nassar and Mustafa H Khan *et al*. (2009) studied that superficial infection was present in 9% (n=15) of patients [3]. Klaus D Wolff *et al*. (2011) concluded that superficial infection was seen in 25.75% (n=17) of patients. In current study, patients presented with cellulitis, wound gape and

suture abscess which resolved after administration of antibiotics with supportive treatment [4].

Conclusion

On the basis of our clinical observations, we are convinced that obtaining vascularised or non-vascularised fibular grafts is associated with a small but demonstrable clinical morbidity related to altered fibular function and localized motor weakness. Free vascularised and non-vascularised fibular grafting provides an attractive option for the reconstructive surgery. Its ability to provide immediate structural support as well as its inherent osteoconductive, osteoinductive and osteogenic properties of fibular grafting should be considered in the management of large segmental bony defects as well as situation in which there has been biological failure of bony healing.

The dissection and preservation of tissue and structures must be meticulous to minimise the chance of donor site complications. The fibular graft (vascularised or non-vascularised) remains the ideal for many applications the morbidity must be weighed against the benefits.

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