

Original Research Article

Donor site morbidity following microvascular fibula transfer

Joyce Jesudass, Anoop Sivakumar*, Rakesh Kain

Department of Burns, Plastic and Maxillofacial Surgery, VMMC and Safdarjung Hospital, New Delhi, India

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*Correspondence:

Dr. Anoop Sivakumar,

E-mail: dranoopsivakumar@gmail.com

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ABSTRACT

Background: The free vascularized fibula has become the first choice of vascularised bone transfer. The advantages of fibula over other microvascular flaps include greater bone length, sufficient pedicle length and size, rich periosteal blood supply, etc.

Aim: This study was designed to evaluate the long-term donor site morbidity following microvascular fibula transfer.

Methods: This study was conducted over two years, in patients who underwent free fibula flap for various defects which needed a composite osseo-fasciocutaneous flap. They were followed up for one year and the donor site evaluated for complications like edema, pain, anaesthesia, spasm of muscles, Flexor hallucis longus (FHL) contracture, ankle stability and hypertrophic scarring.

Results: 28 patients, age ranging 15 to 56 years, of which 22 were male and 6 were female. Total of 7 patients (25%) had complications, of which 6 patients had more than one complication. No patients experienced knee instability, weakness, or decreased range of motion. All patients returned to their normal ambulatory status.

Conclusion: Free fibula transfer does have long term donor site complications, but they can be managed conservatively, seldom requiring surgical intervention. However, there are no functional limitations which makes it a feasible option in reconstructing a composite defect.in various literatures.

Keywords: Free fibula flap, Mandible reconstruction, Donor site morbidity

INTRODUCTION

The free fibula flap is the preferred flap for head and neck reconstruction, after a segmental mandibulectomy or maxillectomy. The free flap helps to close or fill the defect, aesthetic reconstruction and functional rehabilitation.¹ Several options of free flap have been tried in head and neck reconstruction like, radial forearm, scapula, fibula and deep circumflex iliac artery flap. But the fibula free flap has several advantages which make it an attractive option for reconstruction like consistent vascular anatomy, ease of harvest, significant bone stock, numerous endosteal and periosteal blood supplies that allows for segmental osteotomies and ability to accept dental implants.²

The perioperative donor site morbidity ranges from 2 to 38% but the long-term complication is variable.³⁻⁸ Some of the long-term complications include difficulty in walking, pain and paresthesia in distribution of peroneal nerve, abnormality of flexor hallucis longus function, spasmatic inversion of foot, hypertrophic scarring, joint stiffness, ankle and knee instability and muscle weakness.^{1,9}

The available data on the long-term donor morbidity of free fibula flap is limited and therefore this study was undertaken in our center to assess our results. This study was designed to evaluate the long-term donor site morbidity following microvascular fibula transfer.

METHODS

28 patients were included in this retrospective study, who underwent fibula free flap, performed in VMMC and Safdarjung Hospital over two years from 2017 to 2019. Informed written consent was taken from all patients. All patients who underwent free fibula surgery and who gave consent were included.

Procedure

While designing the flap 10, 5 cm of proximal bone and 6 cm of distal bone were left in situ to preserve knee and ankle stability, respectively. Donor-site wounds were closed either primarily or with a split-thickness skin graft. Posterior splint was applied in all patients, with the ankle in neutral position. While in bed, the leg that had been operated on, was elevated continuously. Postoperatively, patients were kept on non-weight bearing status for 15 days. Afterward, they were allowed to ambulate with partial weight bearing for 3 to 4 weeks. Between ambulating phases, patients were asked to keep their operated limb elevated.

Patients were followed up at 1 year for long-term donor site morbidities. Complications and their percentages were evaluated.

RESULTS

Total of 28 patients were studied for long term complications following free fibula flap. 22 patients were male and 6 were female.

The indications for free fibula transfer in our study were the following (Table 1).

Table 1: Indications for microvascular fibula transfer.

Indication	N	%
Oncological mandibular reconstruction	17	60.7
Post traumatic mandibular reconstruction	5	17.9
Fore-arm reconstruction	1	3.5
Compound tibia fracture with segmental loss	5	17.9

We harvested the maximum possible length of fibula in all cases and did osteotomy according to the defect size. Mean surgical time for free fibula harvest was 98 minutes. Primary closure of the donor site was done in 8 cases and split skin graft was used for closure in the remaining 20 cases. Patients were discharged at tenth post-operative day.

During follow up at one year, 7 patients experienced complications and six of them had more than one complication (Table 2). Following figures show Flexor

hallucis longus (FHL) contracture, pedal edema and scar hypertrophy (Figure 1 and 2). Majority of patients did not have any donor site morbidity (Figure 3).

Table 2: Donor site morbidity following microvascular fibula transfer.

Morbidity	n	%
Edema of distal limb	6	21.4
Pain	2	7.1
Anaesthesia in distribution of peroneal nerve	2	7.1
Spasm of invertors/ evertors	2	7.1
FHL contracture	2	7.1
Ankle instability/ weakness	Nil	Nil
Hypertrophic scarring/itching	2	7.1
Total	7	25



Figure 1: Hypertrophic scar, pedal edema and FHL contracture.



Figure 2: FHL contracture.

DISCUSSION

Defects of the mandible could result from trauma, neoplasm or congenital deformity. Malignant and odontogenic tumors are the most common cause for

mandibular defects, which involves resection of bone, teeth and skin. These defects compromise the quality of life. If such defects are left untreated, it would result in significant morbidity which includes loss of chin/lip support, sensory disturbance, malocclusion, retrognathia, oral incompetence, difficulties with mastication and speech.²



Figure 3: Donor site with no morbidities.

Non vascularized bone grafts have functional limitations, making placements of dental implants and prosthetic rehabilitation difficult. So vascularized bone grafts are the preferred choices with donor sites being scapula, iliac crest, radius and rib. Free tissue transfer has revolutionized the treatment options when it comes to reconstructing mandibular defects, specially post radiation.¹⁰ However the vascularized fibula flap is the most suitable reconstructive option for mandibular defect.¹¹

The vascularized free fibula flap was first described by Taylor in 1975 and then popularized by Hidalgo in 1989.^{12,13} This flap has several advantages which includes: the possibility of several osteotomies because of its periosteal blood supply; low donor site morbidity rate; greatest bone length in comparison with other free flaps; possibility of combination with skin flaps to reconstruct composite mandibular defects; suitability for osseointegrated dental implants; and 2-team approach.¹⁴⁻¹⁸ The disadvantage includes the flap morbidity which is wound-healing disturbance, paresthesia, cold intolerance, motor weakness of the lower leg muscles, pain, edema, poor aesthetics, and gait disturbance. Compartment syndrome though rare, can be a serious complication if the donor site closure is too tight. Therefore, when the skin paddle taken is more than 6 cm, skin graft can be used in closure of donor site.¹⁹ Some patients with peripheral vascular disease developed necrosis after tourniquets application during surgery. Higher donor-site complications have also been associated with diabetes mellitus, obesity, smokers, and alcoholics.^{3,9,20}

The ankle joint syndesmosis has enough strength to prevent more than normal excursion of the fibula and along with the distal fibula left after harvest maintains the lateral gutter of the ankle joint.² Because most muscles in the deep

posterior muscle group originate proximal to the fibular osteotomy site, their addition to ankle stability is not disrupted with this procedure. In addition, the function of these muscles is not altered, thus allowing for normal function during gait.

Nassar A et al described that 53% of patients had pain at 3 months follow up and it reduces to 15% at 6 months follow up.²¹ While 1.2% of patients perceive pain up to 9 months and 12 months follow up.

Klaus D Wolff et al observed that pain in 18.18% of patients postoperatively.²² The current study shows fewer patients (7.1%) with pain as a long-term complaint.

Tang CL et al²³ studied that there was muscle weakness in 37% of patients. Adeyaza M et al observed that muscle weakness was present in 8% of patients.³ In the present study no patients had this complaint.

Zimmermann CE et al concluded that sensory deficit was found in 76.3% of patients.⁸ Klaus D Wolff et al observed that sensory deficit was present in 18.18% of patients postoperatively.²² In the current study, 2 patients had sensory deficit in the area supplied by superficial peroneal nerve.

As per the study by Feuvrier et al gait disturbances can be minimized by early ambulation.²⁴ In our series, we didn't experience any gait disturbances.

There are some limitations existing in this research. Only 28 patients were included in this study. Larger group of patients needs to be studied for generating conclusive results and about the risk factors associated with long term morbidity.

CONCLUSION

The long-term complications of free fibula flap do not affect the patient mobility or function and its merits outrun the complications. Thus, making it an excellent mode of reconstruction when an osseocutaneous defect of the mandible needs to be restored.

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