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### Abstract

Defects both functional and aesthetic in maxillofacial region can be caused by various ailments like developmental, infection, trauma, neoplasm and iatrogenic causes. Though reconstructions of these defects with free flap is gold standard, several hindrances such as surgical expertise, duration of surgery, equipments and increased cost associated with microvascular surgery, compliance of the patient make nonvascular bone graft a feasible choice for reconstructions of such defects. In the present case report reconstruction of segmental defect of mandible measuring 6cm due to removal of a tumor in posterior mandibular region is done.

**Key Words** Mandibular defect, Free fibula graft, Microvascular surgery, Avascular graft

## INTRODUCTION

Functional and cosmetic defects in mandible are caused by various ailments like trauma, neoplasm and infections. These need to be addressed according to their extent and severity by ablative surgery of mandible like segmental resection and hemimandibulectomy. These discontinuity defects often severely compromise the mastication, deglutition, speech, protection of airway, and facial aesthetics which makes mandibular reconstruction not only desirable but also essential<sup>1</sup>.

The decision to perform a primary reconstruction of mandibular defects as well as specific nature of the technique to be employed is based on defect related factors like, size and location of the mandibular bone defect, distribution and quality of the remaining native dentition. In turn the procedure should be simple with least possible donor site morbidity so as to return the patient to previous state of function<sup>2</sup>.

Reconstruction options for mandible range from metallic reconstruction plate to vascularised bone flaps. Nonvascular bone grafts could be used judiciously for reconstruction of selective mandibular defects with not much of soft tissue loss provided the defect is <9 cm<sup>3</sup>, stable fixation to the native mandible and a 2-layer watertight closure both intraorally and extraorally.

Early attempts of primary mandibular reconstruction with nonvascularised bone grafts were fraught with suboptimal results and an unacceptable incidence of complications, especially when the patients were subjected to adjuvant post-operative radiation therapy in malignant tumors of jaw. Any nonvascularised bone graft will be taken when 100% ideal conditions are provided<sup>3</sup>. They give good contour and aesthetics but are most successful in non-irradiated patients who have adequate soft tissue and where the defect is shorter.

Though reconstruction with free flaps remains the gold standard, factors like need for surgical expertise and equipment, increased intra-operative time, post-operative stay, economic reasons, increased age and compromised medical condition of the patient are against microvascular grafting. Thus nonvascularised bone grafts are still a reasonable option for mandibular reconstruction in the developing world and can be used for primary

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reconstruction of mandibular defects due to benign pathologies<sup>1</sup>.

The current case report presents reconstruction of segmental defect of a mandibular body of a young patient with a benign lesion.

## CASE REPORT

A 23 year old male patient presented to the department of O.M.F.S, Dr. R Ahmed Dental College & Hospital with history of a painless swelling on the left side of the body of the mandible for last one year. Orthopantogram of the patient shows a well delineated radio opaque lesion measuring 3.5 cm X 2.7 cm in the angle of the mandible with expansion of the buccal cortex of the mandible and pathological fracture of the lower border of the mandible.

The diagnosis of fibroosseous lesion was

confirmed with histopathological evaluation. The patient was planned for segmental mandibulectomy followed by reconstruction with avascular fibular graft. The choice of avascular fibular graft was made looking forward the post operative rehabilitation with osseointegrated dental implant and prosthesis & removal of portion of fibula is associated with acceptable morbidity when weighed against the benefit of the graft.

Consent from the patient was taken and segmental resection of mandible with adequate safe margin was done creating an osseous defect of 6 cm. Two team approach was taken and osseous fibular graft of adequate length was harvested from left leg simultaneously to expedite the surgical procedure. The fibular osseous graft placed on the defect and stabilized

with miniplates and screws. The involved leg was splinted with plaster of paris splint.



**Fig 1:**The side lateral view



**Fig 2:**Orthopantogram



**Fig 3:**Dissection for fibular graft



**Fig 4:**The resected specimen



**Fig 5:**The defect



**Fig 6:**Fibula fraft in place



**Fig 7:**Post operative frontal view, no observable scar



**Fig 8:**Scar on neck

## DISCUSSION

Reconstruction of mandibular defect is needed for not only aesthetic but also for functional reason. Though vascularised free osseous flap remains the gold standard for reconstruction of mandibular defect<sup>4</sup>, a non vascularised graft is a choice over the reconstruction plate in resource limited situations. Both vascularised & non vascularised bone grafts could be used with different range of satisfactory results depending on many factors such as the size and site of the defect, patient age, histopathology of the lesion, fixation methods and radiotherapy<sup>5</sup>. Nonvascularised fibular transfer is a simpler, less expensive and a shorter procedure than the use of vascularised grafts and allows remodelling of the fibula at the donor site. It is a biological reconstruction with good long-term results, and a relatively low donor site complication rate of 16%<sup>6</sup>.

Hypertrophy of vascularised fibular grafts as described in the literature varies between 37% and 90%<sup>7,8,9,10,11</sup> compared with a mean of 32% in nonvascularised grafts<sup>12</sup>.

It enables reconstruction of the mandible in both aesthetic and functional means. Dental implants that integrated in the autogenous fibular bone grafts showed a stable crestal peri-implant bone level up to 15 years after implant placement<sup>13</sup>. An immediate or delayed implant placement followed by prosthodontic rehabilitation can be done to achieve the goal of aesthetic and function. Complications of harvesting the fibular graft include injuries to the peroneal nerve, compartment syndrome, various local muscular problems and ankle instability. The proximal 6 cm of the fibula should be preserved to reduce the risk of nerve injury<sup>14</sup>. The malleolar dysfunction as a donor site morbidity in nonvascular fibula graft can be minimized keeping the distal 6 cm of fibula undisturbed.

The complication rate at the donor site for vascularised grafts has been reported to vary between 7% and 35%<sup>15-19</sup>. It appears to be higher than for non-vascularised grafts whose complication rate has been reported to vary between 4% and 12%<sup>20-22</sup>. Overall success rate, as found in Fosters et al's comparative study, is in case of non vascularized bone graft for reconstruction of mandibular segmental defect as be upto 69%<sup>23</sup>.

## REFERENCES

1. Nonvascularized bone grafting for mandibular reconstruction : myth or reality? Gadre PK, Ramanojam S, Patankar A, Gadre KS *J Craniofac Surg*. 2011 Sep; 22(5):1727-35.
2. Urken ML, Weinberg H, Vickery C, Buchbinder D, Lawson W, Biller HF *Arch Otolaryngol Head Neck Surg*. 1991 Jul; 117(7):733-44.
3. A comparison of vascularized and nonvascularized bone grafts for reconstruction of mandibular continuity defects. Pogrel MA, Podlesh S, Anthony JP, Alexander JJ *Oral Maxillofac Surg*. 1997 Nov; 55(11):1200-6.
4. Houdek, Matthew T., et al. "New options for vascularized bone reconstruction in the upper extremity." *Seminars in plastic surgery*. Vol. 29. No. 01. Thieme Medical Publishers, 2015.
5. Mounir, Mohamed, et al. "Vascularised versus Non Vascularised Autogenous Bone Grafts for Immediate Reconstruction of Segmental Mandibular Defects: A Systematic Review." *Database 1* (2015): 2
6. Krieg, A. H., & Hefti, F. (2007). Reconstruction with non-vascularised fibular grafts after resection of bone tumours. *Bone & Joint Journal*, 89-B(2), 215-221.
7. De Boer HH, Wood MB. Bone changes in the vascularized fibular graft. *J Bone Joint Surg [Br]* 1989;71-B:374-8.
8. Eisenschenk A, Lautenbach M, Rohlmann A. Free vascularized bone transplantation in the extremities. *Orthopäde* 1998;27:491-500
9. Hsu RW, Wood MB, Franklin HS, Chao EY. Free vascularized fibular grafting for reconstruction after tumour resection. *J Bone Joint Surg [Br]* 1997;79-B:36-42
10. El Gammal TA, El-Sayed A, Kotb MM. Hypertrophy after free vascularized fibular transfer to the lower limb. *Microsurgery* 2002;22:367-70
11. Shea KG, Coleman DA, Scott SM, Coleman SS, Christianson M. Microvascularized free fibular grafts for reconstruction of skeletal defects after tumor resection. *J Pediatr Orthop* 1997;17:424-32.
12. Enneking WF, Eady JL, Burchardt H. Autogenous cortical bone grafts in the reconstruction of segmental skeletal defects. *J Bone Joint Surg [Am]* 1980;62-A:1039-58
13. Duttenhoefer, Fabian, et al. "Long-term peri-implant bone level changes of non-vascularized fibula bone grafted edentulous patients." *Journal of Cranio-Maxillofacial Surgery* 43.5 (2015): 611-615.
14. Springfield D. Autograft reconstructions. *Orthop Clin North Am* 1996;27:483-92
15. Kühner C, Simon R, Bernd L. Vascularized fibula transplantation in orthopedic oncology: personal experience and review of the literature. *Orthopäde* 2001;30:658-65
16. Shea KG, Coleman DA, Scott SM, Coleman SS, Christianson M. Microvascularized free fibular grafts for reconstruction of skeletal defects after tumor resection. *J Pediatr Orthop* 1997;17:424-32
17. Weiland A. Current concepts review: vascularized free bone transplants. *J Bone Joint Surg [Am]* 1981;63-A:166-9.

18. Minami A, Kasashima T, Iwasaki N, Kato H, Kaneda K. Vascularised fibular grafts: an experience of 102 patients. *J Bone Joint Surg [Br]* 2000;82-B:1022–5
19. Arai K, Toh S, Tsubo K, et al. Complications of vascularized fibula graft for reconstruction of long bones. *Plast Reconstr Surg* 2002;109:2301–6
20. Enneking WF, Eady JL, Burchardt H. Autogenous cortical bone grafts in the reconstruction of segmental skeletal defects. *J Bone Joint Surg [Am]* 1980;62-A:1039–58
21. Yadav SS. Dual-fibular grafting for massive bone gaps in the lower extremity. *J Bone Joint Surg [Am]* 1990;72-A:486–94.
22. Al-Zharani S, Harding MG, Kremli M, et al. Free fibular graft still has a place in treatment of bone defects. *Injury* 1993;24:551–4.
23. Foster, Robert D., et al. "Vascularized bone flaps versus nonvascularized bone grafts for mandibular reconstruction: an outcome analysis of primary bony union and endosseous implant success." *Head & neck* 21.1 (1999): 66-71.