

FREE VASCULARISED FIBULA RECONSTRUCTION OF COMPLEX OROMANDIBULAR DEFECTS- OUR EXPERIENCE.

Plastic Surgery

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KEYWORDS

INTRODUCTION

The following observational study was done in SRMS, Bareilly over 2 years from July 2016 to July 2018 on 34 patients. Mandibular reconstruction is required in cases where resection is done following tumor of oral cavity involving mandible either benign or malignant or trauma. In 1989, the first lower-jaw reconstruction with a fibular flap, using osteotomies to mimic the shape of the mandible, was described. Since then, the use of the revascularized free fibula flap as bone graft has become a cornerstone in the head-neck armamentarium.¹ The type of reconstruction depends on the amount of tissue excised and the aim is to restore as much functionality as possible. The aim of reconstruction is to reconstruct lower one third of the face, restore the functional ability of the patient such as mastication, normal occlusion and aesthetic aspect of maintaining normal appearance. Management of oral squamous cell carcinoma is the most common malignancy resulting in acquired segmental defects of the mandible. Avulsion segmental wounds most commonly arise from high-velocity injuries such as firearms, industrial accidents, and occasionally motor vehicle collisions. This study was done with the objective of finding the outcome of free fibular flaps in reconstructing the oromandibular defects.

Mandible reconstruction can be done using a 3D printed mould on which the graft is based. This is a method used more in higher centers and developed countries with a better health insurance and expenditure for health care. At our centre since most of the patients come from a modest background, a more cost effective method of on table resection and reconstruction is planned with osteotomy done of fibula and fixation done to achieve normal occlusion and functionality.

MATERIAL AND METHODS

This study included 34 consecutive patients who needed oromandibular reconstruction irrespective of diagnosis, pathology, age, gender. There were no patients who needed the reconstruction following an avulsion injury. All patients had tumors of oral cavity and in one case osteosarcoma of central segment of mandible. There were 2 cases of adamantinoma and 31 were squamous cell carcinoma of oral cavity. Following the resection of tumor, resection was done using fibula free flap using technique where the osteotomy segments are fixed to mimic native mandible by using miniplates. Miniplates are also used to fix the fibular segment to existing part of natural mandible. This method proved to be cost effective, practical and less consuming of resources as well.



Image 1- RESECTED MANDIBLE INTRA-OP

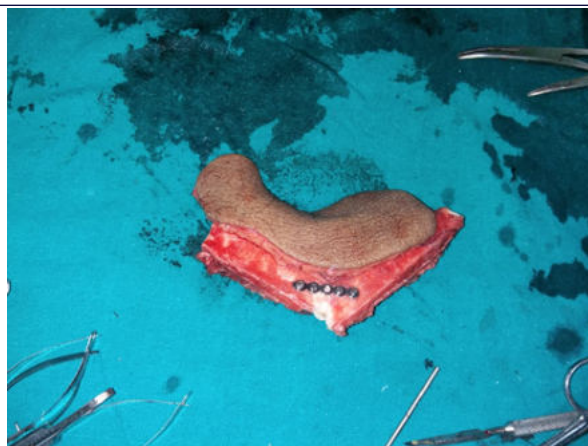


Image 2- RECONSTRUCTED FIBULA WITH OSTEOTOMIES AND MINI PLATES



Image 3- POST OP OF RECONSTRUCTED HEMI MANDIBULECTOMY

Anatomy And Clinical Method Of Reconstruction-

1)Fibular Graft

The origin of the term 'flap' is alleged to originate from the Dutch *Flappe* meaning as something that hung broad and loose attached only at one side. Reconstructive skin flap surgery owes a great deal to the work of the Indian Ayurvedic medical practice of nasal reconstruction. Greater understanding of skin flaps has occurred in both the anatomical descriptions of the blood supply and through pharmacological manipulation of the circulation. A skin flap is a piece of tissue transferred from the donor site and inserted into the recipient site while maintaining a continuous attachment to the body (the pedicle). The flap may consist of skin and subcutaneous fat but could also include fascia, muscle, bone, nerve or any combination of these tissues. Although alive when transferred, the flap may subsequently die due to vascular compromise. Microvascular flap reconstruction adheres to the same principles, except that the pedicle is created in the recipient site by micro anastomoses of donor artery and vein to recipient artery and vein.²

For a fibular flap; skin flap is designed and the fibula marked. The size and shape of skin markings, length of fibula and relationship of skin and bone follow the requirements at the recipient site. Skin flap is about one fifth more than the defect and fibular graft 4 cm longer than the defect for proper fixation. Free fibula flap provides a long, strong segment of bone. Can be harvested as a purely osseous flap or can

include a large fibro cutaneous component if needed. The pedicle runs through the length of the fibula with perforators extending to supply the skin paddle. If required Osseo musculocutaneous flap might be taken to fill the defect in which soleus muscle is included along with the Osseo cutaneous segment that is being raised.

The vascularity of the skeletal and the cutaneous components is provided by the peroneal artery via the nutrient artery and the musculocutaneous perforators. In rare situations, these perforators may arise from other major leg arteries. In such circumstances, the procedure has to be either abandoned or modified so that neither the vascularity of the flap nor the donor limb is compromised. A musculocutaneous perforator from peroneal artery is preferred for raising the flap as it ensures the vascularity of both the limb and the flap. Anastomosis is done of the perforator with either facial artery or superior thyroid artery whichever is available post dissection. End to end anastomoses is done of the arteries. However end to side anastomoses might be done if perforator has to be anastomosed with external carotid artery when none of the peripherical arteries are available or in proximity for a tension free anastomoses.

2) Mandible

Mandibular defects can generally be considered by their location and extent and can be divided into defects involving the anterior mandible, lateral mandible, and ramus/ condyle. The Jewer classification provides an aid in classifying mandibular defects and reflects the complexity of the reconstructive problem. Central defects including both canines are designated "C", and lateral segments that exclude the condyle are designated "L". When the condyle is resected together with the lateral mandible, the defect is designated "H", or hemi mandibular. Eight permutations of these capital letters—C, L, H, LC, HC, LCL, HCL, and HH—are encountered for mandibular defects. The significance of this is that a lateral defect can be reconstructed with a straight segment of bone, whereas a central defect would require osteotomies. The classification was modified to include a soft tissue description as well, with "t" representing a significant tongue defect, "m" a mucosal defect, and "s" an external skin defect.

Attempts to classify defects of the jaw and its soft tissues by location and size to propose appropriate methods for reconstruction have been made for many years (David et al., 1988; Jewer et al., 1989; Urken et al., 1991; Boyd et al., 1993) Various treatment methods have been proposed as a result of such endeavors, and new alternatives continue to be suggested. Many factors come into play in the process of choosing the appropriate method for reconstruction, including location and extent of the hard and soft tissue defect, dentition, possible complications, characteristics of the tissue, goals of the patient and medical staff, and operator preference.^{3GH}

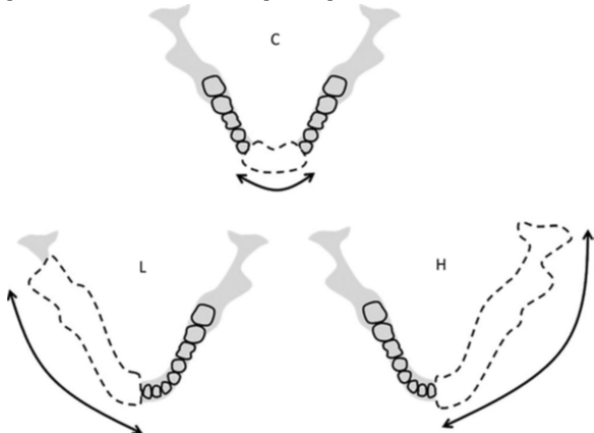


Image 4- HCL method of classification

In our study osteotomies were decided and done on table when dissection was done on approximation without a 3 D mould. The dissection and how much mandible was resected helped in deciding how many osteotomies are required to mimic the natural appearance that patient had.

The segments were modeled using miniplates and fixed to the native remaining portion of the mandible with miniplates and screws.

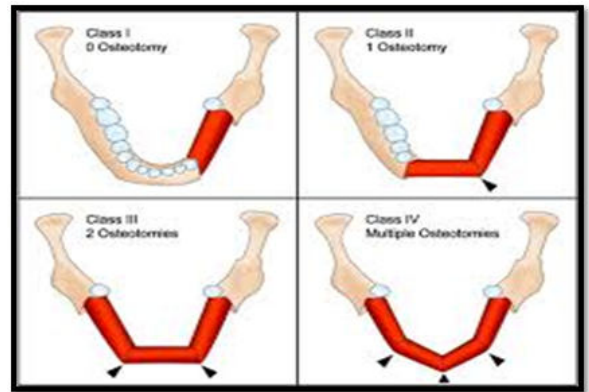


Image 5- Reconstruction of mandible using fibula

RESULT

Out of the 34 operated cases, there was no mortality and 2 cases ended up with flap necrosis due to venous thrombosis. In patients with flap necrosis a PMMC (pectoralis major myocutaneous) flap was done after removing the necrosed fibular flap. Osseous reconstruction was abandoned in these patients post necrosis of the fibular segment. Rest 32 patients developed no complications. They responded well to the flap and anastomoses. In none of the cases operated a muscular pedicle was required; an osseocutaneous flap only was sufficient to fill the defect. 20 patients proceeded to get dental implants.

All 32 presented with perfect occlusion and functionality on follow up. There was only 1 case of osteosarcoma of central segment of mandible. Rest were squamous cell carcinomas of oral cavity involving mandible as well. Using free fibula flap for reconstructing the oromandibular defects proved very successful in our study. It's a method that gives good aesthetic and functional results with low morbidity.

DISCUSSION-

Although there are many options for mandibular reconstruction, vascularized bone flaps are unique in that they permit reconstruction of the oromandibular complex even though the recipient bed is often compromised by salivary contamination and prior irradiation. In contrast to nonvascularized bone grafts, vascularized bone grafts remain capable of healing to the adjacent native mandible and eventually withstand the loading forces associated with mastication.⁴ Patients requiring mandible reconstruction today have much better outcomes. Vascularized bone flaps are the best option for a functional and aesthetic reconstruction, with the free fibula flap remaining the gold standard for mandible reconstruction.⁵ Even though each step in modelling the flap is important, fibula pre plating and templating should be considered to be crucial steps for facilitating the procedure and guaranteeing a satisfactory result. Using a fibular osseo-cutaneous flap proved to be a very effective method of reconstruction improving morbidity of the patient significantly while providing satisfactory aesthetic and functional results.

Our study concluded that mandibular reconstruction using a free fibula flap can achieve good functional and cosmetic outcomes which has been the most common conclusion drawn in various studies worldwide.

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