VOLUME-9, ISSUE-2, FEBRUARY-2020 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Surgery

INTRACORPOREAL MODELING OF VASCULARIZED FREE FIBULA GRAFT FOR HEAD AND NECK RECONSTRUCTIONS.

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ABSTRACT Vascularized free fibula graft using microsurgery technique is currently a well known and most commonly performed reconstructive surgery for reconstruction of composite head neck and limb defects. Various techniques are available for modeling of fibula graft to achieve the desired shape of bony defect in mandible or maxilla reconstruction. We describe our experience of intracorporeal fibula graft modeling and its use and the outcomes we had following this technique in cases of mandible and maxilla reconstruction.

KEYWORDS : Mandible Reconstruction, Free Fibula Osteocutaneous Graft Flap, Maxilla Reconstruction.

INTRODUCTION

Vascularized Free Fibula graft is an established and popular procedure for reconstruction of bony defects in Head and Neck and Limb region. Fibula graft was introduced by Taylor et al in 1975 (1).

The reliability of large skin paddle for coverage of both intra oral mucosa and extra oral skin defects was proved by FC Wei et al in 1986 (2). Currently Fibula is considered a work horse for mandible reconstruction (3). Various techniques are in use which give guide for modeling of fibula graft including prefabricated templates (4), prebent reconstruction plates (5) and osteotomy guides (6). Osteotomies required for modeling of fibula can be done Intracorporeal (before pedicle division) or extracorporeal (after pedicle division). The prepared fibula graft is then transplanted to recipient site for reconstruction. We describe our cases in which Vascularized free fibula graft was done in which all the fibula modeling was done in intracorporeal giving good functional and aesthetic results.

RELEVANT FIBULA VASCULAR ANATOMY FOR OSTEOT OMY AND MODELING

The proximal head and epiphysis of fibula bone is supplied by anterior tibial artery branches. Middle third of fibula receives a direct nutrient artery arising from peroneal artery. Also the important supply of fibula bone is its periosteal segmental vessels which are multiple making fibula bone a flap of choice for osteotomising into many segments (7).

MATERIAL AND METHODS

Between January 2018 to December 2018 6 cases were reconstructed using Vascularized free fibula graft at a tertiary care hospital. All the cases were carefully evaluated preoperatively and a reconstruction plan was made. A preoperative lower limb Doppler study was made in all cases. In all cases the fibula graft were harvested by anterior approach. After completion of harvest tourniquet was deflated and vascularity of bone as well skin paddle was confirmed. In all cases resected specimen was used as a guide for making a template for modeling of fibula bone. This template plate was sterlised and then used for modeling the reconstruction plate which was used for fixing the osteotomised fibula segements. All the segments were primarily fixed with a single reconstruction plate as using many miniplates for holding many segments will complicate the process.

All the fibula bone were osteotomised intracorporeal before pedicle division and the reconstruction plate with the help of paper scale was used as a guide for planning the segments of fibula. Skin paddle perforator was avoided at the planned osteotomy and it was included into the bone segment ensuring protecting skin paddle blood supply. The modeled fibula graft was then detached from the donor site and was transplanted into the defect. After fixation graft vessels were anastomosed to neck vessels. Postoperative graft monitoring was done for 4 days. All the patients showed good functional and aesthetic outcomes.

RESULTS :

CASES DATA

Sr no	Age and sex	Diagnosis	Defect	Vascularised Fibula graft	Number of ostetomies	Bone segments	Skin paddle	Complications
1	26 yr Female	Ameloblastoma Mandible	Bone- Left Lateral segment and left ramus preserving condyle Skin/mucosa-No defect	Left sided	1	Lateral segment -5 cm (single barrel) Ramus-2.7cm	No	Nil
2	35 yr Male	Oral cancer	Bone-Right lateral segment and right ramus Skin/mucosa- Ipsialteral buccal mucosa	Left sided	1	Lateral segment- 5 cm (single barrel) Ramus – 3.5 cm	9x 6 cm	Plate exposed – managed by pedicled Deltopectoral flap

3	40 yr Male	Oral cancer	Bone-Left lateral segment and ramus Skin/mucosa- outer skin defect + ipsilateral buccal mucosa defect	Left sided	1	Lateral segment-5 cm (single barrel) Ramus -2.5 cm	20 x 7 cm	Nil
4	48 yr Male	Ameloblastoma Mandible	Bone-Left lateral segment and ramus Skin/Mucosa- No defect	Left sided	2	Lateral segments – 6cm and 4 cm (double barrel) Ramus- 5cm	3 x3 cm for monitoring graft	Nil
5	55 yr Female	Ameloblastoma maxilla	Bone-Right maxilla alveolus centre and lateral segment (orbit preserving maxillectomy) Skin/mucosa- Maxilla antrum mucosa	Right sided	1	Lateral segment- 4cm Centre- 2.5 cm	7 x 5 cm	Neck hematoma postop day 1 requiring exploration.
6	43 yr Male	Oral cancer	Bone – Left lateral segment,ramus and central segment Skin/Mucosa- Outer skin defect + Ipsilateral Buccal mucosa defect	Left sided	2	Lateral segment- 5cm Ramus 3 cm Central segment- 2.5 cm	25 X 7 cm	Nil

Following are some cases.

CASE 1

26 yr female reconstructed for mandible defect using vascularised Free Fibula graft.

Figure Case 1

Figure1-Preoperative picture

Figure 2 – Intracorporeal fibula modeling completed

Figure 3 – Fixation of Fibula into the defect.

Figure 4- postoperative picture

Case 2

55 yr female reconstructed for maxilla defect using free vascularised fibula graft

Figures Case 2

Figure 1- Preoperative picture

Figure 2 – Intracorporeal modeling of fibula graft

Figure 3 – Fixation of fibula into defect

Figure 4- Postoperative picture

Case 3

48 yr Male patient underwent mandible reconstruction with double barrel Free Vascularised Fibula graft.

Figures Case 3

Figure 1- Preoperative picture

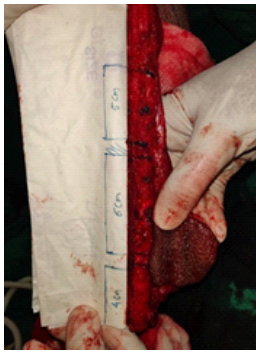

Figure 2- Intra corporeal modeling of fibula bone

Figure 3- Postoperative picture

DISCUSSION

Microsurgical reconstructive surgeries using Vascularised free fibula graft for mandible and maxilla reconstruction are complex as well as require long surgery time. But the outcomes are Superior to any other technique of reconstr uction. Literature has described many techniques for modeling of fibula graft, each having its own advantage and disadvantage.

Intra corporeal modeling of fibula has several advantages.

The main advantage is it reduces the ischemia time of the graft before it is fixed into the defect. Hence the planning and osteotomy can be done with patience avoiding errors and hesitation. Also the time can be utilized for anastomosis of vessels.

As the osteotomies over fibula are done with pedicled attached, skin perforators are nicely seen hence the osteotomy site can be perfectly marked by avoiding and including perforators in bone segments.

It is easier to perform using a single reconstruction plate which can hold different osteotomised segments together.

Disadvantage can be to have a main pedicle injury while doing osteotomy but if adequate pedicle is dissected proximally and graft modeling is done with surgeon in sitting position patiently this can be avoided.

CONCLUSION

Free fibula osteocutaneous graft is an excellent choice for Head and neck reconstructions replacing like with like. Thus it helps to achieve complete aesthetic as well functional rehabilitation of a patient.

Intra corporeal modeling of fibula should be done as it reduces the graft ischemia time thus increases the safety of transplanted flap giving ultimate satisfactory outcome.

ACKNOWLEDGEMENTS

None

CONFLICT OF INTEREST

Declaration no financial interest or any conflict of interest exists

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