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Case Report

Vascularised fibula osteocutaneous flap for mandibular reconstruction and multiple implant retained fixed prosthetic rehabilitation of a patient with mandibular ameloblastoma

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ARTICLE INFO

Article history:

Received 4 September 2013

Accepted 16 February 2014

Available online 26 April 2014

Keywords:

Ameloblastoma

Vascularised free fibula graft

Hemimandibulectomy

FP2 prosthesis

Introduction

Ameloblastomas are rare, benign dental tumours representing 1% of the oral tumours and cysts.¹ The most common site for ameloblastoma is mandibular molar region. It is an aggressive benign tumour of epithelial origin that has generally been treated surgically for metastases. Treatment by wide excision is curative in up to 95% of cases. Chana et al² proposed a 1–2 cm normal margin, and the large defect left after resection warrants reconstruction preferably with the fibula osteocutaneous

flap. Taylor in 1975³ first described vascularised fibula graft for composite reconstruction of the bone and soft tissue defect. After demonstrating that osteotomies can be performed in vascularised fibula grafts without compromising the viability of the bone segment, these grafts became the state of art reconstruction method after mandible ablation. The free fibula flap provides the greatest bone length and is suitable to accept dental implants. Osseointegrated implants have become generally accepted for prosthodontic management.⁴ The application of endosseous implants in combination with bone grafting for jaw reconstruction has allowed for improved results. Different types of osseointegrated implants have been placed either simultaneously with bone grafts^{5,6} or at a later stage after the bone grafts have healed. In this case report a 23-year-old female patient underwent left hemimandibulectomy because of ameloblastoma. Fibula was osteotomised and reconstructed to resemble mandible shape and fixed to reconstruction plate with intact pedicle. Implants were placed four months after surgery and prosthetic rehabilitation of the edentulous site was accomplished.

Case report

A 23-year-old female patient developed left mandibular swelling, which was diagnosed as ameloblastoma of the left

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<http://dx.doi.org/10.1016/j.mjafi.2014.02.007>

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Fig. 1 – A: Pre-operative OPG, B: Pre-operative CT scan.

side of the mandible. Clinical evaluation revealed expansion of the buccal plate of the left mandibular body along with the numbness of lower lip. A panoramic radiograph and CT scan [Fig. 1A and B] of the mandible revealed a unilocular radiolucent lesion extending from root apex of the left mandibular third molar to the midline. On CT scan the tumour size and cortical bone penetration was assessed. In light of the diagnosis the patient underwent left hemimandibulectomy [Fig. 2A] and immediate reconstruction with microvascular free fibula graft and titanium reconstruction plate [Fig. 2B and C]. For a fibula osteocutaneous flap, intraoperatively a tourniquet was applied and the standard lateral approach described by Gilbert⁷ was planned. The skin paddle was planned and centred over the pre-planned intraoral mucosal deficit. The anterior margin was raised and the posterolateral intermuscular septum was exposed to identify the septocutaneous branch. The fibula was exposed and a 14 cm segment was cut with oscillating saw. The distal cut was 6 cm from the ankle joint so as not to compromise joint stability. The vascular pedicle was carefully dissected. Four osteotomies

were performed with the pedicle still attached. Care was taken to protect the periosteal branch of the peroneal artery before performing an osteotomy as described by Jones et al.⁸ Shaping of the resected fibula was done according to the preoperative template. A titanium miniplate with locking screws (Leibinger Universal Fixation System, Leibinger Co., Germany) was used to secure the osteotomized fibula and the mandible. This was carried out at the right lower limb itself with the pedicle intact. When the recipient site and vessels were ready, the pedicle was cut and the newly formed mandible was transferred and revascularised after selecting the suitable position. The graft pedicle was anastomosed to the superior thyroid artery and two tributaries of external jugular vein. After a healing period of 4 months [Fig. 2D] multiple implant supported fixed prosthesis was planned. Four external hex implants with size 4 mm × 9 mm (Biohorizons External Implant Systems, Inc. Birmingham) were placed in the region of 33, 34, 35 and 36 region [Fig. 3A, B, C]. After a healing period of four months second stage surgery was performed and abutments were placed. A multiple implant retained porcelain fused to metal

Fig. 2 – A: Resected left body of mandible, B: Harvested microvascular free fibula graft with osteotomy, C: Reconstruction of mandible with vascularised free fibula graft and titanium plate, D: Post-operative healing after 4 months.

Fig. 3 – A: Post-operative OPG after 4 months of mandibular reconstruction, B: Placement of implants in the region of 33, 34, 35 & 36, C: OPG (4 months) after placement of implants, D: Prosthetic rehabilitation with porcelain fused to metal crowns.

fixed prosthesis (FP-2 Prosthesis, Misch classification) connecting the implants in the region of 33, 34, 35 and 36 with cantilever extending to the region of 31 and 32 were fabricated and inserted [Fig 3D]. The patient was reviewed at 2-, 4-, 6- and 12-month interval. All the implants were stable and in good function with no post-operative complications.

Discussion

Ameloblastoma is classified as a benign odontogenic tumour, although its behaviour is similar to that of true neoplasia for being locally invasive and aggressive.⁹ Historically multicystic or solid ameloblastoma are treated with curettage and enucleation. Normally if the tumour is small (<5 cm) the defect can be repaired with a free bone graft.¹ However if the tumour resection is large reconstruction is challenging and may require a microsurgical flap either from fibula, iliac crest, scapula, radius or ribs to achieve function, cosmesis and restoration of mastication and speech to enhance the quality of life. Restoration of bony defect should be followed by addressing the mucosal defect. Since this patient had a large bony defect a free fibula osteocutaneous flap was chosen to address both the bony and soft tissue defect. The flap is easily accessible with vascular pedicle and it is possible to harvest the flap while tumour resection is being carried out. A vascularised bone graft enables the insertion of osseointegrated implants, which facilitates oral rehabilitation. Yilmaz et al¹⁰ did a comparison between vascularised iliac crest flap and vascularised free fibular flap in 24 cases. They noticed that less complication rate, superior functional and aesthetic results were achieved for those with fibular flap. For this patient resection of ameloblastoma of left mandible, reconstruction with vascularised fibula graft and placement of implants in 33, 34, 35 and 36 region was performed. After 4 months of healing

period second stage surgery was done and porcelain fused to metal restorations were inserted.

Conclusion

The vascularised free fibula graft provides a good alternative to other bone grafts for mandible reconstruction. It is relatively easy to perform and carries a low complication rate. In addition to mandibular shaping, placement of implants in these grafts has shown good results in prosthetic rehabilitation. In our case the patient underwent left hemimandibulectomy followed by reconstruction with vascularised free fibula graft. Prosthetic rehabilitation was completed with the aid of multiple implant retained fixed prosthesis. The patient had good masticatory efficiency and esthetics 1 year post-operative follow-up.

Conflicts of interest

All authors have none to declare.

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