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Reconstruction of mandible after resection of benign tumour using titanium crib and particulate corticocancellous iliac bone: Two Case Reports

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Abstract

Reconstruction of the mandible after ablative surgery can be achieved by using preformed trays or cribs formed from models produced by computer-assisted modeling systems such as stereolithographic models. Here, we present a case report of two patients who reported with a history of swelling in the mandible and was diagnosed with ameloblastoma. Both patients underwent resection of the tumor including condylar head, followed by reconstruction of the mandible using a custom-made titanium crib with a particulate corticocancellous iliac bone graft.

Out of two cases operated, one patient has swelling on right side of the face at first month postoperatively. The other patient had good facial symmetry and a normal range of mandibular motion. There were no other complications after the first month, sixth and twelfth months postoperatively. Thus, we concluded that titanium crib with a corticocancellous iliac bone graft is valuable for mandibular reconstruction.

Keywords: Titanium crib, mandibular reconstruction, corticocancellous iliac graft, ameloblastoma, benign tumor

Introduction

Reconstruction of the mandible after ablative tumor surgery remains a challenge. There is continuing debate

regarding the timing of reconstruction and optimal reconstruction method. However, it is generally accepted that autogenous bone grafts remain the best grafting material for choice over years[1,2,3].

When undertaking mandibular reconstruction, the restoration of bony continuity alone should not be considered a measure of success. The functions of chewing, swallowing, speech articulation, and oral competence must also be addressed[4,5].

The various methods of reconstruction of mandible are reconstruction plates, cribs**,** non vascularised bone graft such as iliac bone graft, costochondral rib graft, transport distractor**,** vascularized bone graft like fibular bone graft, radial free forearm flap, scapular graft etc[2,6].

The basic advantage of titanium tray is that it can serve as a reliable permanent implant for restoration of continuity and contour of the mandibular arch, thus maintaining mandibular segments in proper alignment. Other advantages include low morbidity of donorsite, less resorption of bone, good osseointegration of crib to bone and the availability of room for implant placement on the bone[3,6,7,8].

Case Report

We present a case report of 2 cases of mandibular reconstruction with custom-made titanium crib and corticocancellous iliac bone graft in patients diagnosed with ameloblastoma of the mandible based on radiographic and histopathological evaluation.

Case I

A female patient aged 16 years presented with a chief complaint of swelling in the right lower back region of her face since 6 months. She gives a history of intermittent dull pain. The swelling was initially small in size and slowly increased in size to reach the present condition.

On extraoral examination, a swelling was noted on the right side of the mandible extending from the body to the ramus region approximately 3 ^{x} 3 cm in its maximum dimension. The swelling was hard and tender on palpation. Intraoral examination showed missing mandibular third molar(48) and buccal cortical plate expansion.

An OPG was done which showed a large unilocular radiolucency extending from the mesial of the second premolar to the mandibular ramus with involvement of the condylar neck. The second and third molars were impacted and pushed to periphery.

3D CT Face with reconstruction showed buccal and lingual cortical expansion.

The patient was planned for surgical resection under general anesthesia .The titanium crib was fabricated and contoured preoperatively based on prediction tracing from panoramic radiographs of the patient's mandible.

Surgical resection of the tumor was performed extraorally by a submandibular incision(Figure 1).

Figure 1: Resected specimen

The titanium crib was trimmed, adjusted for fit in the gleniod fossa and mandible. The corticocancellous bone graft was then harvested from the anterior iliac bone and adapted on the titanium crib(figure 2).

Figure 2: Titanium crib with corticocancellous iliac graft

The crib was then fixed with screws(Figure 3).

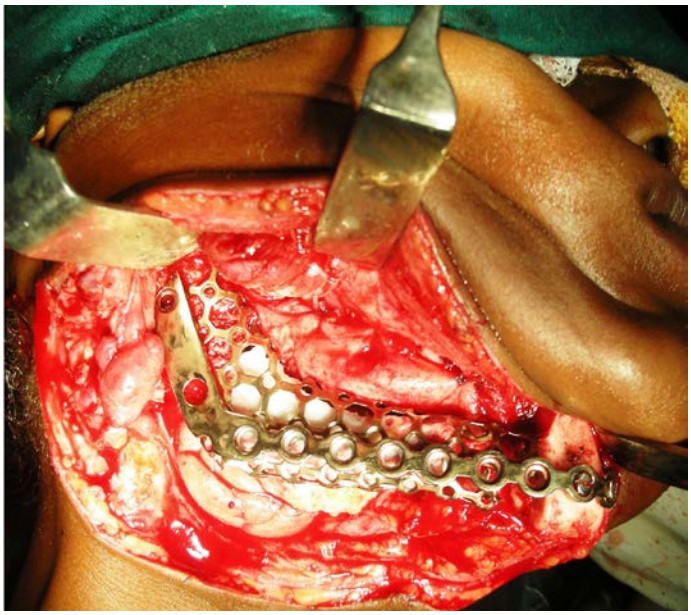

Figure 3: Intraoperative photograph

Case II

A male patient aged 45 years reported with chief complaint of pain and swelling on the lower right side of the face since 1 year. He was previously diagnosed with ameloblastoma of mandible on right side and had undergone surgical resection of mandible followed by reconstruction with titanium plate 4 years back. OPG revealed fracture of titanium plate.

Patient was planned for plate removal followed by reconstruction of mandible using titanium crib with particulate corticocancellous iliac bone. The titanium crib was fabricated and contoured pre-operatively based on prediction tracing from panoramic radiographs[5] and steriolithographic model of patient's mandible. The stereolithographic model was fabricated with the aid of a CAM(Computer Aided Manufacturing) system(Figure 4).

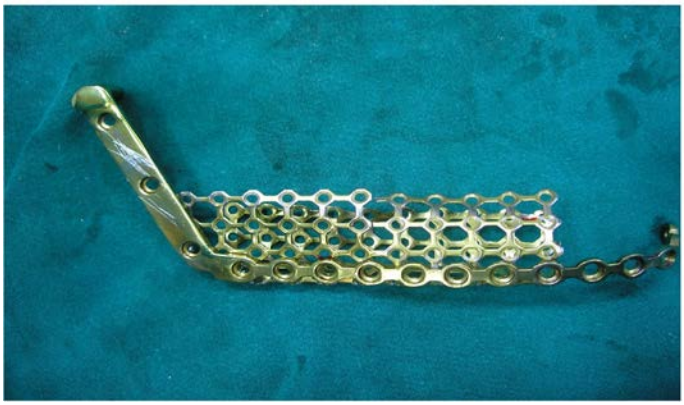

Figure 4: Stereolithographic model

The fractured plate was removed under GA. The titanium crib was trimmed and adjusted to fit in the gleniod fossa and mandible. Corticocancellous bone graft was then harvested from anterior iliac bone and adapted on the titanium crib. The crib was then fixed with screws (Figure 5).

Figure 5: Intraoperative photograph

Results

Out of two cases operated, one patient had some swelling in right side of the face at the end of first month. Other patient had good facial symmetry and normal range of mandibular motion. There are no other complications after first month, sixth month and twelth month postoperatively (Figure.6)

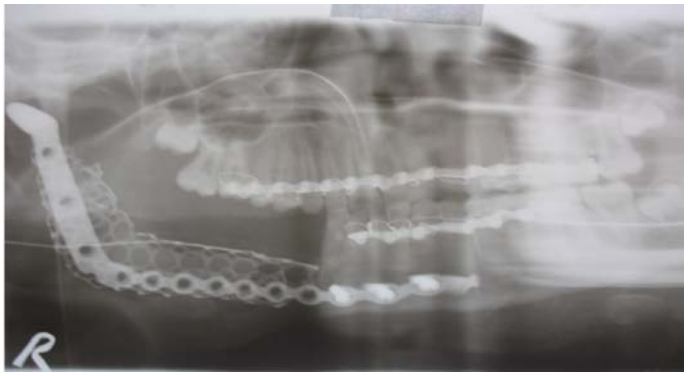

Figure 6: Postoperative OPG

Discussion

Mandibular reconstruction after ablative surgery is indicated for the following reasons: to stabilize the residual segment, maintain facial contour and to restore masticatory function[4,9]. Reconstruction in a normal host, with defects smaller than 5 cm can be done with nonvascularized bone graft. However, larger defercts more than 5 cm or defects in an irradiated host are typically well suited for microvascular reconstruction[4,6].

Patients diagnosed with benign tumors, who are immunocompromised or unaffordable for microvascular surgery are ideal candidate for titanium crib with corticocancellous iliac graft[2,3]. Both the cases reported here were diagnosed with ameloblastoma which is a benign tumor that is locally aggressive.

Iliac corticocancellous bone graft is the best from an osteogenetic point of view[8], our cases showed that good results can be achieved also with solid block grafts with respect to function and esthetics. In both our cases OPG showed good graft incorporation rate along with low overall morbidity. This correlate with the study of Tidstrom et al[10] and Giordano et al[11].

Shockley et al stated that immediate reconstruction of mandibular defects using reconstruction plates does not replace the use of free flaps but should be remembered as an alternative that offers fast and reliable reconstruction with no donor site morbidity and excellent facial contour[12]. Postoperatively, both our cases had good facial contour with no donor site morbidity.

Development of computer-aided design/computer-aided manufacturing systems [CAD/CAM] allows for precise planning and designing of patient specific implants preoperatively[9,13]. Similar technology was utilized for our second case and the results were excellent.

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