Replacement after reconstruction - prosthetic management of distracted mandible after hemimandibulectomy: A case report

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ABSTRACT

Maxillary or mandibular defects due to pathological or traumatic reasons need to be managed with a clinical challenge in order to assure the psychological, esthetical and functional needs of the patient. Post mandibulectomy would result with loss of teeth, bone height, width and deviation of mandible to the affected side. The degree of deviation might be due to the type of surgery and soft tissue contracture. Distraction osteogenesis or osteodistraction is one of the accepted treatment modality for a mandibular defect in which the segments of natural bone distracted sequentially for bone formation by means of intraoral or extraoral device. Here, we report the case of prosthetic management of distracted mandible after hemimandibulectomy in a 27-year-old female. This case succinctly explains the management of post distraction hemimandibulectomy by simple removable prosthetic rehabilitation which assured patient demands. This simple conservative approach was cost-effective and promisable prosthetic replacement in a short period than other treatment options.

Keywords: *Cast partial denture, Hemimandibulectomy, Removable prosthesis.*

Mandibular resection for Odontogenic tumors is a treatment option as patient life is of prime concern. Distraction osteogenesis (DO) is one of the methods to treat mandibular defect as reconstruction. DO is a biologic process of new bone formation between the surfaces of bone segments that are gradually separated by incremental traction [1]. A callus forms between the separated bone segments and as long as the traction proceeds, callus tissues are stretched inducing the new bone formation [2]. Post-surgical management with prosthesis is of prime concern as it restores their day to day life. In 1990, a review [3] was done to describe the various outcomes of mandibular reconstruction techniques. They stated that functional outcomes were provided for only 4% of the 782 patients when evaluated and prosthetic rehabilitation was given for only 16 patients (2%) of all mandibular reconstructions.

In this case report, post-distraction deviation of mandible was managed in a simplified manner by giving an interim prosthesis for one month which guided the patient to occlusion. A removable cast partial denture was given later which helped to restore patient esthetic as well as functional needs.

CASE REPORT

A 27-year-old female patient reported to the Department of Prosthodontics with a history of hemimandibulectomy of the left side for odontogenic keratocyst 8 months before followed by transport distraction osteogenesis of the left mandible (Fig. 1). Intraoral and extraoral activator (Indigenous distractor) device for traction were fixed connecting the two halves of the resected mandible at 31,32 region. Activation was given for one month and complete distraction of the left side segment attained. The patient was referred for prosthetic management after 3 months of distraction.

Extraoral examination presented with mild asymmetry and deviation of mandible to the left side. On intraoral examination,

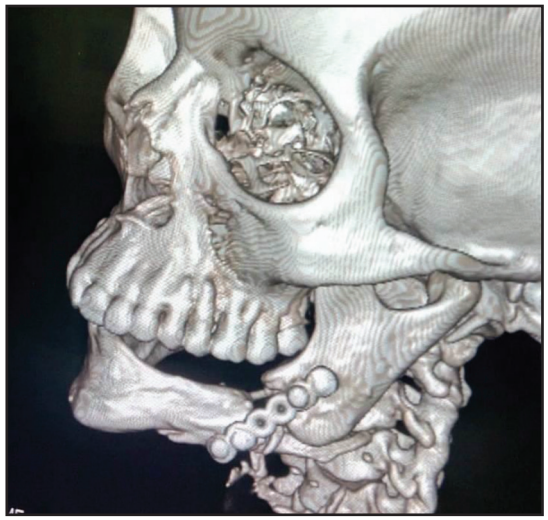

Figure 1: Postoperative CT after transportation Distraction osteogenesis.

Figure2: Preprosthetic intraoral picture.

entire mandibular teeth of the left side quadrant were missing. Drifting of lower right side quadrant 43 to the left side due to distraction was seen. A lingually placed supernumerary premolar was present between 45 and 46 which was planned for extraction (Fig. 2). A mucosal cleft was observed between the new fragment of the distracted mandible and mandibular ramus. A slight deviation of the jaw to the left side was present and the right side occlusion was not in contact due to the deviation of mandible to the left side (Fig. 3a).

Discussion about various treatment options like implant fixed partial denture, removable cast partial denture was done. As newly formed bone is not ideal for implant placement, the patient was informed about the necessity of restoring normal occlusion by removal prosthesis. Alginate impression was made and the removable interim partial denture was given as a training prosthesis for the patient to get the coordination of chewing and for occlusion. After multiple reviews and adjustments, the patient completely adapted to the interim prosthesis and satisfactory guidance in occlusion was also observed after one month (Fig. 3b).A removable cast partial denture was planned as a prosthetic replacement as the patient was not ready for another surgery for implant placement.

Lingually positioned supernumerary premolar between 45 and 46 was planned for extraction as it would interfere in designing ofa major connector in cast partial denture. Primary impression was made with alginate after complete healing of the extraction site and the casts were poured with Type III Dental stone. Casts were trimmed and finished and the lower cast was surveyed using a dental surveyor. All undercuts were blocked and favorable undercuts were utilized for retention of the prosthesis. Occlusal rest seats were prepared in the distal aspect of 46 and mesial aspect of 47 for direct retention. Additional retention was attained from mesial occlusal rest in 45 and guiding planes prepared in mesial aspect of 43 in mouth preparation. Indirect retention planed via I bar in 43. The final impression was made using Polyvinyl siloxane (Aquasil Putty Aquasil XLV – light body [Addition Silicone Elastomeric Material] Dentsply, Germany) using dual impression technique (Fig. 4). Master cast was poured with type IV die stone (Ultrarock, Kalabhai Karson Pvt Ltd, Mumbai, India).

Figure 3: (a) Lingually deviated occlusion to left side; (b) Guided occlusion after one month

The lingual bar was selected as a major connector as there is reduced depth in the floor of the mouth. Embrasure clasp was planned as a direct retainer and positioned over 46 and 47. Distal Extension of minor connector limited before the mucosal cleft to avoid impingement and pain. After casting of cobalt chromium framework, fitting of the cast was checked in the patient's mouth. Adaptation and retention were evaluated as satisfactory and the next stage of bite registration proceeded. During the trial stage, semi-anatomic 20-degree teeth (acrylock, Ruthenium group, Badia Polesine) were selected in order to counteract parafunctional forces on the prosthesis. The trial was done and checked for occlusion. Acrylisation was done and removable cast partial denture delivered and reviews were done for minor corrections (Fig. 5). After 4 to 5 reviews patient had good setting of the denture and found satisfied in both esthetic and functional aspects. Recall and review was done after one month and 3 months.

DISCUSSION

Distraction osteogenesis was first done by Codivilla in 1905 [4] for femoral lengthening, and the technique was popularized by Gavriil Ilizarov, a Russian orthopedic surgeon, in the 1950s [5,6,7,8,9]. This procedure ensures restoring the resected bone replacement naturally without grafting. In this case, the patient was emotionally unstable about her tumor and mandibular resection. Hence, rehabilitation of esthetics and function had become a primary concern in the management. Even though implant prosthesis is considered to be more comfortable and definitive prosthesis for patient, removable interim prosthesis was given immediately as a reassurance for the patient.

As the deviation of mandible was not very severe and the patient reported after a long time of surgery, the simple interim prosthesis was given as training prosthesis instead of Guided flange prosthesis. Better coordination and guidance in occlusion was observed after one month of wearing the interim prosthesis. Takahashi *et al* discussed a case in which an implant was placed 8 weeks after the distraction device was removed. At that time, the newly formed distraction site was filled with fibrous soft tissue. During the drilling procedure, the tip of the implant body was found to be firmly placed into the solid bone. The stability of the implant was insufficient and the osseointegration was hardly obtained as the implant was placed during the consolidation

Figure 4: Framework fabrication.

Figure 5: Cast partial denture delivery

period. However, on radiographic evaluation, the position of the implant immediately after placement was identical to that on the image taken 24 weeks and 10 months after implant placement [10]. But there are few reports on implant placement in the distracted site and optimum timing for implant placement. Hence, it is still unclear and insufficient evidence to make a conclusion [11,12].

As post distraction bone referred to as poor quality in Computed tomography (CT) scan, the chance of implant failure was discussed and explained to the patient. We generally believe that patient satisfaction and acceptance play a profound role in the acceptance of Removable Partial Denture (RPD). Dissatisfaction would lead to underusage and failure in rehabilitation. A retrospective study on evaluation of factors that affects continuous usage and patient satisfaction states that 39% of RPD were no longer used in 5 years due to pain, age, location of edentulous area, rests and occluding area. But longtime follow-up and clinical trials on patient satisfaction are necessary to understand the impact on RPD therapy [13]. Garrett *et al* [14] designed a longitudinal prospective study to determine whether conventional prostheses or implant-supported prostheses are preferred by patients after mandibulectomy. They concluded that 72% (33/46) of the subjects enrolled in the study were able and willing for conventional prosthesis, and only 35% (16/46) preferred and completed with implant-supported prostheses treatment.

Considering patient consternation for implant surgery, the removable prosthesis was suggested for this patient. Patient‘s good acceptance for the prosthesis was observed as she presented herself with a smiling face in subsequent follow-ups. But implant retained fixed prosthesis may be fabricated based on the patient demand in the future.

CONCLUSION

An early reporting of jaw resection patient to a maxillofacial prosthodontist must be emphasized for effective and easy management. In this case report, a removable partial denture is considered as it is a cost-effective replacement with a fulfillment of patient demands. Proper evaluation of the patient remaining teeth, oral muscular status, and proper designing of removable partial denture would reassure and restore esthetics and function.

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