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Case Report

Dentistry Section

Non Surgical Correction of Mandibular Deviation and Neuromuscular Coordination after Two years of Mandibular Guidance Therapy: A Case Report

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ABSTRACT

Carcinomas of the mandible may require resection of a segment of bone (continuity defect), partial removal of bone (discontinuity defect), tongue, and floor of the mouth and muscle attachments. Patients undergoing such treatment suffer from facial disfigurement, loss of muscle function, loss of neuromuscular coordination resulting in inability to masticate and swallow acceptably. Surgical reconstruction may not always be possible because of high reoccurrence rate, inability of the patient to cope with another surgery etc. The treatment of choice in non surgical cases is prosthetic rehabilitation using guiding flange prosthesis. This article describes the management of a patient who had undergone hemimandibulectomy and was not willing for a surgical reconstruction. Interim maxillary ramp prosthesis was given to the patient 15 days postoperatively followed by definitive guiding flange prosthesis for two years after which the patient was able to occlude in centric occlusal position without any aid.

Keywords: Guiding flange prosthesis, Hemimandibulectomy, Interim maxillary ramp

CASE REPORT

A 76-year-old male patient was referred to the Department of Prosthodontics about 2-3 weeks after right segmental mandibulectomy. The patient was diagnosed with squamous cell carcinoma which was extending from the second molar region to the ramus of the mandible. Radiographic examination revealed the carcinoma had infiltrated the bone and the patient was recommended to undergo segmental mandibulectomy. In this procedure the segment of mandible affected was excised resulting in a discontinuity defect. The defect created by surgery was repaired to some extent with a skin graft. Intra oral examination revealed missing teeth and defect extending from first premolar to retromolar area on the right side [Table/Fig-1].

Tongue movements were restricted, more on the surgical side. The tongue appeared dry and smooth. General oral health condition was fair. There was no bleeding on probing, no mobility or caries associated with the remaining natural teeth. Extraoral examination revealed mandibular deviation towards the resected side, drooling of saliva and difficulty in speech. Patient complained of difficulty in mastication and swallowing. During the initial healing phase an interim maxillary guidance ramp [Table/Fig-2] was planned because it is away from the surgical site thus easy to place and adjust. Since the patient had severe deviation maxillary guidance ramp was indicated. Maxillary impression was made using alginate (Zelgan plus, DENTSPLY). Maxillary acrylic resin (DPI) plate was fabricated with Adam's clasp on molars for retention [Table/Fig-2].

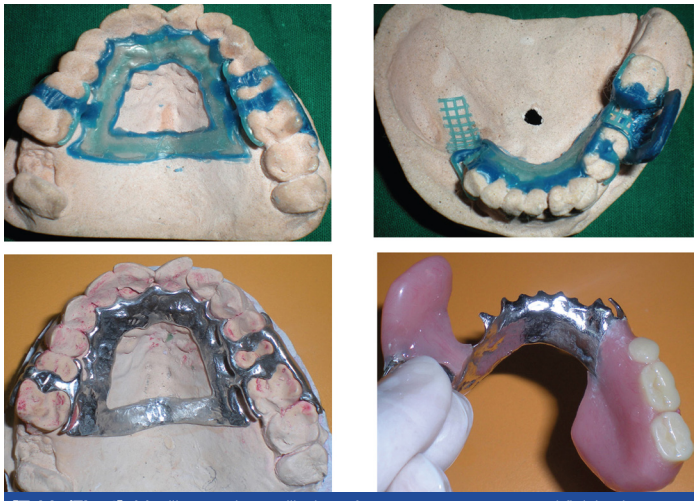
The plate was checked for fit and comfort. Self cure acrylic resin was added on the left side of maxillary plate palatally in dough stage and mandible was manipulated into centric occlusal position [Table/Fig-2]. This movement was repeated several times making a glide path helping the mandible into interocclusal position without any interference. The acrylic resin was allowed to polymerize, after which it was polished and placed intraorally. Maxillary ramp was advised immediately in the post operative period as it is easy to adjust and helps prevents the scar tissue contracture during the initial phase of healing. Definitive mandibular guiding flange prosthesis [Table/Fig-3] was planned after 6 months. The patient's oral health status was re-evaluated. Examination revealed the need for oral prophylaxis and few restorations. The mandibular guiding flange prosthesis consists of two components a maxillary cast framework [Table/Fig-4] engaging all the maxillary teeth and thus distributing the lateral forces to all the teeth and the entire maxilla.

[Table/Fig-1]: Post surgical picture showing the defect and deviation of the jaw **[Table/Fig-2]:** Maxillary ramp prosthesis guiding the mandible into interocclusal position
[Table/Fig-3]: Mandibular guiding flange in position guiding the jaw into centric occlusal position

The maxillary cast was surveyed and embrasure clasps were planned on right first molar and second premolar. Continuous embrasure clasps were planned on left posterior teeth. A buccal plate [Table/Fig-4] was incorporated on the left side of this framework which would engage the mandibular ramp [Table/Fig-3] on jaw closure.

The mandibular cast was surveyed and cast partial denture was planned. Occlusal rest seat preparation was made on the mesial fossa of the second molar and embrasure clasp between first and second premolar. Gingivally approaching clasp was planned on the canine with cingulum rest. Mouth preparation was done and secondary impressions were made. The master cast obtained was duplicated and refractory cast [Table/Fig-4] was made. Wax-up [Table/Fig-4] was done with a retentive mesh attached on the left side to retain the acrylic resin guidance ramp. The retentive mesh was designed in such a manner as to prevent any interference with the maxillary teeth during guided closure.

The maxillary cast framework and mandibular cast partial frame works were tried in the patient's mouth for fit and comfort. Autopolymerising acrylic resin was added to retentive mesh extending 7-8 mm above the occlusal plane. The mandibular framework was then seated in the patient's mouth and the mandible was manipulated into the desired occlusal relationship [Table/Fig-3]. The mandible was manipulated several times to confirm the position of the jaw. The prosthesis was then removed and the resin was allowed to polymerize. The prosthesis was then finished, polished and reinserted to check the occlusal relationship, fit and comfort. Any corrections required were done and patient was trained to insert and remove the prosthesis. Initially it was difficult for the patient to wear the prosthesis and engage the mandibular ramp with the maxillary framework. Manual manipulation with hand and with the help of family member was advised until the patient had learned to use the prosthesis.



[Table/Fig-4]: Maxillary and mandibular refractory cast, wax-up and finished cast partial framework with guiding flange

[Table/Fig-5]: Patient able to achieve centric occlusal position without the aid of guiding flange

Patient was recalled initially for every 15 days followed by monthly visit. During these recall appointments patient was motivated and trained to use the guiding flange. After six months patient was recalled once in every 3-4 months.

After 2 years of exercise and use of guiding flange patient could approximate his jaws without the aid of guiding flange. Patient had a missing first molar on the unressected side. So it was decided to restore the missing tooth with a fixed partial denture [Table/Fig-5] which would aid in mastication. Occlusal equilibration was carried out to make sure that all the teeth made uniform occlusal contact and the masticatory forces were evenly distributed. Teeth with shallow cuspal inclinations were used to eliminate interferences in eccentric movements. The masticatory ability on the resected side was compromised as the underlying tissue was poor in support and monoplane acrylic teeth were used to replace the missing teeth on the resected side.

DISCUSSION

Beumer et al., stated that mandibular guidance therapy begins, when the immediate post surgical sequelae have subsided usually at about two weeks after surgery [1]. The main advantage of non surgical method is that it can be initiated immediately thus comforting the patient morally and psychologically. Physiotherapy along with various prosthodontic methods useful in preventing the scar tissue contracture and severity of mandibular deviation. The success of the rehabilitation process depends on a myriad of factors like type of surgical defect, wound closure, presence or absence of condyle on the resected side, treatment planning, follow up and patient cooperation [2].

The patient presented with a Class II mandibular defect according to the classification by Cantor and Curtis, with a severe deviation of the residual fragment towards the surgical side [3,4]. This mandibular deviation was mainly due to uncompensated influence of contralateral musculature particularly the internal pterygoid muscle and loss of proprioceptive sense of occlusion. The loss of muscle attachments due to mandibular resection results in rotation of the mandible in the frontal plan. During mandibular closure the teeth of the non resected side contact first because of the normal muscles attachment on that side and the teeth on the resected side moves away from their antagonist teeth in the maxillary arch due to lack of muscle activity. Now as the patient increases the force of closure in an attempt to occlude all his teeth the remaining mandible rotates with the initial tooth contact on the unresected side as the fulcrum point. This is called frontal plan rotation which is seen in most patients of lateral discontinuity defects.

The main aim of the treatment was to prevent the scar tissue contracture resulting in severe mandibular deviation and to re-establish an occlusal relationship which would be repeatable thus assisting the patient in mastication and swallowing. Immediate rehabilitation was commenced 10 to 15 days postsurgically to ensure an early start with the correction of the deviation minimizing the postsurgical implications of jaw resection occurring due to cicatricial tissue contracture, preventing extrusion of the maxillary teeth and improving masticatory efficiency [1].

Intermaxillary fixation done immediately after the resection, splinting the maxillary and mandibular teeth with vacuum formed PVC splints, mandibular based guidance prosthesis, widened maxillary occlusal table using double row of teeth and palatally based guidance prosthesis are the different non surgical options for correction of mandibular deviation post hemimandibulectomy [5]. Best result can be achieved if the clinician can combine these methods with a well organized mandibular exercise regime [1].

Exercise regime to train the neuromuscular system suggested to the patient was maximum opening of the jaw followed by grasping the chin and moving the mandible away from the surgical side as advocated by Beumer et al., along with chewing gum [6]. Such

movements reduce trismus and loosen scar contracture towards the surgical site. Furthermore straight opening and closing exercise were also suggested to avoid deviation [7].

Clinicians have to decide whether to give an interim acrylic resin guiding flange or to directly fabricate a cast metal one. Initially an acrylic resin guiding ramp was given to the patient in the present case as immediately after surgery there was resistance in centric positioning of the mandible and the deviation was sever. If the patient is able to acceptably approximate maxilla and the mandible but lacks only motor control then there is no need of an interim guidance prosthesis instead cast mandibular prosthesis can be fabricated directly [6,8].

The framework was designed following the basic prosthodontic design principles, to distribute the stresses uniformly over a larger area and a rigid major connector for cross arch stabilization. The direct and the indirect retention was planned as per the basic designing principles of cast partial denture, in order to minimize dislodgement of the prosthesis and to prevent the exertion of the detrimental forces on the abutment teeth.

Restoring the defect with implants was a good treatment option but considering the high reoccurrence rate of oral cancer, economic feasibility and requirement of multiple surgical procedures makes implants a lesser chosen option over mandibular guidance flange prosthesis [9]. Garrett et al., conducted a longitudinal prospective study and concluded that of all the subjects enrolled, 72% (33/46) opted and successfully completed the treatment with conventional prosthesis verses 35% (16/46) choose implant supported prosthesis [10]. This case report clearly demonstrates the advantages of early initiation of mandibular guidance therapy, patient cooperation and careful treatment planning, combining the various techniques can help and successfully treat mandibular deviation to a great deal. Although it is true that even after successful guidance therapy where the patient was able to achieve intercuspal position efficient mastication may not be possible and occlusal equilibration is often necessary after guidance therapy was completed [1].

CONCLUSION

Successful rehabilitation of a patient suffering from carcinoma depends a lot on understanding the patient's perspective rather than imposing our elaborate treatment techniques. Very simple rehabilitative procedures like a simple guidance ramp may suffice the patient's needs ruling out surgical reconstructions. It's not important to demonstrate what we can do but to justify what we have done. A patient who is already undergoing the psychological trauma of carcinoma may not be able to cope up with additional reconstructive surgeries, at such times simple non surgical techniques can help the patient to gain his lost confidence and give him time to think over other treatment options.

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