

The use of mandibular guidance prosthesis to correct mandibular deviation following hemimandibulectomy - Case reports

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ABSTRACT

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The unilateral loss of mandibular continuity due to surgery or trauma results in mandibular deviation towards the defect side resulting in loss of occlusion on the unresected side. Mandibular resections also result in impaired speech articulation, difficulty in swallowing, mandibular deviation, poor control of salivary secretions, and severe facial disfigurement. One of the primary goals of treatment is the restoration of acceptable occlusal function. Residual dentition can be used to confirm proper realignment of the mandibular fragments in dentate patients. This can be achieved by the use of various guidance prostheses. The guidance prosthesis can effectively retrain the mandible after partial mandibulectomy procedures to achieve a functional occlusal relationship thereby facilitating early progression to a nearly perfect functioning permanent restoration. This clinical report describes the rehabilitation of two patients exhibiting deviation of the mandible following hemimandibulectomy using palatal guidance prostheses.

Introduction

Discontinuity of the mandible after surgical resection or trauma destroys the balance and symmetry of mandibular function, which leads to altered mandibular movements and deviation of the residual segment towards the defect side, resulting in loss of occlusion on the unresected side.^[1] This mandibular deviation is mainly due to uncompensated influence of contralateral musculature particularly the internal pterygoid muscle and pull from the contraction of cicatricial tissue on the resected side.^[2,3]

The degree of deviation is dependent on several factors which include the location and extent of osseous and soft tissue resection, the method of surgical site closure, degree of impaired tongue function, the presence and condition of the remaining natural teeth, the degree to which innervation has been involved, the use of adjunctive procedures like radiation therapy and the timing of prosthodontics treatment.^[4-6]

The other debilitating consequences following resection are impaired speech articulation, difficulty in swallowing, poor control of salivary secretions, and severe cosmetic disfigurement.^[2] If the continuity of the mandible can be restored with a bone graft, metal plates or a combination of both methods most of the problems of the discontinuity can be resolved.^[1]

However for some patients who do not desire reconstruction, or who are medically compromised, mandibular guidance therapy can be instituted to retrain the patient's neuromuscular system to achieve an acceptable occlusion of the remaining natural teeth.^[1]

The proprioceptive influence of the remaining teeth in the maxilla and the residual mandibular segment can be used to confirm proper realignment of the mandibular fragments to attain repeatable intercuspal position. This can be achieved by the use of various

guidance prostheses.^[1-3]

This clinical report describes the rehabilitation of two patients exhibiting deviation of the mandible following hemimandibulectomy using palatal guidance prostheses

Case report 1

A 55yrs old female patient whose hemimandibulectomy was done on the left mandible for the removal of a carcinoma 12 years back reported to the department of prosthodontics KAHE, Belgaum for prosthetic rehabilitation. The patient had undergone radiation therapy post operatively. However the patient did not go for any prosthetic rehabilitation after that the patient's chief complaint was inability to chew food. She also complained of difficulty in speech and swallowing.

Examination revealed facial asymmetry on the defect side with hollowed out appearance (Figure 1). Mandible showed a CLASS 3 defect i.e. Lateral resection of the mandible to the midline.^[7] There was marked deviation of the mandible towards the defect side resulting in disocclusion of teeth on the normal side (Figure 2).



Figure 1. Facial asymmetry on the defect side with hollowed out appearance on the left side following hemimandibulectomy



Figure 2. Deviation of the mandible towards the defect side resulting in disocclusion of teeth on the non defect side

Root stumps were present in relation to maxillary left anterior teeth. The right maxillary anterior teeth and maxillary posterior teeth were grossly worn out. Patient was unable to guide the residual mandible to occlude with the remaining maxillary dentition even on application of force.

Diagnosis

Full mouth radiographs were taken to assess the amount of hard tissue that was left intact and to see the amount of bone that had been resected. Impressions were made of both of the upper and lower arches with irreversible hydrocolloid impression material to make the diagnostic casts. The mandible was manually guided into the centric occlusion and a wax interocclusal record was obtained which was then used to mount the diagnostic casts on an articulator.

Treatment

Since it was a long term case of scarring with marked deviation toward the affected surgical site, a maxilla based guidance prosthesis with palatal flange was planned for the patient. Treatment plan with its prognosis was explained to the patient and was accepted by the patient.

The guidance prosthesis consisted of a palatal flange extending inferiorly into the lingual vestibule between the lateral border of the tongue and the lingual surface of the mandible (Figure 3). The appliance was fabricated in wax before being acrylated in clear heat cure acrylic resin. The palatal flange was made such that, that it contacted only the lingual surfaces of mandibular teeth and it did not impinge on the lingual mucosa of the mandible throughout the opening and closing movements. However the length of the palatal flange was kept sufficient enough to prevent medial deviation of unresected mandible even when the mouth was open (Figure 4). Retention was achieved using interproximal ball clasps and Adam's clasps. [5]

The appliance was inserted in the patient's mouth. The mandible was guided manually so that the residual mandible occluded with the remaining maxillary dentition on the non- defect side (Figure 5).



Figure 3. Guidance prosthesis with palatal flange



Figure 4. Deviation of the mandible prevented by the palatal flange



Figure 5. Occlusion established on the non defect side

Pressure indicating paste as well as response from the patient was used to locate any regions of soft tissue impingement. The flange was relieved where necessary, by adjusting the acrylic resin. An exercise program was suggested to the patient to assist the patient in improving the symmetrical arc of closure and finding centric occlusion position without guiding the mandible manually. It consisted of simple opening and closure of mandible with and without the appliance and patient grasping the chin and moving the mandible away from the surgical site. [1,6]

After the patient had worn the training flange appliance

for a period of 6 months, she was pleased that more teeth contacted on the right side and that she was able to chew her food better.

Once the patient was able to repeatedly approximate the maxillary and mandibular teeth without the use of the guidance prosthesis, permanent removable partial denture was made for the patient.

Case report 2

A 27 year old patient who had a hemimandibulectomy of the left mandible for the removal of a carcinoma 1 week back reported to the department of prosthodontics KAHE, Belgaum with the chief complaint of lack of contact of the remaining teeth resulting in inability to chew food effectively.

Examination revealed facial asymmetry along with the presence of the scar tissue on the defect side (Figure 6). The mouth opening of the patient was reduced considerably. Mandible exhibited a Class 2 defect i.e. Lateral resection of mandible distal to cuspid.7 Maxillary arch showed intact dentition. There was deviation of the mandible towards the defect side thus, disocclusion of the teeth on the normal side (Figure 7).



Figure 6. Facial asymmetry along with the presence of the scar tissue on the defect side



Figure 7. Deviation of the mandible towards the defect side resulting in disocclusion of teeth on the non defect side

Diagnosis

Full mouth radiographs were taken to assess the amount of hard tissue that was left intact and to see the amount of bone that had been resected. Impressions were made of both of the upper and lower arches with irreversible hydrocolloid impression material to make the diagnostic casts. The mandible was manually guided into the centric occlusion and a wax interocclusal record was obtained which was then used to mount the diagnostic casts on an articulator.

Treatment

The patient had reduced mouth opening so buccal guide flange and guidance prosthesis consisting of a palatal flange would be difficult to insert or remove. Therefore, maxillary inclined plane prosthesis was planned for the patient. Treatment plan with its prognosis was explained to the patient and was accepted by the patient.

The guidance prosthesis consisted of an occlusal table palatal to the maxillary teeth on the non-defect side which sloped occlusally away from the natural teeth (Figure 8). Because the residual mandible deviated medially, mandibular closure would result in the progressive sliding of the remaining mandibular teeth up the incline in a superior and lateral direction until the occlusal contact is reached. [8]

The appliance was fabricated in wax from a functionally generated occlusal record before being acrylated in clear heat cure acrylic resin. Retention was achieved using interproximal ball clasps and Adam's clasps.

Appliance was inserted in the patients mouth and was checked for the progressive sliding of the remaining mandibular teeth up the incline until the occlusal contact was reached (Figure 9). Any high points were checked using an articulating paper and were removed. An exercise program was suggested to the patient same as for the previous patient.



Figure 8. Maxillary inclined plane prosthesis



Figure 9. Occlusion established on the non defect side with the appliance in mouth

After that, the patient had worn the training flange appliance for a period of three months. The occlusion as well as mastication on the nondefect side was restored completely. The patient was able repeatedly approximate the maxillary and mandibular teeth without the use of the guidance prosthesis. Thus a permanent mandibular removable partial denture was made for the patient. Instructions were given to the patient for maintenance of the oral hygiene and regular checkup.

Discussion

The patient who has undergone mandibular resection is left with multiple physiologic and cosmetic deficiencies, including the inability to masticate in an acceptable or efficient manner. The prosthodontic rehabilitation of such patients is challenging. One of the primary goals of treatment is the restoration of acceptable occlusal function.[8] The degree of success is related to the location and extent of the mandibular resection, the amount of adjacent soft tissue removed during surgery and the presence or absence of natural teeth.[8]

The methods used to minimize this deviation include use of skin grafts and flaps for wound closure, intermaxillary fixation at the time of surgery, guidance restorations and intensive physiotherapy to decrease fibrosis.[1]

The use of simple guidance prosthesis can effectively retrain the mandible after partial mandibulectomy procedures to achieve a functional occlusal relationship which can be maintained throughout the post-operative healing period. The success of such guidance therapy varies and depends upon the nature of surgical defect, early initiation of guidance therapy and patient cooperation and other factors.[1]

The guidance prosthesis that can be used may be

- 1) Palatal based guidance prosthesis which include Maxillary inclined plane prosthesis, Positioning prosthesis with palatal flange, widened maxillary occlusal table.[1,4,5,8]
- 2) Mandibular based guidance prosthesis which include Mandibular lateral/ oblique guide flange prosthesis.[1]

Guidance prosthesis has the following advantages

1. Effectively realigns the residual mandible to occlude with the opposing maxillary dentition

2. Improved mastication
3. Improved speech and swallowing
4. Ease of fabrication and economical
5. Good patient compliance
6. Facilitates early progression to an early perfect functioning permanent restoration.

The earlier the mandibular guidance therapy is initiated in the course of treatment, the more successful is the patient's definitive occlusal relationship.[6] When the prosthetic therapy is combined with a well organized exercise regimen, improved results can be achieved within a short span of time. The objective of these exercise programs is to reprogram the remaining musculature, improve the maxillo-mandibular relationship, reduce the scar contracture and to decrease the trismus.[1]

Conclusion

Mandibular guidance therapy, can be a useful adjunct to preserve the mandibular function after partial mandibulectomy procedures and to minimize complications associated like mastication, speech and swallowing. The philosophic approach to the treatment and rehabilitation of patients with resected mandible is not in concentrating on what has been sacrificed in the eradication of disease but rather in taking full advantage of remaining structures.

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