

Attachments: A Boon for Hemimandibulectomy Patients

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ABSTRACT

Discontinuity defects in the mandible cause various ill effects like imbalance in the muscles of the lower face, facial disfigurement, restriction of tongue causing alteration of speech and altered salivation. It leads to decreased mandibular function by deviation of the residual segment toward the surgical side and affects masticatory function adversely. Postoperative care and prosthodontic rehabilitation required in hemimandibulectomy patients is interdisciplinary including surgical management, prosthodontic treatment, speech therapy, oral physiotherapy and psychologic care. It is difficult to provide a functional, retentive and stable prosthesis to such patients. In the described case report, a hemimandibulectomy patient was successfully rehabilitated by providing maxillary and mandibular overdentures with intraradicular ball attachments on natural teeth. This treatment option was a simple, convenient and economical method of enhancing denture retention and stability; and providing security and comfort to the patient.

Keywords: Hemimandibulectomy, Overdenture, Attachment, Rehabilitation.

How to cite this article: Chandavarkar SM, Ram SM, Gurav S, Nadgere JB, Shah N. Attachments: A Boon for Hemimandibulectomy Patients. *J Contemp Dent* 2013;3(3):159-164.

Source of support: Nil

Conflict of interest: None declared

INTRODUCTION

Malignancy with respect to the floor of the mouth, mandible or their related structures may be treated with radiation, chemotherapy, surgery or in combination. Postoperative care and prosthodontic rehabilitation required in such patients is determined by the extent of surgical resection of the mandible, amount of remaining structures, amount of mouth opening, tolerance of the tissues, xerostomia and radiation mucositis. A discontinuity in the mandible causes various ill effects like imbalance in the muscles of the lower face. It leads to decreased mandibular function by deviation of the residual segment toward the surgical side and affects masticatory function adversely. It may also cause facial disfigurement, restriction of tongue causing alteration of speech and altered salivation due to lack of support and innervations on the defect side.¹⁻⁵

Rehabilitation effort in hemimandibulectomy patients is interdisciplinary and may include secondary surgical management, prosthodontic treatment, speech therapy, oral physiotherapy and psychologic care.⁶ A prosthodontist may provide service to such patients at every step in their treatment. This includes assessing the patient correctly, determining the prognosis of remaining teeth, fabricating training flange prostheses and post resection prostheses.⁷

The treatment plan varies for a dentate, partially dentate and edentulous hemimandibulectomy patient. The presence of few teeth or root stumps in edentulous ridges may effectively act as abutments for a tooth supported overdenture. Overdentures may be fabricated with non-coping root stumps, telescopic crowns, intracoronal, extracoronal or radicular attachments. The following clinical report describes the prosthetic rehabilitation of hemimandibulectomy patient with tooth supported overdentures using intraradicular ball attachments.

CASE REPORT

A 72-year-old male patient reported to the Department of Prosthodontics, MGM Dental College and Hospital with a hemimandibular defect of left side. The patient gave a history of squamous cell carcinoma in the left mandibular region. The patient had undergone wide resection of the lesion with hemimandibulectomy excluding the coronoid process, followed by chemotherapy and radiotherapy of 60 Gy in fractions over 45 days. The radiotherapy was completed 1 year before he reported for dental treatment.

On extraoral examination, the patient had a tapered face with noticeable asymmetry of face and slight deviation of mandible on opening of mouth (Fig. 1). The patient had a mouth opening of 30 mm. Intraoral examination revealed several decayed, mobile teeth and root pieces- 11, 14, 16, 17, 22, 24, 31, 32, 45 and 46 (Fig. 2). The teeth that could be salvaged in the maxillary arch were the right canine and left central incisor. The grafted flap area on the resected side was attached upto the hamular notch. The attachment of the maxillary freni and mucosa were very close to the ridge on the defect side. The maxillary buccal sulcus was obliterated leaving no area for the denture base on the resected side. The remnant mandibular ridge extended on the defect side upto left lateral incisor area. The left buccal mucosa and floor of the mouth were sutured to cover the defect leading to scar tissue and high attachment of grafted flap was present distal to the ridge on the resected side. In the mandibular arch only the right first premolar could be saved.

The patient's radiographic examination revealed there was a mandibular discontinuity with a defect involving condylar process, ramus of body or mandible till left lateral incisor (Fig. 3). The grossly carious teeth and root pieces were extracted. The upper right canine, upper left central incisor and lower right first premolar were preserved with

root canal treatment. A maxillary diagnostic impression was made in irreversible hydrocolloid (Tropicalgin, Zhermack) in a stock perforated tray and the diagnostic impression for the hemimandibular ridge was made using a sectional stock perforated tray (Fig. 4). Casts were poured in type III dental stone (Kaldent, Kalabhai) and retrieved. It was finally decided to treat the patient with maxillary complete overdenture and mandibular sectional overdenture with intraradicular ball attachments using the remaining natural teeth as abutments. Preprosthetic management of the patient included local and systemic methods. The patient was advised gum massage with an astringent gum paint and saline mouthwash. He was also advised to have healthy foods and vitamin supplements. The patient was prescribed exercises to increase jaw opening and reduce further deviation of mandible.

In order to place the intraradicular ball attachments, the teeth were reduced to 2 mm above the gingival level. The AccessPost Overdenture® (EDS) kit consisted of the intraradicular ball attachments, a single primary reamer, a counter sink drill, red elastic bands and nylon attachment caps (Fig. 5). Postspaces were created in the three abutment teeth up to two-third of the root canal using the reamer mounted on a contra-angle micromotor handpiece. The countersink drill was used to shape the coronal third of the root canal. Intermittent irrigation was carried out with saline to prevent debris accumulation. The fit of the intraradicular ball attachments were assessed clinically and radiographically. The post spaces were dried using sterile paper points. The attachments were luted in their respective canals using luting consistency of zinc phosphate cement (Fig. 6). Excess cement was removed after it had set.

The diagnostic casts were used to fabricate the custom trays. The teeth on the cast were reduced to simulate the attachments which were placed in the oral cavity. This was done to avoid discomfort to the patient for one more primary impression. Modeling wax (Elite) was adapted over the teeth and ridge as a spacer for the final impression. Autopolymerizing acrylic resin (Acralyn 'R') was used to fabricate the maxillary and mandibular custom trays. The trays were retrieved after the acrylic had set and they were finished and kept ready for final impression.

During the final impression stage, the red elastic bands provided in the kit were slipped over the intraradicular ball attachments. This was done to prevent excess material from getting entrapped in the undercut area of the attachments. The nylon attachment caps were placed over the ball portion of the attachments (Fig. 7). The custom trays were individually tried in the patient's mouth to ensure that the attachments were not obstructing the positioning of the trays and they had proper extensions. Border molding was carried



Fig. 1: Pretreatment extraoral photograph



Fig. 2: Pretreatment intraoral photograph



Fig. 3: Pretreatment orthopantogram

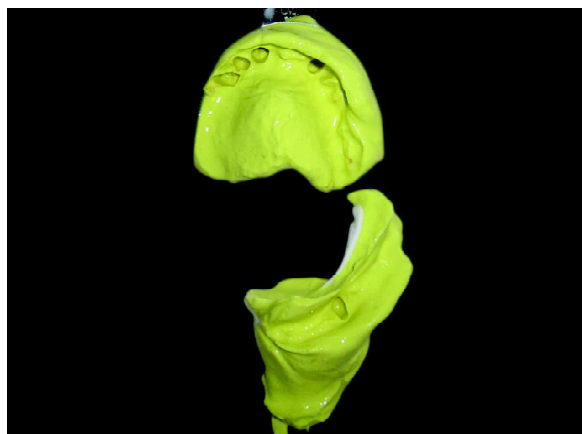


Fig. 4: Diagnostic impressions



Fig. 5: Endoaccess postsystem for overdentures

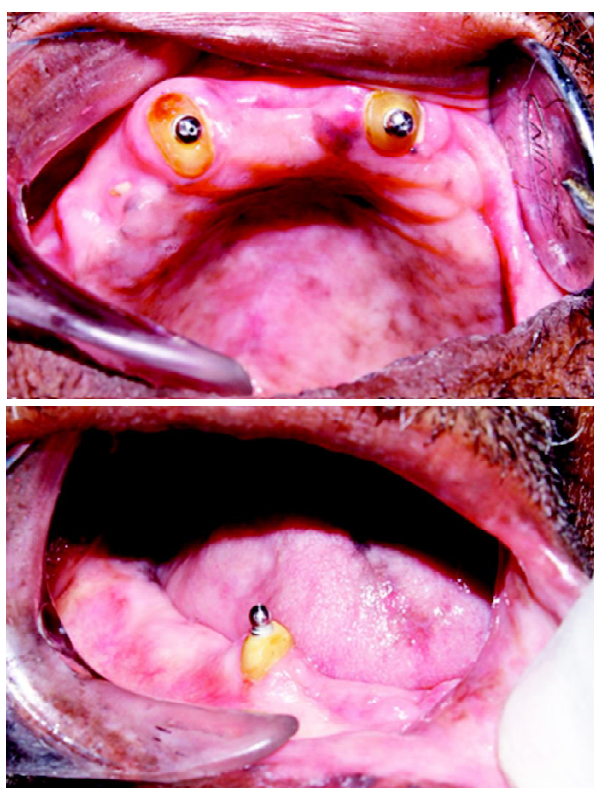


Fig. 6: Intraradicular ball attachments luted in postspaces

out using low fusing impression compound (DPI Pinnacle). After border molding was completed, modelling wax from both custom trays was removed. Both custom trays were coated with a thin layer of universal tray adhesive (Tray fix) and allowed to remain for one minute. Final impressions were made in medium body polyether (Impregum, 3M ESPE) impression material with the nylon caps picked up in the impression (Fig. 8). The elastic bands were removed from the mouth. The caps were removed from the impressions and poured in type III dental stone (Fig. 9). Maintaining the caps in position during impression making ensured space for the cap in the final denture.

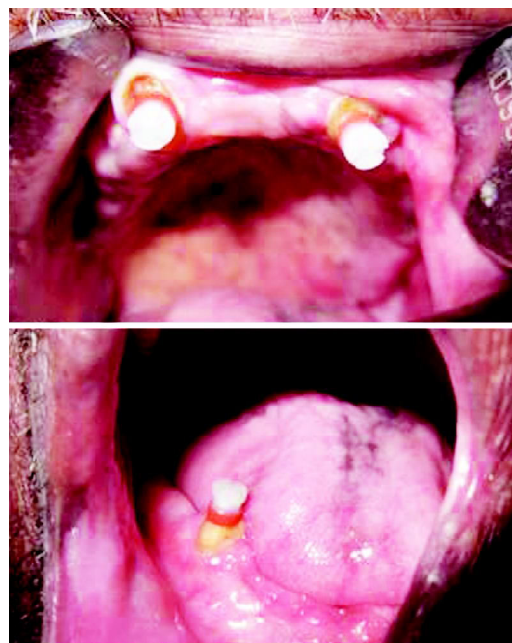


Fig. 7: Nylon caps placed prior to impression hemimandibulectomy

On retrieval of the casts, the area over the attachments was relieved using lead foil and it was maintained till the packing stage of the denture. This was done to facilitate ease of insertion and removal of temporary bases. Temporary record bases were fabricated in pink autopolymerizing acrylic (Acralyn 'R') and occlusal wax rims were prepared for jaw relation.

The upper wax rim was adjusted anteriorly parallel to the interpupillary line and posteriorly parallel to the ala-tragus line. The rim was kept just visible at rest. The lower sectional rim was maintained at the height of two-third of the retromolar pad posteriorly and at the corner of the mouth anteriorly. The patient was asked to close on the wax rims and allowed to maintain contact. The vertical dimension was determined using esthetic and phonetic techniques. The centric relation was recorded at the decided vertical dimension using static check bite method by guiding the patient's unresected segment of the mandible.

The shape, size and shade of the anterior teeth were selected according to the patient's face. The posterior teeth on the normal side were anatomic teeth modified to reduce the cuspal angle. They were arranged like a conventional complete denture. On the defect side, maxillary posterior teeth were reduced to keep only their buccal halves intact. These teeth were arranged on the maxillary complete denture on the defect side to provide adequate esthetics and cheek fullness to the patient. Posterior mandibular teeth were arranged on the right side for occlusion and anterior teeth were arranged upto the lower left lateral incisor on the defect side for esthetics.

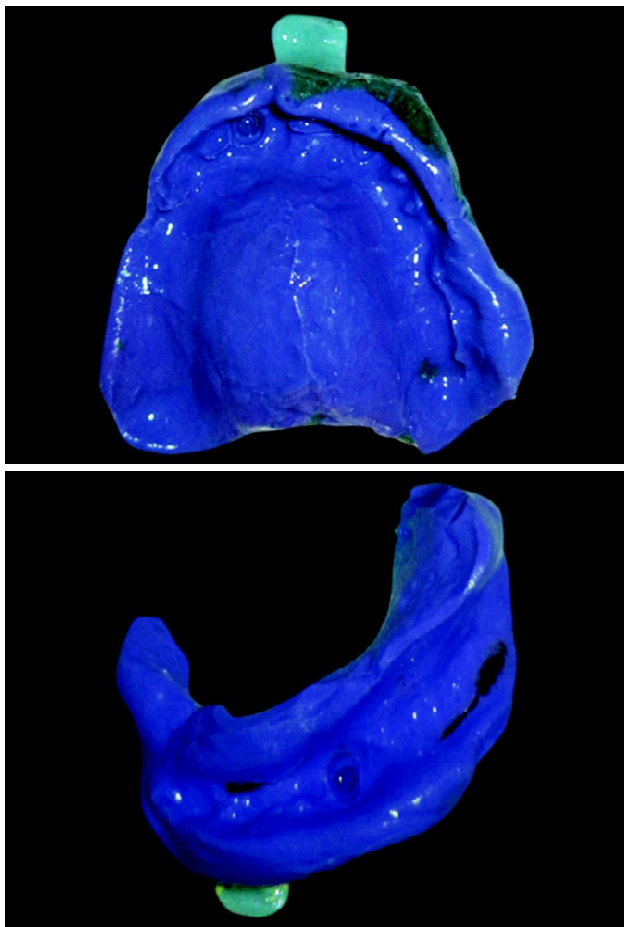


Fig. 8: Final elastomeric impression

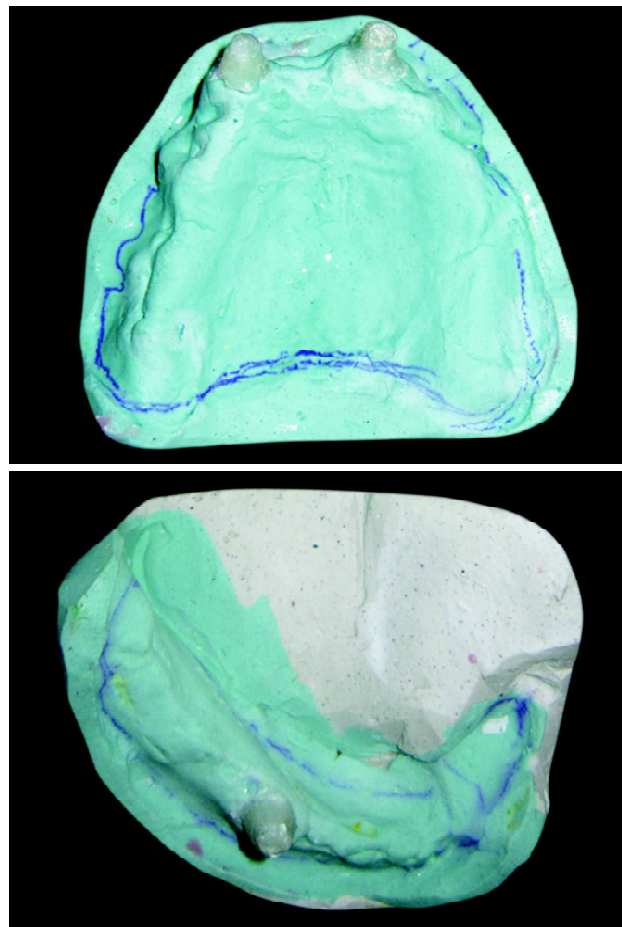


Fig. 9: Final casts

Try in of the waxed up dentures was carried out. Vertical and centric relations were verified. The esthetics and speech of the patient was assessed; and consent was taken from the patient.

The waxed up dentures were sealed on their respective casts and processed in heat cure acrylic material while maintaining the lead foil relief. The dentures were retrieved, finished and polished (Fig. 10).

On the day of denture insertion, the red elastic bands in the kit were slipped over the intraradicular ball attachments. Petroleum jelly was applied to them. The nylon attachment caps were placed over the ball attachments. The dentures were seated in the mouth to check for comfort and extensions. Any areas on the intaglio surface of the dentures obstructed by the nylon cap were relieved till the dentures were completely seated without obstruction. Autopolymerising acrylic liquid and powder (Kooliner, GC) were mixed in the ratio 3:1 by volume till the mixture reached a fluid consistency. The nylon caps were maintained in the mouth. properlyHence, it waportant to determine the vertical dimension of such patients ried using paper. The areas of the intaglio surface of the maxillary denture

corresponding to the nylon caps were lined with the autopolymerizing acrylic resin and placed in the patient's mouth.⁸ After the acrylic resin polymerized, the denture was removed from the patient's mouth and the nylon caps were picked up in the denture (Fig. 11). In a similar manner, the nylon cap was also picked up in the mandibular denture (Fig. 11). The flash present beyond the caps in the dentures was removed with a sharp scalpel blade. The red elastic bands were removed as they had served their purpose of preventing acrylic from entering the undercut area of the attachments.

The overdentures were finally placed in the patient's mouth and rechecked for stability, retention and comfort (Fig. 12). The patient was taught to place and remove the dentures and given postoperative instructions on maintaining the hygiene of the retained teeth, attachments and dentures (Fig. 13). Recall check up was done after 24 hours, 1 week and 1 month.

DISCUSSION

Scarred soft tissue, freely movable tissue, deficient alveolar ridge, high attachments of freni and loss of buccal and



Fig. 10: Polished dentures



Fig. 11: Nylon caps picked-up in the intaglio surface of overdentures



Fig. 12: Post-treatment intraoral photograph



Fig. 13: Post-treatment extraoral photograph

lingual sulcus in the mandibular region can complicate the prosthetic rehabilitation of a hemimandibulectomy patient.⁶ The unseating of the mandibular denture is more compared to the maxillary denture due to the unilateral pull of the muscles. It was planned to use intraradicular ball attachments in the described case to secure the denture base to its foundation. A stable and retentive denture would help the

patient re-train the residual mandibular muscles to provide an acceptable occlusion of the artificial teeth.⁹

Treatment of hemimandibulectomy patients is multifold. The patient has to be given correct guidance regarding regular follow-ups, diet and nutrition and oral hygiene. In the described case report, the salvaged teeth were used as abutments for overdentures instead of extracting them. An

overdenture can offer several advantages over a conventional complete denture especially in a hemimandibulectomy situation. It provides better proprioception, retention, security and reduced alveolar bone resorption.¹⁰⁻¹²

Impression making can be challenging with restricted mouth openings which is common in such patients. The patient should be advised mouth opening exercises. Final impressions must be made in custom trays. Border molding and proper placement of tissues is of essence. Impression material of choice was elastomeric impression due to its accuracy and dimensional stability.

Jaw relation is variable with hemimandibulectomy patients. No articulator can reproduce the movements of a mandible with discontinuity. A decreased vertical dimension of occlusion and lower occlusal plane decrease the torque generated to the mandibular denture and make it easier to control the mandibular denture. The unilateral pull of the unresected muscles makes it very difficult to record the jaw relation. The patient should not be forced to close the mandible but rather must be asked to close in a comfortable position with guided assistance. Centric relation record cannot be truly repeatable but must be determined to provide comfort and stability of the denture to the patient.⁹

The modified anatomic posterior teeth with reduced cuspal angle were used on the normal side to reduce lateral stresses, improve denture stability, comfort and to maintain adequate occlusal contact. Sharper cusps on teeth would create unnecessary lateral torque on the remaining teeth and may dislodge the overdentures while non-anatomic teeth would not have met the esthetic requirements. Occlusion was not of significance on the left side as no posterior teeth would be placed on the resected side of the mandible. On the left side of the maxillary arch, buccal halves of teeth were provided for cheek fullness, esthetics and to prevent trauma to the tongue and buccal mucosa that could be caused due to the cusps of the teeth.

AccessPost Overdenture[®] is a system with intraradicular ball attachments which can be luted into prepared root canals and the nylon caps housed in the overdentures has a snapfit on the ball attachments to provide adequate retention to the prosthesis. In the described clinical case, the use of attachments was of immense importance since retention of the denture on the unilateral unresected mandibular segment would have been inadequate and unpredictable.

SUMMARY

It is difficult to provide a functional, retentive and stable prosthesis to hemimandibulectomy patients. Patients need to be explained the limitations of their rehabilitation and should be prepared for the effort required to adjust to a prosthesis. In such defects, it is important to use additional forms of enhancing retention for the prosthesis.

In the described case report, a hemimandibulectomy patient was successfully rehabilitated by providing maxillary and mandibular overdentures with intraradicular ball attachments on natural teeth. This is a desirable treatment option as it is a simple, convenient and economical method of enhancing denture retention and stability; and providing security and comfort to the patient.

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