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Case Report

Rehabilitation of segmental mandibular defect using semi-precision attachment and neutral zone technique

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ABSTRACT

The mandible along with its adjoining structures forms the lower third of the face. Any mandibular defect, either congenital or acquired, affects the form, function, esthetics and psycho-social well being of the patient. In segmental mandibular defect, the inferior border of the mandible remains intact. Rehabilitation of such patients poses a great challenge due to loss of teeth, alveolar bone, obliteration of vestibule and remaining movable mucosa, which severely interferes with the retention, stability and support of the prosthesis. This case report describes the rehabilitation of segmental mandibulectomy patients using semi-precision attachment and application of neutral zone technique to achieve adequate retention and stability of prosthesis and a high level of clientele satisfaction

1. Introduction

Mandible is a bone that forms the boundary of the oral cavity and, along with muscles of mastication and peri-oral musculature it forms the lower third of the face.[1] Any mandibular defect jeopardizes the form, function and esthetics of an individual. However, marginal mandibular defect does not severely affect the esthetics but function is hampered. It results in loss of teeth along with resection of alveolar bone leaving inferior border of mandible intact. This case report describes the rehabilitation of Class I Subdivision A mandibular defect[2,3] with cast partial denture using semi-precision attachment and arranging teeth in neutral zone.

2. Case Report

A 28 years old male patient was referred to the department of dental surgery for rehabilitation of post mandibulectomy residual defect. History of the patient revealed that he had undergone segmnetal mandibulectomy for the treatment of odontogenic keratocyst 1 year back. Intra oral examination revealed presence of right mandibular second premolar, and first and second molars on the same side. Remaining all mandibular teeth were resected along with alveolar bone leaving inferior cortex intact resulting in continuity defect (Figure 1). The wound was closed by split thickness skin graft over the resected mandible.

To rehabilitate marginal mandibular defects, the treatment options available are: (a) fixed dental prosthesis b) Implant supported prosthesis c) surgical reconstruction followed by implant supported prosthesis (d) removable partial denture.[4,5] As implant supported prosthesis is the first choice of treatment, to evaluate availability of bone, CBCT was done (Figure 2). It revealed inadequate bone to place dental implants and the crown height space of approximately 24mm. The patient was given the choice of surgical reconstruction of mandible but this option was declined. So, the treatment plan was formulated to rehabilitate the patient with removable cast partial denture.

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3. Procedure

The patient was explained about the treatment plan. The diagnostic impressions were made to obtain diagnostic casts and treatment planning was done. The remaining three teeth were prepared to receive full coverage three unit single piece metal crowns with chamfer finish line. Impression was made in polyvinyl siloxane addition silicone putty and light body by two step dual stage impression technique. Impression was poured in type IV dental stone.

Wax patterns in blue inlay wax with rest seats on molars were designed with favorable undercuts for direct retainers. The castable male component of semi-precision attachment was attached on the mesial surface of wax pattern of second premolar. The whole assembly was casted and luted with glass ionomer cement to the prepared teeth. Alginate impression was made of the luted assembly and the remaining resected mandible. Cast was poured in type 3 dental stone. Designing was done for the cast partial denture. Cast partial denture was fabricated with hollow first premolar (Figure 3) to receive the female component of semi-precision attachment. Cast partial denture framework was tried in and functional impression of edentulous area was made using functional relining method. According to functional impression the master cast was altered and altered master cast was obtained.

Again, with the framework, bite registration was done and orientation jaw relation was recorded with face-bow. The wax rim over the framework was replaced with impression compound, which was softened in warm water and placed in patient's mouth. Patient was instructed to carry out functional movements of tongue, cheeks and lips to determine the netural zone. After functional molding of impression compound, addition silicone putty index was made around impression compound. Impression compound was removed and wax rim was fabricated according to the putty index. Teeth arrangement was done in neutral zone, try-in was done and polished surface of the denture was recorded by placing zinc oxide eugenol paste and again asking the patient to carry out functional movement. Acrylization of the partial denture was done. Denture was again tried in the patient's mouth to evaluate the stability and retention.

The female component was attached over male component in the mouth and it was picked up in the hollow first premolar with the help of self cure acrylic resin. After complete setting of the acrylic resin, denture was removed and resin was finished. Cast partial denture along with semi-precision attachment was inserted and post insertion instructions were given (Figure 4). Patient was followed up after 7 days and minor adjustments were done. High level of clientele satisfaction was achieved.

Fig. 1: Pre-op Intraoral

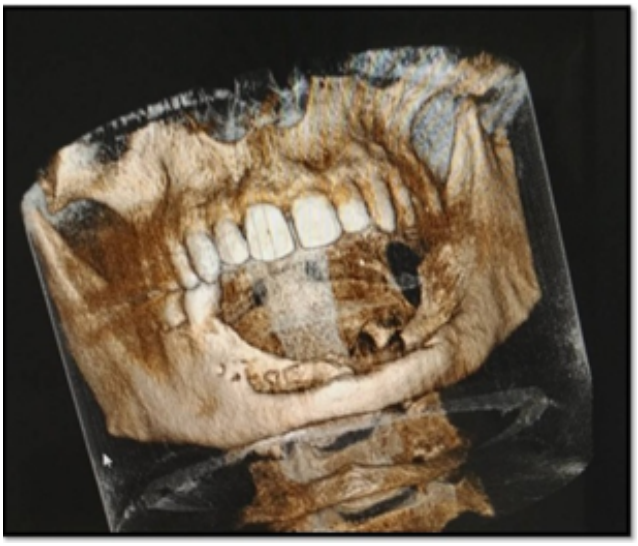

Fig. 2: CBCT 3D View

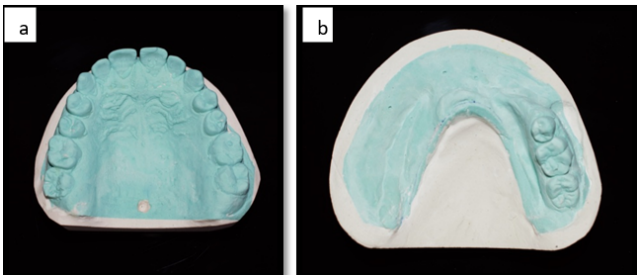

Fig. 3: a: Maxillary diagnostic cast; **b:** Mandibular diagnostic cast

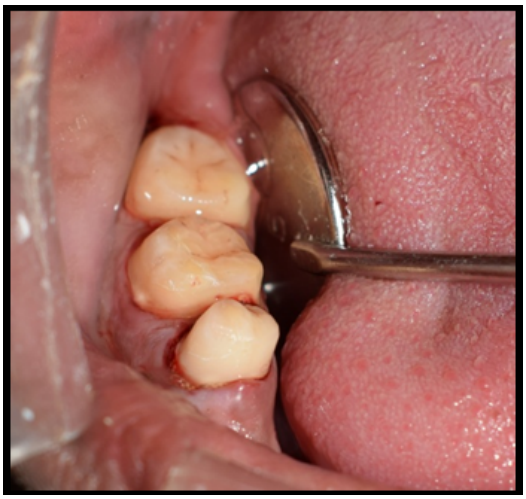

Fig. 4: Prepared teeth

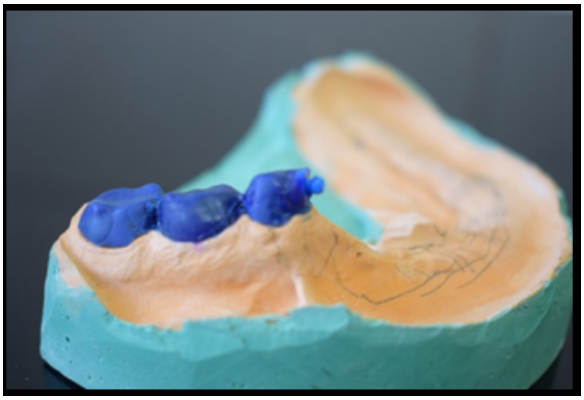

Fig. 5: Wax pattern with male component of semi-precision

Fig. 6: Crowns and attachment assembly in situ

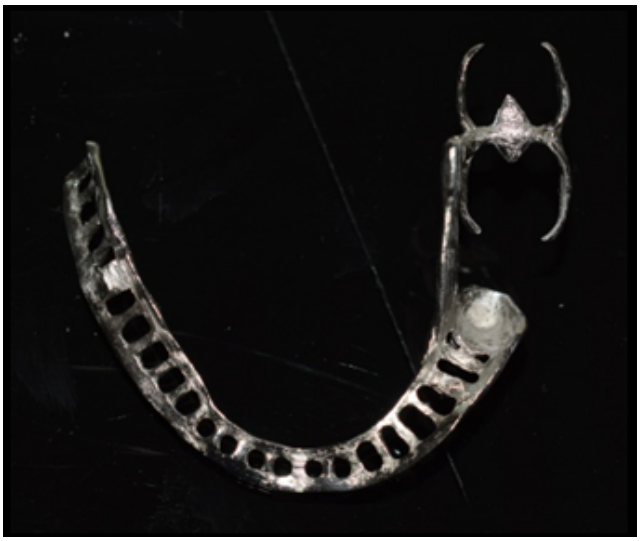

Fig. 7: Cast partial denture framework with hollow premolar

Fig. 8: Cast partial denture framework tryin

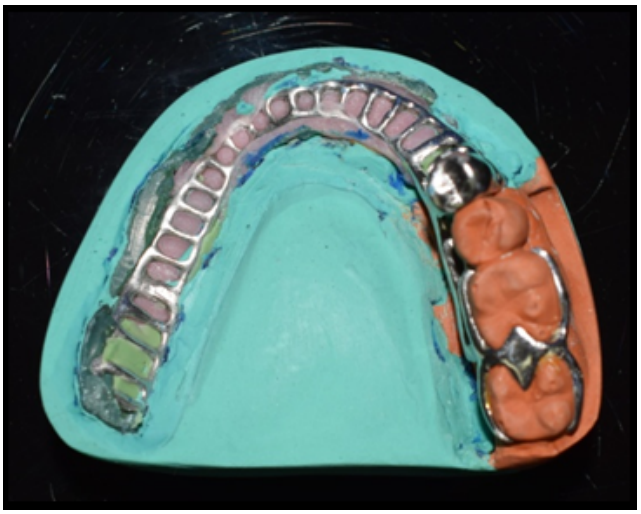

Fig. 9: Altered cast after functional impression

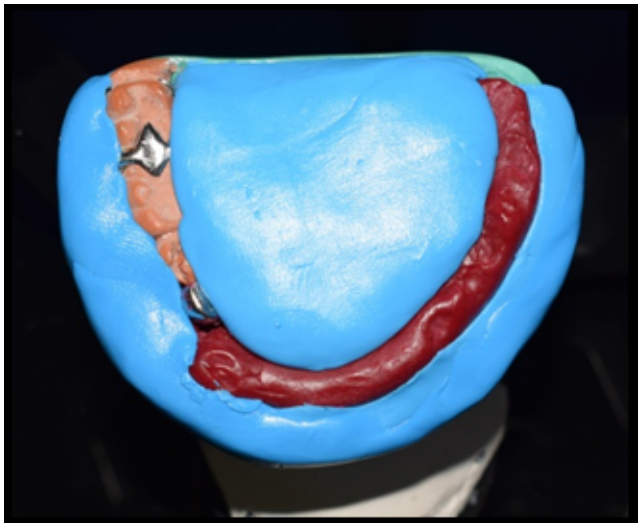

Fig. 10: Putty index around functionally moulded impression compound

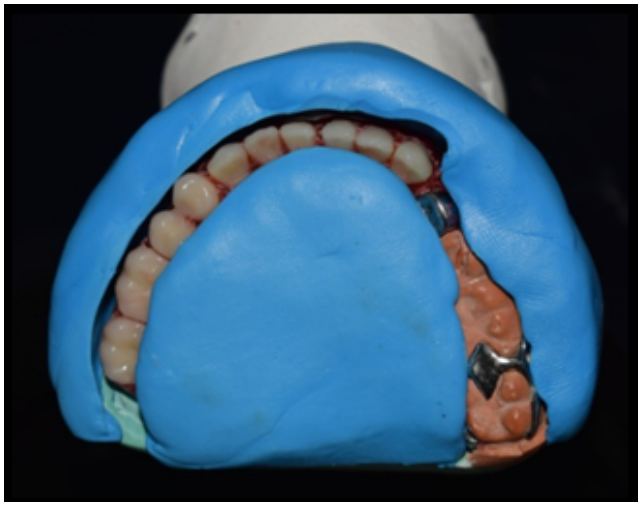

Fig. 11: Teeth arrangement in Neutral Zone

Fig. 12: Polished surface of denture recorded in neutral zone

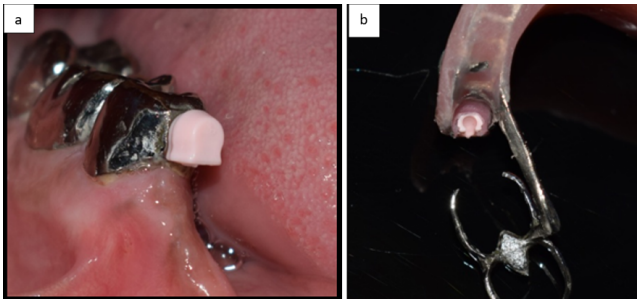

Fig. 13: a: Female component attached over male component of semi-precision attachment; **b:** Female component picked up in hollow premolar

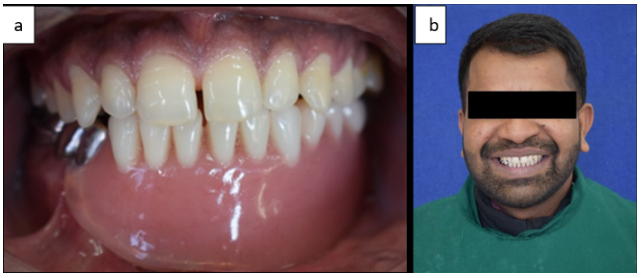

Fig. 14: a: Prosthesis in situ; **b:** Post op extra oral view

4. Discussion

Marginal mandibulectomy defects generally poses rehabilitation challenges due to less number of remaining teeth, loss of vestibular depth, restricted functional movements of tongue and peri-oral musculature.[6] The post resection wound is closed by split thickness skin graft, which provides better foundation for the denture to rest over it instead of movable oral mucosa.[7] So, to achieve adequate retention and stability of partial denture, additional measures are taken like use of multiple abutments incorporation of precision or semi-precision attachments along with direct retainers.[8] In this case semi-precision attachment was used to provide retention as well as allows minor movements of the prosthesis for broad stress distribution[9] over the teeth as well as split thickness skin graft covered residual mandibular bone.

Stability of denture is very important for efficient functioning of the prosthesis.[10] To accomplish adequate stability, arranging teeth in the neutral zone is essential, especially when very few teeth are remaining.[11] The neutral zone in mouth is the place where the forces by peri-oral musculature is balanced and equally opposed by forces applied by tongue. Arranging teeth in this zone establishes stability of the denture and prevent its dislodgement.

5. Conclusion

This case report lays emphasis on using semi-precision attachments and application of neutral zone technique in marginal mandibulectomy patients. It helps in achieving adequate retention and stability of the denture and also restores the form, function, esthetics and psycho-social well being of the patient.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Source of Funding

None.

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