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Hollow Denture with Neutral Zone (Soft Tissue Liner): A Case Report

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Keywords

Neutral zone, Hollow denture, Atrophic ridge, All green technique, Increased inter-ridge distance.

Abstract

In Atrophic ridges (Atwood Classification: Order 5 & 6) prosthetic rehabilitation with complete dentures can be a tedious task with difficulty in achieving retention and stability. To maximize the prognosis of the completed prosthesis, certain changes must be made to the treatment plan. Additionally, the greater inter-arch space necessitates hollowing the maxillary denture in order to alleviate retention problems brought on by the increased weight. The purpose of this case study is to illustrate how the neutral zone approach can be utilized to fabricate mandibular denture and hollow maxillary denture in cases where inter –arch space is increased.

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Introduction

One common but mysterious therapeutic approach in prosthetic dentistry is the complete denture prosthesis. Because the denture-bearing surface in a mandibular denture has a less surface area for coverage, establishing proper retention, stability, and support is nevertheless regarded as a difficult therapeutic intervention (1). Furthermore, the peri-oral muscles' neuromuscular coordination has a significant impact on the denture's stability (2). The buccal and lingual displacement forces indicate an equilibration in the "area of minimal muscular influence," which is known as the neutral zone. A denture made for a severely atrophied mandibular ridge can be made more stable by using a variety of materials and techniques that have been described in the literature to successfully record the neutral zone area and arrange artificial teeth in the "zone of no-influence" (1). An increased interarch space that coexists with ridge atrophy adds weight and makes it impossible to achieve effective retention. In order to prevent additional resorption, the denture can be hollowed using a retrievable material, which also helps to reduce the prosthesis's weight and offload stress onto the ridge (3). In order to present an instance of full denture rehabilitation, this article is case report regarding the neutral zone concept and hollowing

the maxillary denture to optimize the prognosis of the intended treatment strategy.

Case Report

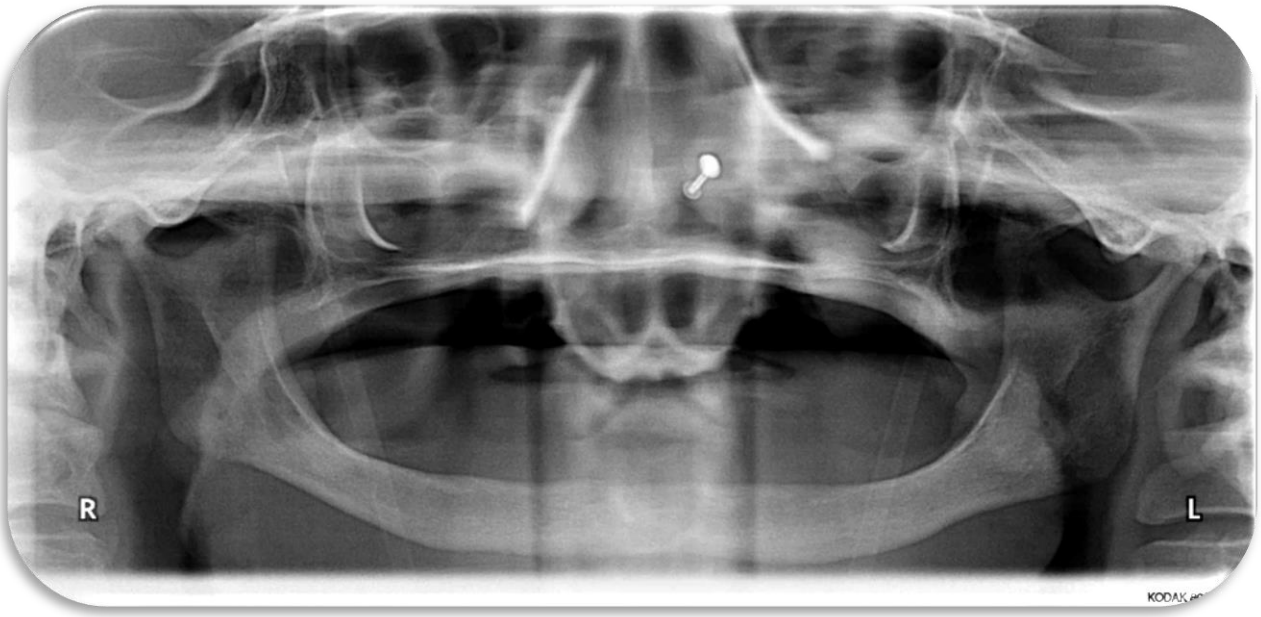
Patient presented with resorbed maxilla and completely resorbed mandibular ridge (Atwood order6)with significant losss of vertical dimension and class 3 ridge relationship. Hence it was decided to record neutral zone followed by maxillary hollow denture to increase stability and retention respectively.



Maxillary resorbed ridge



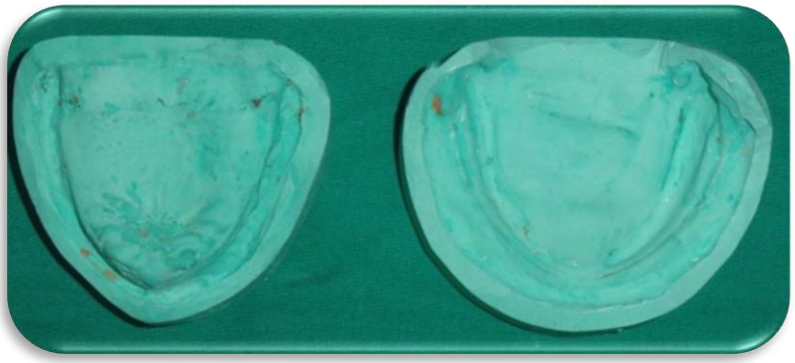
Atwood's order VI mandibular ridge



OPG



Primary casts Maxillary and Mandibular Final impressions (Mc Cords technique)



Maxillary and Mandibular Mater casts

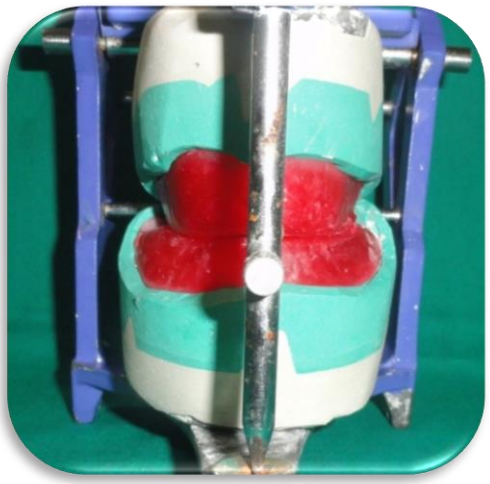
Primary Impression was made by with Impression Compound (Mucocompressive impression technique) and Cast were poured with Type 2 Gypsum product (Dental Plaster) by beading and boxing to preserve the sulcus.

Custom tray was then fabricated by Sprinkle on method utilizing auto polymerizing acrylic resin without spacer. Mc cord and Tyson Impression technique was utilized to make definitive functional impression. In this in 3: 7 ratio impression compound and greenstick was being mixed and secondary impression was made by Zinc oxide eugenol impression paste. The master cast was made of Type 3 Gypsum Products (Dental Stone)

Permanent record bases were made (by acrylization of modelling wax sheet adapted on the master cast), Orientation Jaw relation was done with fox plane parallel to Camper's plane . Vertical Jaw relation was recorded by Niswonger method and verified by Phonetics and tentative centric relation was recorded by Nick and Notch Method in which nick and notch was created in the maxillary occlusal rim and trough approximately 3mm deep was created in mandibular rim. Patient was guided in centric relation position by Dawson's bimanual technique and centric relation was being recorded by making bite registration material (zinc oxide eugenol impression paste) flow in the nick, notch and trough.

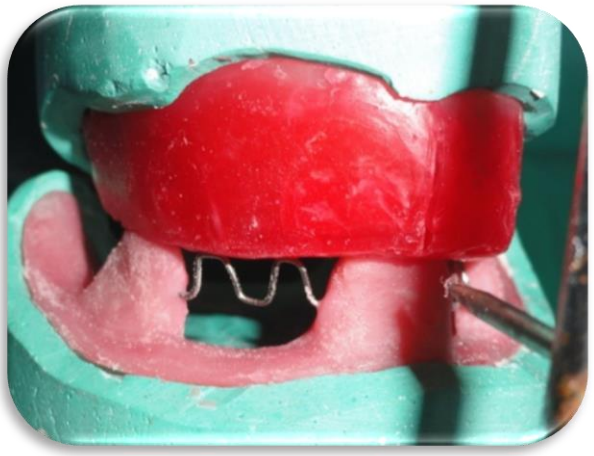


Wax up for permanent record base



Jaw relation recorded





Removal of wax rim and fabrication of vertical stops with wire incorporated in between.

Tentative jaw relation it was observed that the inter arch distance is increased, thus maxillary hollow denture fabrication will be suitable option. The mandibular rim was removed and vertical stops were created with the wire incorporated at the established vertical dimension.

Neutral zone recording was done with self-cured soft tissue liner, which is mixed and applied to the buccal and lingual surfaces of the mandibular base. The denture base is inserted, and patient performs functional movements (swallowing & puckering movements) for several minutes to allow the material to mold.





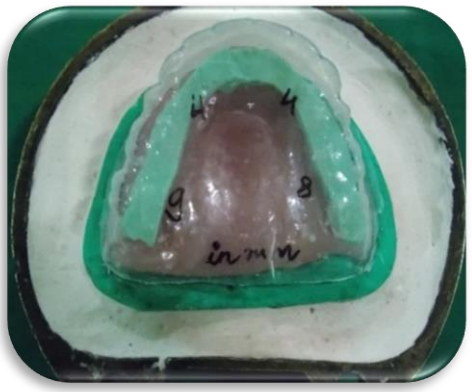


Recording neutral zone with tissue conditioner



Plaster index of the neutral zone and fabrication of corresponding occlusal rim





Putty added according to the desired hollow space











Pre operative Frontal & Lateral view



Post operative Frontal & Lateral view

Steps for conventional complete denture fabrication were followed up till the try – in stage. The trial denture was sealed to the definitive cast. The trial denture was duplicated in irreversible hydrocolloid impression material and poured in type III dental stone to obtain a working cast. On the working cast with the help of a vacuum press a template of 1mm thick transparent thermoplastic sheet was fabricated. The maxillary trial denture was invested and de-waxed in the conventional manner. After this, a trial closure was carried out using the temporary putty spacer and then the flasks were opened and a temporary putty spacer was retrieved. The hollow space left by the temporary putty spacer was visually assessed for adequate resin thickness The hollow space left by the temporary spacer (Putty) was now filled with soap spacer and final closure of the flask was done with acrylization. The denture was retrieved in the usual manner after processing. Using micro motor hand piece , openings were cut into denture base distal to second molar .

To dissolve the soap, denture was immersed in the bowl of water, cleaning brush was utilized for cleaning. Then the holes cut in the denture base were sealed utilizing autopoymerizing acrylic resin.

A water test was performed to evaluate the effectiveness of the technique.

Discussion

Achieving principles of impression making (Stability and Retention) is difficult in cases with residual ridge resorption of mandible. Stability is dependent on many factors out of which one of factors is teeth araangement. Teeth arrangement in neutral zone (in which forces applied by cheek is neutralized by forces applied by tongue) enhances the stability of the mandibular

prosthesis .

There are various materials with the help of which neutral zone can be recorded (Impression compound & Greenstick occlusal rim, Tissue conditioner, waxes, impression plaster, tissue conditioners, and polyether) . In this article Tissue conditioner is being utilized for recording the Neutral Zone. Advantages of Tissue conditioner is that it is Mucostatic in nature, It has long setting time therefore allows all functional movements to be performed, It can be added to same material again if the recording of neutral zone is not accurate.

In the case series by Potdukhe etal two commonly available materials namely, low fusing impression compound with zinc oxide eugenol paste wash and tissue conditioner were used to record the neutral zone. Low fusing impression compound is a thermoplastic material with low viscosity allowing ease in manipulation of oral musculature, better flow and good accuracy. Tissue conditioners are viscoelastic material they have long working time, good flow, longer durability and don't resist forces exerted by the surrounding tissues. Thus most accurate neutral zone position which is close to crest of ridge was recorded by using the above two materials

Occlusion is one of the factors for enhancing the principles of denture. Balanced occlusion helps in directing the forces of mastication to aid in the balance and stabilization of the functioning mandibular denture. Thus, denture fabricated by neutral zone impression technique and balanced occlusion aids in retention and stabilization of the denture rather than dislodging the denture during function as well as reduced food lodgement, good esthetics due to facial support, proper positioning of the posterior teeth allowing sufficient tongue space. Clinicians must identify and record the neuromuscular dynamics of the oral tissues and this should be applied in the construction of the definitive prosthesis

In cases of the resorption of the basal seat is usually accompanied by an increase in the inter- arch space, Numerous techniques have been confirmed in the literature for reducing the weight of the maxillary denture using various intervening spacer materials (9). Ideally, the applied material must be able to withstand the temperature and pressures of compression during processing and must also be retrievable thereafter (10). In this technique, the putty spacer allows the trial packing of the denture without the spacer being affected, and the soap spacer works to withstand the processing technique, as well as being easily retrievable for successfully hollowing out the maxillary denture . The difficulty in retrieving was encountered in the inter-canine region due to its curvature, but the excellent water-solubility of the glycerine soap spacer worked to mitigate this issue. Moreover, the vacuum-form template allows the operator to better visualise the 3-D coverage of the spacer to be used, thus ensuring better resin coverage throughout the intaglio surface without the inclusion of extensive porosities or voids.

Conclusion

The utilization of tissue conditioner for recording the neutral zone in this case resulted in better stability and hollow denture was fabricated with putty as temporary spacer which resulted in reduced weight of maxilary prosthesis thus enhancing the retention in increased interach space. A versatile approach is imperative in prosthetic rehabilitation using complete dentures in cases of ridge resorption with increased interarch space.. The dynamism with which edentulous patients are present, requires the clinician to be prepared with modified techniques to maintain prognostically-favourable standards of care. In the cases of severely atrophic ridges, modifying various treatment phases to optimize the retention an stability of the finished denture is a difficult yet possible task. This report sought to document such versatility in the required treatment strategy

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