DHR International Journal Of Medical Sciences (DHR-IJMS)
ISSN: 2278-831X, Vol. 5(1), Special Issue 2014
Available online *http://www.doublehelixresearch.com/DHRIJMS*

Original article

Hollow maxillary denture-A new ray of hope for resorbed ridges

K S Negi[1] and Laxman Singh Kaira[2]*

[1]Associate professor, Department of Dentistry, Veer Chandra Singh Garhwali Government Medical Sciences and Research Institute, Srinagar, Pauri Garhwal , Uttrakhand , India
[2]Assistant professor, Department of Dentistry, Veer Chandra Singh Garhwali Government Medical Sciences and Research Institute, Srinagar, Pauri Garhwal , Uttrakhand , India
*Corresponding Author: Laxman Singh Kaira

Abstract

Dentures are designed to replace missing teeth, and are worn by the patient for considerable period of time. The dentists skill lies in applying the principles of retention, stability and support efficiently in critical situations. Severely atrophic ridges provide decreased retention, support, and stability and pose a clinical challenge to the success of complete denture prostheses. The severely resorbed maxillary and mandibular edentulous arches that are narrow and constricted with increased interarch space provide decreased support, retention and stability. The consequent weight of the processed complete denture only compromises them further. Technological advancements have resulted in dentures that are lightweight, mimic the look and feel of natural teeth. This article highlights on a technique for the fabrication of a hollow maxillary complete denture in situation where there is excessive resorption of the maxillary residual alveolar ridge. This technique greatly reduces the weight of an exceptionally heavy maxillary denture. Whenever weight of a denture may be a contributing factor to the successful resolution of a patient's problem, the hollow denture should be considered.

Key words: Dentures, Resorption, Lightweight, Hollow.

Introduction

Residual ridge resorption is the reduction in size of the bony ridge under the mucoperiosteum. The resorption occurs at a faster rate in mandibular arch as compared to the maxillary arch; but severely atrophic maxillae with large interridge distance often pose a clinical challenge during fabrication of a successful maxillary complete denture. The severely atrophic maxilla poses a clinical challenge for fabrication of a successful complete denture. In addition to this increased interridge distance often results in heavy maxillary complete denture that further reduces the retention of the prosthesis.

Reducing the weight of a maxillary prosthesis has been shown to be beneficial when constructing an obturator for the restoration of a large maxillofacial defect [1,2] . It has also been proved that prosthesis weight can be reduced by making the denture base hollow. Different approaches like using a solid 3-dimensional spacer, including dental stone[1-6], silicone putty[7,8,14], modelling clay[9,10] , or cellophane wrapped asbestos [11] ,thermocol[14] have been used during laboratory processing to exclude denture base material from the planned hollow cavity of the prosthesis.

Holt[7] processed a shim of acrylic resin over the residual ridge and used a spacer (Insta-mold; Nobilium, Albany, NY). The resin was indexed and the second half of the denture processed against the spacer and shim. The spacer was then removed and the 2 halves luted with autopolymerized acrylic resin using the indices to facilitate positioning. The primary disadvantage of such techniques is that the junction between the 2 previously polymerized portions of the denture occurs at the borders of the denture. This is a long junction with an increased risk of seepage of fluid into the denture cavity increasing the risk of leakage. Fattore et al [12] used a variation of a double flask technique for obturator fabrication by adding heat polymerizing acrylic resin over the definitive cast and processing a minimal thickness of acrylic resin around the teeth using a different drag. Both portions of resin were then attached using heat-polymerized resin.

Kaira et al [13,14] described a modified method for fabricating a hollow maxillary denture. A clear matrix of trail denture base was made. The trail denture base was then invested in the conventional manner till the wax elimination. A 2 mm heat polymerized acrylic resin shim was made on the master cast using a second flask. Silicone putty was placed over the shim and its thickness was estimated using the clear template. The original flask with the teeth was then placed over the putty and shim and the processing was done. The putty was later removed from the distal end of the denture and the opening was sealed with autopolymerizing resin. Though this technique was useful in estimation of the spacer thickness, but removal of putty was found to be difficult especially from the anterior portion of the denture. Moreover, the openings made from the distal end had to be sufficiently large to retrieve the hard putty. In this case report, a 46-year-old edentulous male patient with severely resorbed ridges and increased inter-ridge distance was treated with a hollow maxillary denture, using lost salt technique combined with neutral zone concept to improve the retention and stability of dentures.

Case Report

A 46-year-old male patient reported to the department of Prosthodontics, with a chief complaint of looseness of both upper and lower dentures and desired the replacement of the same. The intra-oral examination revealed a narrow and constricted U-shaped flat palatal vault and severely resorbed

maxillary and mandibular ridges [Figure 1]. The treatment plan decided for the patient was the fabrication of a hollow maxillary complete denture combined with neutral zone concept to enhance the retention and stability of dentures. Because of severely resorbed ridges and increased inter-ridge distance, fabrication of hollow maxillary complete denture with utilization of neutral zone concept was planned for better stability and retention.

Figure 1 Preoperative photograph

Technique

Preliminary impressions of the edentulous maxilla and mandible was made with a viscous mixture of two varieties of softened impression compound (3 parts impression compound(DPI Pinnacle Impression Compound, The Bombay Burmah Trading Corporation Ltd) + 7 parts greenstick compound (DPI Pinnacle Tracing sticks, The Bombay Burmah Trading Corporation Ltd.) [Figure 2] .The impressions were washed and poured with the dental plaster. The custom tray was prepared with auto-polymerising acrylic resin (DPI –RR cold cure, Dental Products of India, the Bombay Burmah Trading Corporation limited). Border molding was performed with green-stick (DPI Pinnacle tracing sticks, The Bombay Burmah Trading Corporation Ltd.,) and final impression with zinc oxide eugenol impression paste (DPI Impression paste, The Bombay Burmah Trading Corporation Ltd.,). Compound occlusal rims were fabricated by using modeling compound (DPI Pinnacle Impression Compound, The Bombay Burmah Trading Corporation Ltd.) for making a neutral zone record by having the patient perform various Orofacial movements.

Artificial stone is poured into the final impression. The base is then set down on a platter-shaped portion of the mix which extends at least 1 inch beyond the borders of the acrylic resin base. Before the stone sets completely, it is notched. The notches are made quickly [Figure 3]. The stone cast, the acrylic resin base, and the compound are immersed together in cold water to avoid the effects of the chemical heat

of the setting stone. The stone is coated with a separating medium when it is set hard, and the compound is covered with a 1-inch-thick layer of a plaster which is worked into the notches of the base. When this plaster has hardened, the index can be split at the median line on the labial side. The shape of the denture is now permanently registered in this plaster index The low fusing compound is now destroyed down to the bare acrylic resin . The plaster index is soaked in hot water and the excess is blown off. The pink baseplate wax is slowly melted in a ladle and poured into the index through the space between the labial and lingual indices on the occlusal surface . Then the entire assembly is immersed in cold water. When the index is opened, a hard wax duplicate of the low fusing compound has been formed. This is easily handled, and being attached to the acrylic resin base, it becomes the maxillary and mandibular occlusion rim. The maxilla-mandibular relationship was recorded using compound occlusal rims and transferred to the articulator and the artificial teeth were arranged [Figure 4]. Try in procedure was done and then, all the wax excluding the wax surrounding the teeth was removed and replaced with light body elastomeric impression material (Aquasil Ultra LV Dentsply Caulk, Milford, USA). Trial denture bases were reinserted into the patient's mouth and patient was instructed to perform various Orofacial movements so as to record the polished surface of the denture in harmony with the Orofacial musculature . After the try in procedure, wax up was done and dentures were made ready for processing. The mandibular denture was processed using the conventional procedure.

The Steps Taken for the Fabrication of Hollow Maxillary Complete Denture were as Follows: The maxillary trial denture was flasked and dewaxed in the conventional manner .Half of the heat cure PMMA (Trevalon, Dentsply India Pvt. Ltd., Gurgaon, India) in dough stage was positioned accurately over the dewaxed mould and then salt crystals were placed over it [Figure 6].Above that, the remaining heat cure resin was packed and cured at 74 degree C for 7-8 hours .Cured denture was retrieved and 3 holes were made in the tissue surface [Figure 6]. All the residual salt crystals were removed by flushing water with the high pressure syringe through the holes.After making sure that all the salt crystals have been removed, the escape holes were closed with autopolymerizing resin (Trevalon, Dentsply India Pvt. Ltd., Gurgaon, India). The hollow cavity seal was verified by immersing the denture in water, if no air bubbles are evident, an adequate seal is confirmed [Figure 7].The dentures were inserted in the patient's mouth [Figure 8] and instructions regarding care, hygiene and maintainance were given. Preinsertion occlusal corrections were made and the denture was inserted in the patients mouth. The method described has advantages over the previously described techniques. The salt crystals being heat labile melt during the curing procedure and thorough flushing after curing results in no crystals remaining in the denture thereby maintaining the integrity of the denture, avoiding the tedious effort to remove the spacer

material from the denture. This technique of lost salt technique is simple to execute and utilizes a very cheap and easily available spacer material.

There are studies in which it is proved that, by reducing the weight of the denture, either by making a hollow denture or by altering the plane of occlusion to some extent, preservation of the existing residual alveolar ridge is possible. An added advantage with a hollow denture is a comparable increase in retention and stability that can be achieved. The advantages of hollow dentures are reduction in the excessive weight of the acrylic resin, resulting in the lighter prosthesis, and decreased load on the residual alveolar ridges thereby making the patient comfortable [1-14].

Figure 2 Preliminary impression

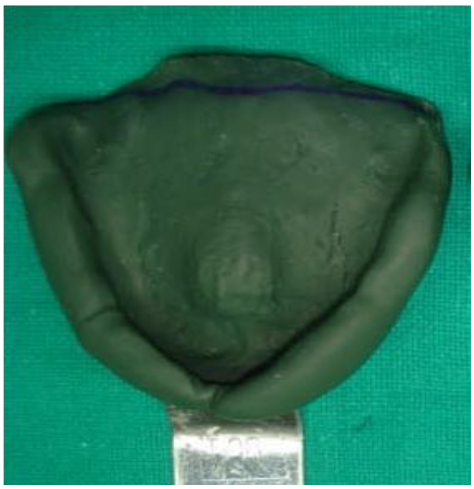


Figure 3 Neutral zone recording

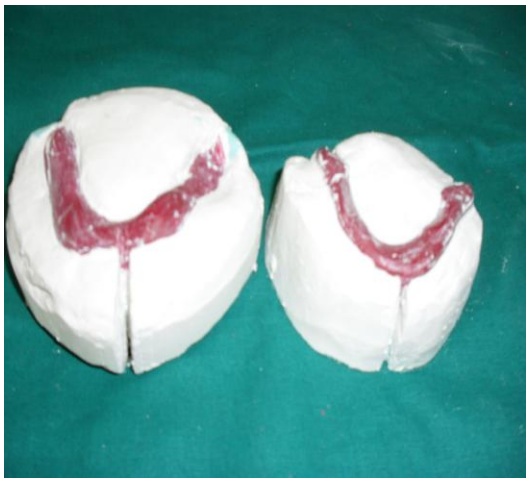


Figure 4 : Teeth arrangement in neutral zone

Figure 5: Salt crystals placed over heat cure

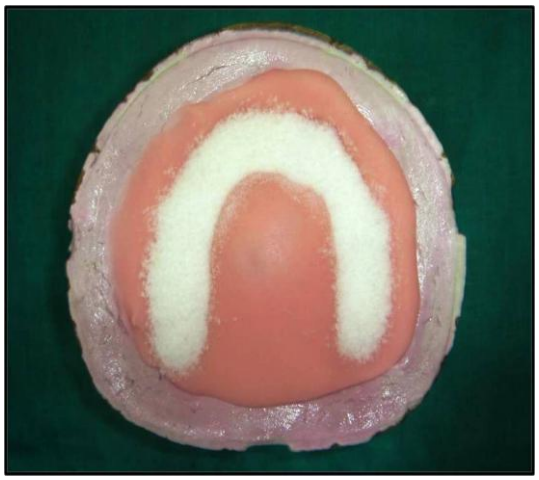


Figure 6:3 Holes were made in dorsal surface of denture

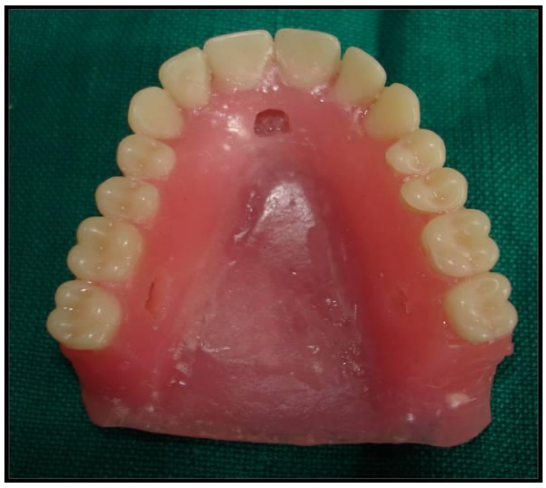


Figure 7: Hollow denture

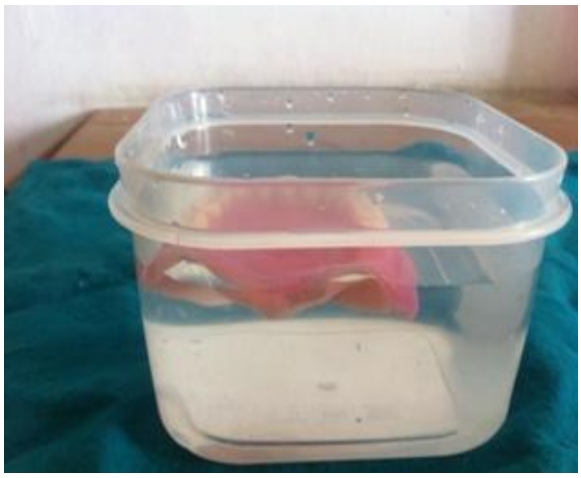
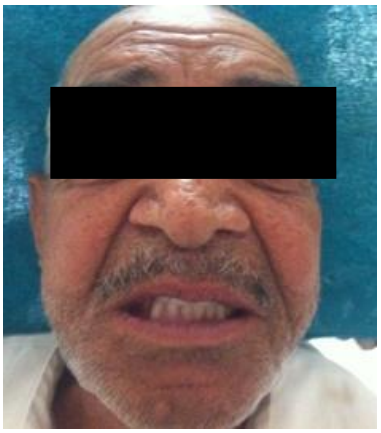


Figure 8: Happy patient



Conclusion

Rehabilitation of severely resorbed ridges is a challenge to the prosthodontist. Even though, the choice of rehabilitation can be overdentures, implant retained over-dentures, ridge augmentation, etc., many a times the patients who comes with such a problem are geriatric patients with many systemic illness. Hence, the best way is to rehabilitate them with conventional complete dentures. A simplified technique of fabricating hollow denture using salt crystals as spacer has been described.

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