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Hollow Denture - Boon for rehabiliatation of resorbed ridges

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Abstract

Residual ridge Resorption is a complex phenomenon driven by many factors. Extreme resorption of residual ridge often leads to decrease in denture bearing surface area well as increased inter arch space thus compromising the retention and stability of denture. By application of basic principles of denture retention with few modifications in denture fabrication, one can considerably increase the retention of denture. Fabrication of hollow denture in cases with increased arch space seems to provide better retention as compared to conventional denture.

Introduction

In the process of ageing, resorption of residual ridge becomes more evident. The severely atrophic ridge poses a clinical challenge for fabrication of a successful complete denture. In addition to this, increased inter ridge distance often results in heavy maxillary complete denture thus reducing the retention of maxillary complete denture. Therefore, reducing the weight of a maxillary prosthesis may appear useful increasing the retention of maxillary denture.[1] In this case report, we describe a simple technique of fabricating a hollow maxillary complete denture.

Case Report

A 62-year-old male patient walked into dept of prosthodontics, Buddha Institute of Dental Sciences, Patna, with chief complain of difficulty in eating due to due loose prosthesis. Past medical and dental history revealed that patient has been denture wearer for last 10 years and wanted fabrication of new prosthesis. On evaluation of previous denture wear we came to know that the denture was not stable.

Intra oral evaluation revealed atrophic maxillary and mandibular arch (Figure 2) with increased inter arch space when measured at premolar region. Radiographic examination showed resorbed maxillary and mandibular ridge.

Patient was well explained about the various treatment modalities including the pre-prosthetic surgery followed by a conventional denture and implant supported complete denture. Considering the time and cost for pre prosthetic surgery or implant supported prosthesis, patient wanted to go for conventional denture. Thus, considering the oral condition of the patient, fabrication of unconventional denture (hollow denture) for maxillary arch with conventional mandibular denture was planned and well explained to the patient.

Primary impression was made using impression compound and cast was poured (Figure 3). After fabrication of special tray border molding and final impression were made using Zn oxide eugenol impression paste (Figure 4). Further jaw relation was done in conventional manner with face bow transfer (Figure 5).

Teeth arrangement and try in was carried out, following the neutral zone record for the mandibular arch (Figure 6). After the final try in was done, packing and dewaxing was done in conventional manner.

Figure 1: pre operative extra oral view

Figure 2: pre operative intra oral view

Figure 3: Primary Impression

Figure 4: Final Impression

Figure 5: Face-Bow Transfer

Figure 6: Teeth arrangement

Figure 7: 2mm thick denture base

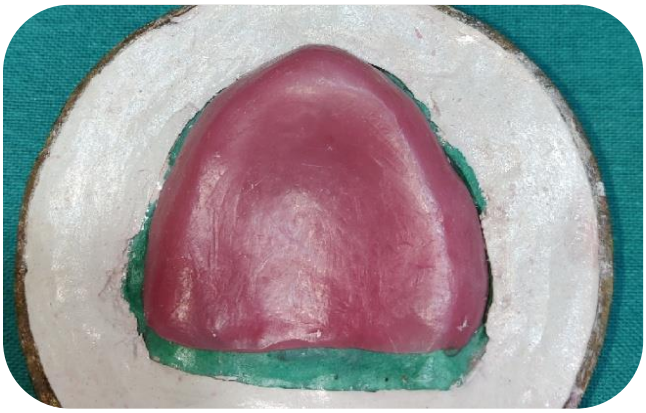

Figure 8: Wax Analogue

Further, a denture base of uniform thickness (2mm) was adapted over the maxillary cast to ensure uniform thickness of heat cure denture base material and thus maintaining its strength and integrity (Figure 7). Next, a wax analogue was created and adapted over the intaglio surface of teeth, according to the space available between the intaglio surface of teeth and denture base (Figure 8). Now, trail closure of the flask was done to check for complete closure the counterpart of flasks.

Figure 9: Trial closure with wax anlague and 2mm thick denture base

First trial closure was carried out with the denture base placed over the cast and the wax analogue (Figure 9). The analogue was checked for indentation/ distortion and if any, modifications were made accordingly. Once the wax analogue corresponding to the hollow spacer was created, a putty index was made out of it (Figure 10). Using this putty index thin acrylic shell was created by sprinkle on technique using auto-polymerizing resin (Figure 11). This acrylic shell was to be incorporated into the final denture creating the hollow space.

Figure 10: acrylic shell

Figure 11: Acrylic shell

Again, second trial closure was done with heat cure denture base resin in place and wax analogue placed over it to ensure compete closure of the counterparts (Figure 12). After the trial closure, the flask was opened to check for the hollow space created and ensure uniform thickness of heat cure resin throughout. Next, the final packing was carried out using heat cure denture base resin material and the acrylic shell in place. Further, curing, finishing and polishing were done in conventional manner.

Figure 12: Trial closure with wax anlogue and heat cure base resin.

Figure 13: Confirmation for hollow space created.

Marked reduction in weight of maxillary denture was seen as the denture floats in water (figure 14). The denture was delivered to the patient (figure 15) and reviewed after a week. Minor adjustments were done.

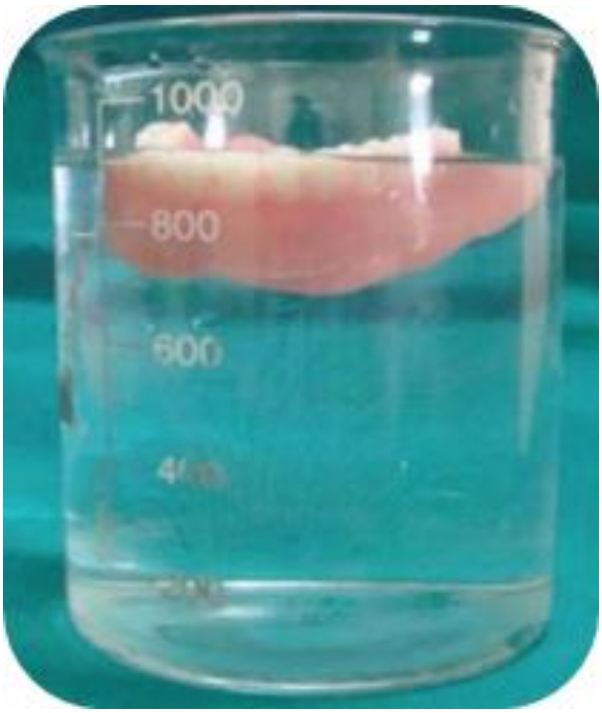

Figure 14: marked reduction in weight of denture

Figure 15: post operative view of patient

Discussion

The goal of prosthodontic treatment is the perpetual replacement of what is missing and preservation of the remaining in order to restore the form and function. Tooth loss often leads to residual ridge resorption which is a complex phenomenon driven by various anatomic, prosthetic, functional and metabolic factors. Extreme resorption of ridge often leads to reduced denture-bearing area, which in turn affects retention, stability and support for the complete denture. Excessive ridge Resorption also results in a large restorative space between the residual ridges. Prosthetic rehabilitation in such scenarios often results in increased height and weight of the prosthesis, overloading the residual ridges and further compromising the retention and stability.[2]

An attempt was made to decrease the weight of prosthesis by fabrication of hollow denture. Different weight reduction methods have been used such as using a solid 3-dimensional spacer, including dental stone, cellophane wrapped asbestos, silicone putty or modelling clay have been used during laboratory processes to exclude denture base material from the planned hollow cavity of the prosthesis.[3]

Holt et al processed a shim of indexed acrylic resin over the residual ridge and used a spacer, which was then removed and the two halves luted with auto polymerized acrylic resin. The primary disadvantage of such technique is that the junction between the two previously polymerized portions of the denture occurs at the border of the denture, which increases risk of seepage of fluid into the denture cavity. Another disadvantage is that it is difficult to gauge resin thickness in the cope area.[4]

O'Sullivan et al described a modified method for fabricating a hollow maxillary denture using a clear matrix of denture base. 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. This case reports describes three techniques for fabrication of a hollow maxillary complete denture in a patient with resorbed maxillary and mandibular ridges and increased interridge distance.[5] Chaturvedi et al used dough of dental plaster – pumice and sugar syrup rolled and placed it over heat-cured base to act as a spacer. Heat polymerizing resin was then mixed, packed, and processed. Two small openings were made with bur into denture base distal to most posterior teeth. Dental plaster – pumice and sugar syrup was then removed by scraping and keeping it in water. The opening was then closed by Autopolymerizing resin.[6]

Shetty et al used a denser thermocol and placed it over the roughened acrylic shim along the ridge and luted with cyanoacrylate.[7] In this case report, we have used a conventional easy method for fabrication of hollow denture. In this current technique many of the disadvantages are eliminated. Incorporation of the acrylic shell in denture overcomes the problem of leakage and the effort for removal of spacer material. There is no need of window preparation or perforations as no spacer is introduced in the final denture. Acrylic shell was prepared using the putty index. Alternatively, acrylic shell can be directly prepared using the wax analogue. The method described here used auto-polymerizing acrylic resin to add strength. Colour of auto-polymerizing resin matches with the heat cured acrylic resin; thus Esthetic is maintained.

Conclusion

The hollow denture seems to be a boon to patients with increased interarch space and resorbed ridges. It considerably reduced the weight of the denture, thus enhancing the denture retention and stability of the denture. Reduction in weight considerably prevents the transmission of leverage forces. The technique described is simple to execute and it is satisfactory to the edentulous patients in restoring the form and function.

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