Fabrication of maxillary hollow denture using various ingenious techniques: A case series.

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Abstract

Maxillary hollow denture represents an innovative approach to denture fabrication by revolutionizing the denture design and its fabrication methods. The design aimed at reducing the weight of the denture in various clinical scenarios such as with increased interarch space, and atrophic maxilla by fabrication of hollow space in maxillary denture thereby, creating a lightweight prosthesis. Therefore, this hollowed design reduces the weight of the denture; enhancing the retention, stability, and support of the denture. Moreover, the reduced material volume contributes to more life-like usage of the maxillary complete denture with improved patient satisfaction.

Keywords: Maxillary hollow denture, increased interarch space, lightweight prosthesis.

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Introduction

Rehabilitation of completely edentulous maxillary and mandibular arches comprise several treatment strategies. Those treatment protocols are decided based on patient age, systemic diseases, financial status, and other factors.[1]

Complete denture is one such treatment options for resorbed maxillary and mandibular ridges. There are numerous factors necessary to maintain its longevity, which include retention, stability, and support. Dentures fulfilling these criteria, provides patient comfort and re-establishes function and esthetics. Fabrication of complete denture involves several steps, which must be followed to achieve the desired results.[2]

Severe resorption of the edentulous ridge decreases the denture foundation area, which will affect denture support, stability, and retention and also increases the inter ridge distance.[3] In such situation, rehabilitation causes the prosthesis to become heavier and increase in height, which in turn stresses the residual ridge and jeopardizes the denture's stability and retention.[4] The addition of weight combined with gravity cause disturbances in denture retention.[5]

The weight of the prosthesis is reduced by incorporating a hollow cavity in the denture base. The rationale for choosing hollow dentures,

- Managing the existence of increased inter-ridge distance
- Reduce the heaviness of the denture base.

The processing of complete dentures is done by excluding the denture base material from the designated hollow cavity in the prosthesis to decrease its mass. Hollowing out the denture base can alleviates the weight of the prosthesis for patients with extensive maxillofacial anomaly or severe residual ridge resorption, because of the substantial amount of denture base material present in the prosthesis.[6, 7]

Different weight reduction approaches[8] were used in the construction of complete dentures with various spacers like caramel, soap, putty, plaster, and thermocol etc.

This case series outlines various techniques for creating maxillary hollow dentures, addressing clinical scenarios involving increased inter-ridge distance.

Case report

A 56-year-old male patient presented to the Department of Prosthodontics with a complaint of complete edentulism in both maxillary and mandibular arches. Patient was a denture wearer for the past 3 years and complains of looseness of maxillary denture. Past medical history was not significant.

So, the treatment of maxillary hollow dentures is planned with a conventionally fabricated mandibular denture.

Technique 1: (Caramel)

1. The maxillary denture was constructed up to the trial denture stage using conventional method.
2. The waxed up trial denture base was sealed to the master cast; duplicated using irreversible hydrocolloid (alginate) and then poured with dental stone.
3. A 1 mm thick thermoplastic sheet was used to create a template of the duplicated trial denture using a vacuum heat-press machine onto the duplicated cast. The trial denture was then subsequently processed up to the wax burnout stage using conventional method (Figure 1).
4. The denture processing was carried out using two denture flasks with interconvertible lids.
5. To the master cast, two layers of baseplate wax were adapted in line with the peripheral extension of the cast. Then it is invested in the second flask, and processed conventionally.
6. Following deflasking, the template was positioned on the master cast, creating an index in the land area of the cast to serve as a seating reference. The space between the template and the processed base is measured using endodontic file with rubber stopper.
7. The Polyvinylsiloxane putty was manipulated and shaped to conform the estimated configuration of the template, leaving 2–3 mm of space between the template and the spacer. An additional 1 mm of clearance was maintained over tooth segment of the denture.
8. With the putty spacer as reference, the caramel spacer is carved and the exact measurement was verified with Vernier's caliper.
9. The trial closure was performed using putty spacer, which was then removed from the flask. The mold space was visually inspected to ensure that the resin thickness was adequate around the entire hollow cavity.
10. Then mold space was filled with caramel spacer; final closure was achieved and acrylized conventionally (Figure 2).
11. After retrieval of the denture, two orifices were created on the distal aspect of the most posterior tooth in the denture base. Then, it is placed in the container of water for dissolution of caramel and water spray are used to completely remove any remaining traces of caramel. The two orifices were sealed with auto-polymerizing resin.
12. Water test was conducted to assess the hollow space, as indicated by floating of the denture.
13. The maxillary and mandibular dentures were inserted after final finishing and polishing. The patient was recalled for review, during which minor refinements were done.

Technique 2: (Soap)

1. The maxillary denture is fabricated similarly to the previous technique up to the preparation of trial denture, and putty spacer.
2. With the putty spacer as reference, soap replica was modelled using Le Cron carver and the exact measurement was verified with Vernier's caliper.
3. The trial closure was performed using putty spacer, which was then removed from the flask. The mold space was visually inspected to ensure that the resin thickness was adequate around the entire hollow cavity.
4. Final closure is done with soap spacer filled into the mold space and acrylized conventionally (Figure 3 and 4).
5. After retrieval of the denture, two orifices were created on the distal aspect of the most posterior tooth in the denture base. Then, it is placed in the container of water for dissolution of soap. Devices such as cleaning brush and water spray were used to completely remove any remaining traces of soap. The two orifices were sealed with auto-polymerizing resin and assessed for water test.
6. The maxillary and mandibular dentures were inserted to the patient after final finishing and polishing.

Technique 3: (Shimstock)

1. The maxillary denture is fabricated in a similar way to the previous technique up to the preparation of the template of the trial denture.
2. The wax was adapted to the denture base in the form of a hollow tube confined within the estimated configuration of the matrix, with an internal hollow space of 3-5 mm. An additional 1 mm of clearance was maintained over tooth segment of the denture (Figure 5 and 6).
3. Acrylization was carried out and a water test was conducted to assess the floating nature of the denture.
4. The maxillary and mandibular dentures were insertred to the patient after final finishing and polishing.

Technique 4: (Thermacol)

1. The maxillary denture is constructed similarly up to the preparation of the template of trial denture and putty spacer.
2. With the putty spacer as reference, thermacol replica was modelled using Le Cron carver and the exact measurement was verified with Vernier's caliper.
3. The trial closure was achieved with a putty spacer and mold space was filled with thermacol material in the final closure of the processing step.
4. The thermacol material is left inside the mold space and acrylization is carried out conventionally. After that, retrieval of the denture is done, finishing and polishing is performed in the usual manner and evaluated by water test (Figure 7 and 8).
5. The maxillary and mandibular dentures were inserted to the patient after final finishing and polishing.

Discussion

These are all the several techniques used in the construction of maxillary hollow complete dentures in managing resorbed ridge and increased inter-ridge distance. The hollowness in the complete denture decreases mass which accordingly decreases the leverage forces[9] acting on it. These approaches carried out with spacers such as caramel, soap, thermacol, and shim stock technique holds their own advantages and disadvantages. In this fabrication technique using caramel and soap, necessitates the elimination of the spacer after creating a hollowness in the denture.

The technique with thermacol as a spacer, holds an advantage, where the removal of the spacer material is not needed; as the material has the property of lightweight and there is no need for the creation of a channel to let out the material and restore the openings with auto-polymerizing resin.[10] Since, the material is as such enclosed within the denture base, the properties of the thermacol spacer material do not have any effect on the denture and the patient. In this article, several techniques have been dealt with in the construction of hollow dentures in a maxillary arch which is helpful in the fabrication of complete dentures with varying clinical scenarios.

Conclusion

Maxillary hollow dentures mark a notable progression in prosthodontics, providing a hopeful avenue for improving patient comfort and functions. Ongoing research and clinical trials are essential to substantiate their effectiveness and patient satisfaction.

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FIGURES

Figure 1.

Figure 2.

Figure 3

Figure 4

Figure 5

Figure 6

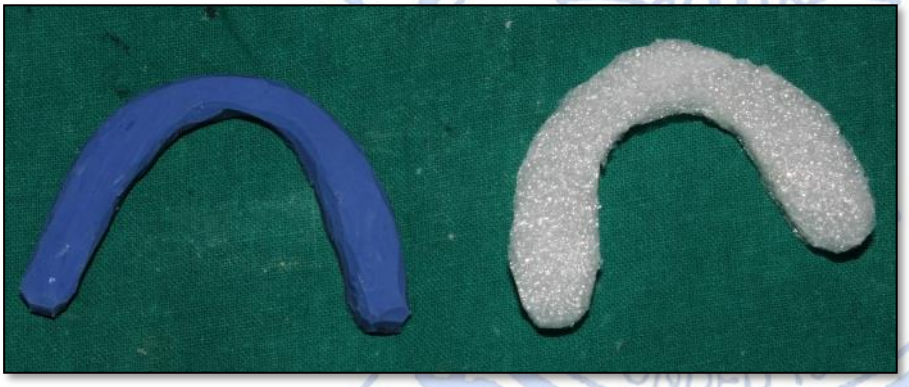

Figure 7

Figure 8