Light weight dentures: An innovative technique

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Abstract

Retention, stability and support are the basic principles on which the success of a complete denture relies. The severely resorbed maxillary and mandibular edentulous arches that are narrow and constricted with increased interarch space provide decreased support, retention and stability. To decrease the leverage, reduction in the weight of the prosthesis was recommended and also found beneficial. This article describes a simple procedure to reduce the weight of maxillary complete denture by use of an autopolymerizing acrylic resin shell which is incorporated during the packing stage. This method has the advantage of being easy and requires very little additional time. Hollow maxillary complete denture considerably reduces the weight of the prosthesis, which in turn prevents transmission of detrimental forces by reducing leverage action. This results in increased retention and stability and up to some extent it also preserves the existing residual alveolar ridge. The technique uses a clear matrix of trial denture to facilitate shaping of dough spacer to ensure an even thickness of acrylic to resist deformation and prevent seepage of saliva into the cavity making this technique more predictable. An autopolymerizing acrylic resin shell which creates hollow space and also has strength. Technique is simple to execute, easy economical and matching the shade of autopolymerizing acrylic resin with heat cures acrylic resin enhances esthetics. Light weight hollow dentures provide healthy and comfortable living for the geriatric edentulous patient.

Keywords: Autopolymerizing acrylic resin shell, clear matrix, hollow maxillary complete denture, play dough

Introduction

Extreme resorption of the maxillary denture-bearing area may lead to problems with prosthetic rehabilitation. These may be due to a narrower, more constricted residual ridge as resorption progresses, decreased supporting tissues and a resultant large restorative space between the maxillary residual ridge and opposing mandibular teeth. The latter may result in a heavy maxillary complete denture that may compound the poor denture-bearing ability of the tissues and lead to decreased retention and resistance.

Reducing the weight of a maxillary prosthesis, however, has been shown to be beneficial when constructing an obturator for the restoration of large maxillofacial defects.

Historically, weight reduction approaches have been achieved using a solid 3-dimensional spacer, including dental stone, cellophane wrapped asbestos, silicone putty, or modeling clay during laboratory processing to exclude denture base material from the planned hollow cavity of the prosthesis. Multiple and separate pieces of the prosthesis are polymerized around a 3-dimensional spacer. Following the initial polymerization process, the solid spacer is removed. Individual pieces of the prosthesis are then joined using auto-polymerizing acrylic resin repair techniques.

A study by Fattore et al. 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 the heat-polymerized resin.

Holt processed a shim of acrylic resin over the residual ridge and used a spacer. 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.

O’Sullivan et al. described a modified method for fabricating a hollow maxillary denture. A clear matrix of trial denture base was made. The trial denture base was then invested in the conventional manner until the wax elimination. A 2 mm heat polymerized acrylic shim was made on the master cast, using a second flask. Silicone putty was placed over the shim and its thickness was estimated using a clear template. The original flask with the teeth was then placed over the putty
and the processing was carried out. The putty was later removed from the distal end of the denture and the openings were sealed with autopolymerizing resin.

Chaturvedi et al.[7] used dough of dental plaster – pumice and sugar syrup rolled and placed it over heat cured record base to act as spacer. Heat polymerizing resin was then mixed, packed and processed for 7-8 h. Two small openings were made with bur into denture base distal to most posterior teeth. Dental plaster – pumice – sugar syrup paste was then removed by scraping and putting it in water. This opening was later closed with autopolymerizing resin.

Shetty et al.[8] used a denser thermocol and placed it over the roughened acrylic shim along the ridge and luted with cyanoacrylate.

Aggarwal et al.[9] used lost salt technique. Half of heat cure in dough stage was positioned accurately over the dewaxed mold and salt crystals were placed over it. Above that, the remaining heat cure resin was packed. 2 holes were made in the thickest palatal area. All the residual salt crystals were removed by flushing water with high pressure syringe through the holes. Escape holes were closed with autopolymerizing resin.

This article describes the technique for fabrication of hollow denture using play dough (modeling clay) and autopolymerizing acrylic resin which is simple and easy.

Case Report

The present case is about a 69-year-old male patient who reported to the Department of Prosthodontics with the chief complaint of difficulty in chewing food due to worn out dentures. History revealed that the patient was edentulous for past 11 years and has been using the same denture from 11 years. Both maxillary and mandibular ridges were edentulous with no bony spicules. His upper lip [Figure 1] was long and inter-ridge distance was more than normal. The previous denture was with severely attrited teeth. Hence, it was decided to fabricate a new set of denture for the patient.

After analyzing each available option, it was decided to fabricate hollow maxillary complete denture and conventional mandibular complete denture. The patient also approved the treatment plan as it was light in weight, inexpensive and a non-surgical procedure.

Technique

1. Until try in stage, the denture was fabricated in a conventional manner
2. The land area of the cast was indexed using a conical bur and trail denture was sealed to the definitive cast
3. The sealed trail denture was duplicated in irreversible hydrocolloid and poured in dental stone
4. A template of the duplicated trail denture was made adapting 1 mm thermoplastic sheet on the recovered cast using vacuum heat press machine [Figure 2]
5. Two split denture flasks with interchangeable counters were used for processing
6. Trial denture was then processed in the standard manner up to the wax elimination stage in base 1 counter 1 flask
7. 2 sheet thickness of the base plate wax were adapted to the definitive cast in the drag (base 1), conforming to the border extensions. For fabrication of permanent heat polymerized acrylic resin record base; base flask 1 with counter flask 2 was used
8. After deflasking the clear matrix was placed on the definitive cast (base 1) using the indices in the land area as seating guides
9. Play dough was placed on the base 1 [Figure 3] and shaped to the approximate contours of the matrix. A space of approximate 1.5 mm was created between the clear matrix and play dough all over. An endodontic file with the rubber stop was used to measure the space between the matrix and the shaped play dough [Figure 4a and b]
10. Additional 1 mm space was provided over the tooth

Figure 1: Extraoral view (long lips)

Figure 2: Duplicated sealed trial denture with clear matrix
portion of the denture. The original cope (counter 1) was reseated on the drag (base 1) and verified for complete closure of the flask
11. Then alginate impression was made of base 1 with record base and shaped play dough
12. Autopolymerizing acrylic resin was sprinkled over the impression to form a thin shell of approximately 1 mm.
13. Dough was removed from heat cured record base (base 1) and it was cleaned
14. Autopolymerizing acrylic resin shell was placed and original cope (counter 1) was reseated on the drag (base 1) and verified for complete closure of the flask
15. Minor corrections if required were made and then the shell was secured over heat cured record base with the help of autopolymerizing acrylic resin [Figure 5]
16. Heat cured acrylic resin was packed over shell (base 1 and counter 1) and processed
17. The denture was recovered in the usual manner; lab remounting was performed followed by finishing and polishing.

Seal was verified by immersing the denture in the water (air bubble should not be evident after immersing the dentures in the water) [Figure 6].

Denture care instructions were given to the patient.

Discussion

Rehabilitation of patient with long lip length is a challenge to the dentist. Geriatric patients with systemic illness, economic constrains, possess reluctance for a long duration of treatment procedure and unwillingness for any kind of surgical procedure. Hence the best way is to rehabilitate them with the conventional way.

Resorbed residual ridges (compounded with long lip) resulted in increased inter‑ridge distance. If conventional maxillary dentures were constructed then it would have resulted in increased weight of maxillary dentures that may result into resorption of maxillary edentulous foundation at a higher rate.

Reducing the weight of maxillary prosthesis, however, has been shown to be beneficial when constructing prosthesis for rehabilitation of edentulous patient. This can be achieved by making the maxillary denture hollow.

Figure 3: Play dough placed on base 1

Figure 4: (a and b) Endodontic file with rubber stops used for measuring space

Figure 5: Autopolymerizing acrylic resin shell secured over heat cured record base with the help of autopolymerizing acrylic resin

Figure 6: Verification of seal by immersing the denture in water
The technique has advantages of avoiding tedious effort to remove the spacer material from the denture. Problem with leakage and gauging resin thickness are overcome.

In O’Sullivan et al. technique removal of putty was difficult especially from the anterior portion and a large opening has to be made at the distal end to retrieve the hard putty.

Chaturvedi et al.[7] used dough of dental plaster – pumice and sugar syrup this dough is brittle and may break during compression molding, it may also absorb monomer and in this technique also opening has to be made in the distal end to remove the spacer which may later compromise the seal of the denture.

Shetty et al.[8] used a denser thermocol which may get displaced during compression molding.

Aggarwal et al.[9] used lost salt technique. In this technique, the thickness of hollow part cannot be kept uniform; salt may react with heat cured acrylic resin and may lead to porosity.

The method in this case report has advantages over previously described techniques for the hollow denture fabrication. There is minimal extra laboratory procedure, there is no tedious effort to remove the spacer material, autopolymerizing acrylic resin shell also adds to the strength of the denture, color of autopolymerizing acrylic resin can be matched with heat cured acrylic resin thus enhancing esthetics, there is no chance of leakage. The technique is predictable and provides even space all around. The technique is economical and is performed using commonly available materials.

Conclusions

Hollow maxillary complete denture considerably reduces the weight of the prosthesis, which in turn prevents transmission of detrimental forces by reducing leverage action. This results in increased retention and stability and up to some extent it also preserves the existing residual alveolar ridge. The technique uses a clear matrix of the trial denture to facilitate shaping of dough spacer to ensure an even thickness of acrylic to resist deformation and prevent seepage of saliva into the cavity.[10] making this technique more predictable. An autopolymerizing acrylic resin shell which creates hollow space and also has strength. Technique is simple to execute, easy economical and matching the shade of autopolymerizing acrylic resin with heat cures acrylic resin enhances esthetics. Light weight hollow dentures provide healthy and comfortable living for the geriatric edentulous patient.

References

1. O’Sullivan M, Hansen N, Cronin RJ, Cagna DR. The hollow maxillary complete denture: A modified technique. J Prosthet Dent 2004;91:591-4.
2. Worley JL, Kniejski ME. A method for controlling the thickness of hollow obturator prostheses. J Prosthet Dent 1983;50:227-9.
3. Holt RA Jr. A hollow complete lower denture. J Prosthet Dent 1981;45:452-4.
4. Jhanji A, Stevens ST. Fabrication of one-piece hollow obturators. J Prosthet Dent 1991;66:136-8.
5. DaBreo EL. A light-cured interim obturator prosthesis. A clinical report. J Prosthet Dent 1990;63:371-3.
6. Fattore LD, Fine L, Edmonds DC. The hollow denture: An alternative treatment for atrophic maxillae. J Prosthet Dent 1988;59:514-6.
7. Chaturvedi S, Verma AK, Ali M, Vadhwani P Hollow maxillary denture: A simplified approach. People’s J Sci Res 2012;5:47-50.
8. Shetty V, Gali S, Avindram SR. Light weight maxillary complete denture: A case report using a simplified technique with thermocol. J Interdiscip Dent 2011;1:45-8.
9. Aggarwal H, Jurel SK, Singh RD, Chand P, Kumar P. Lost salt technique for severely resorbed alveolar ridges: An innovative approach. Contemp Clin Dent 2012;3:352-5.
10. Kaira LS, Singh R, Jain M, Mishra R Light weight hollow maxillary complete denture: A case series. J Orofac Sci 2012;4:143-7.

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