

Comparative Evaluation of Accuracy of an Impression Made with Custom Trays Fabricated with Different Spacer Materials

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Abstract

Aim

To analyze and compare the effect of vacuum formed resin sheet as a spacer material on the impression made with custom tray as compared to wax spacer.

Materials and methods

Two sets of preliminary impressions were made

for 10 randomly selected completely edentulous patients and plaster casts poured. Two custom trays were fabricated for each patient, one with vacuum sheet spacer (1.5mm thickness) and other with wax sheet spacer (1.5mm thickness) and named as V and W respectively. Secondary impressions were made and casts fabricated. Index was poured on polishing

surfaces of trays without retrieving the trays from the cast. The casts were sectioned into 8 equal sections and the thickness of light body impression material was measured under stereomicroscope at 4 equidistant points on each section of all the casts. Data collected were analyzed using SPSS and compared. Mann-whitney test was applied.

Results

Accuracy of impressions made with vacuum formed resin sheet spacer is slightly greater compared to the impression made with wax spacer.

Conclusion

Fabrication of custom tray using vacuum formed resin sheet spacer is simple and effective technique to preserve and maintain the space for final impression material enhancing the accuracy of the impression.

Keywords

Custom tray , wax spacer , vacuum formed resin spacer ,impression

Introduction

Despite advances in computer-aided design/computer-aided manufacturing (CAD/CAM) technologies, conventional dental impressions are still most commonly used for fabrication of complete dentures^{1,2}.

The success of the complete dentures is largely dependent on accuracy of impression, which requires good understanding of anatomical landmarks and physiology of supporting structure in addition to, understanding the properties and manipulation of different impression materials³. Complete dentures are primarily mechanical devices but since they function in the oral cavity, they must be fashioned so that they are in harmony with the normal neuromuscular function⁴.

Stability of complete lower dentures has challenged dentists and patients alike. Making accurate final impression for complete dentures is a multistage process that involves a preliminary impression, a customized final impression tray and a final border impression. There are various impression techniques and spacer designs for making definitive impressions of edentulous arches with custom trays⁵. A precisely fabricated custom tray is essential for impression accuracy and implementation of chosen impression technique⁶. One of the most important factors is control of the cross-sectional thickness and the provision for a relatively uniform bulk of impression material.

Custom impression tray fabrication with the use of auto polymerizing acrylic resin with baseplate wax as spacer still remains commonly used for fabrication of custom tray.

However, heat of polymerization released during the exothermic setting reaction of auto polymerizing resin during tray fabrication frequently results in wax softening/ melting, causing dimensional distortion, tray contamination and discrepancy in predetermined thickness of wax spacer that may jeopardize the very objective of a spacer^{7,8}.

Providing an accurate, uniform thickness of the wax spacer is critical to the improved accuracy of an impression made in a custom tray. Control of the thickness of the wax spacer is not easy, and the resultant impression may not provide the accuracy desired. This article describes a simple technique that can be used to provide the predictable, required spacing using vacuum-formed resin sheets

Polyvinyl vacuum sheet can be used as a spacer material in fabrication of custom tray for complete dentures, which preserve spacer thickness during tray fabrication. No such technique has been documented

for custom tray fabrication with auto polymerizing polymethylmethacrylate resin (PMMA). This article describes a simple technique to prevent change of thickness of wax spacer during custom tray fabrication with auto polymerizing PMMA.

Materials and Methodology

This study was conducted at kamineni institute of dental sciences, Narketpally in 2019. This study group comprised of randomly selected 10 completely edentulous patients reported to the department of prosthodontics.

Inclusion Criteria

Completely edentulous patients without any ridge defects.

Exclusion Criteria

Compromised oral conditions, local lesions, resorbed or flabby ridges.

For each patient 2 sets of preliminary impressions of edentulous maxilla were made using impression compound and casts were poured with dental plaster. Two custom trays were fabricated using different spacer materials for each patient. Vacuum sheet of 1.5mm thickness as spacer for first cast, modeling wax sheet of 1.5mm thickness spacer for

second cast of the patient named as V and W respectively (Figure-1).

After the custom trays were fabricated and border molding done, spacer in each custom tray was peeled off and final impressions were made using light body impression material (Figure-2) and casts were poured using Beading and Boxing (Figure-3). Without retrieving the tray from the cast, handles of the custom tray were sectioned (Figure-4) and an index was poured on the polishing surface of the custom tray (Figure-5). Lines were drawn on the casts dividing it into 8 equal sections on vacuum and wax group casts of all the patients. And on each line drawn on the cast, 4 equidistant points were marked. The casts were then sectioned along these lines to obtain 8 sections naming them as A, B, C, D, E, F, G, H from left to right and the points were named as A1, A2, A3, A4, B1, B2, B3, B4... so on. Under stereomicroscope the thickness of the light body impression material was measured at these points marked on each section of all the casts. Mean of all the sections was taken as final reading for that cast. Data collected were tabulated and subjected to statistical analysis.



Figure1: Special tray fabricated with wax spacer (1.5mm) and polyvinyl vacuum sheet spacer (1.5mm).



Figure 2: Final impression made with custom tray fabricated with two different spacer materials



Figure 3: Beading and boxing was done to pour the cast



Figure 4: After cast pouring of final impressions, handle of special tray is sectioned and lines are drawn on the custom tray dividing it into 8 equal sections and 4 equidistant points were marked on each line.



Figure 5: Plaster index poured on the polished surface of the custom tray.

Results

After compilations of the data, appropriate statistics were applied. All the data were analyzed using the Statistical Package Of Social Sciences (SPSS).

Mann - Whitney Test: Non - parametric

equivalence of independent sample t test was used in the analysis of the present study. All the measurements obtained for both the groups were tabulated and statistically analyzed.

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
values Equal variances assumed	1.480	.239	.444	18	.662	.001100	.002478	-.004105	.006305
Equal variances not assumed			.444	14.315	.664	.001100	.002478	-.004203	.006403

Group Statistics

Type	N	Mean	Std. Deviation	Std. Error Mean
values vinyl	10	.02340	.006802	.002151
wax	10	.02230	.003889	.001230

The results of present study shows that the mean value of vinyl spacer is slightly grater compared to the wax spacer group. But the values are statistically not significant (p>0.05).

The aim of the present study was to compare the accuracy of final impressions in complete denture patients obtained using different spacer materials. The critical factor that influences the accuracy of final

Discussion

impression is the controlled wash bulk which may vary by using custom trays fabricated using wax spacer.

The heat of polymerization in auto-polymerizing PMMA ranges from 71°C to 91 °C varying with thickness. The spacer wax used in custom tray fabrication has a melting temperature of approximately 45°C⁹. Therefore, heat of polymerization leads to obvious distortion of wax, resulting in an inaccurate custom tray. whereas Vinyl vacuum sheets has a melting point in a range of 100°C - 260°C and acts as an insulating layer interfering with transmission of heat of polymerization from auto-polymerizing PMMA resin and withstand distortion.

The above results showed that when impressions obtained using custom trays with wax and vinyl sheet spacers were compared, the accuracy of impression using vinyl sheet spacer was slightly greater compared to the impression obtained using wax spacer. However, the values obtained are not statistically significant. Further investigation with greater sample size is needed to determine and confirm the accuracy of final impressions obtained using different spacer materials.

Conclusion

Fabrication of custom tray using poly vinyl sheet spacer is simple and effective technique to preserve and maintain the space for final impression material during custom tray fabrication with auto-polymerizing PMMA resin.

References

1. Infante L, Yilmaz B, McGlumphy E, Finger I. Fabricating complete dentures with CAD/CAM technology. *J Prosthet Dent.* 2014;111:351-5.
2. Mann K, Davids A, Range U, Richter G, Boening K, Reitemeier B. Experimental study on the use of spacer foils in two-step putty and wash impression

procedures using silicone impression materials. *J Prosthet Dent.* 2014.

3. Rajendra Prasad Bitragunta, Sashi Purna C R, Mallikarjun M. Systematic review of Complete denture impression techniques. *Indian J Dent Adv* 2011; 3(4): 673-680.
4. Bhupender Yadav, Manisha Jayna, and Reshu Madan. Comparison of Different Final Impression Techniques for Management of Resorbed Mandibular Ridge: A Case Report. *Case Rep Dent.* 2014.
5. Davis DM. Boucher' prosthodontic treatment for edentulous patient. 12th ed. Mosby: St. Louis; 2004. p.211-31.
6. Chung KH, Wadhvani C, Cagna DR. A simple technique to control the heat generated during light polymerization of custom impression trays. *J Prosthet Dent* 2014 ;111:79-80.
7. Baker PS, Frazier KB. Water immersion procedure for making light-cured custom trays with wax spacers. *J Prosthet Dent* 1999 ;82:714-5.
8. Leknius C, Henderson R. Simple technique for making custom impression trays. *J Prosthet Dent* 2000;84:371.
9. Arvind Tripathi, Saumyendra V. Singh, Himanshi Aggarwal, Ashutosh Gupta, Deeksha Arya. A technique to preserve spacer thickness during custom tray fabrication with autopolymerizing polymethylmethacrylate. *International Journal of Dentistry Research* 2017; 2(1): 1-2.