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RESEARCH ARTICLE

A STUDY EVALUATING THE EFFECT OF INVESTING MEDIUM ON THE TOOTH MOVEMENT DURING DENTURE PROCESSING A RESEARCH STUDY

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Abstract

The tooth movement occurs during denture processing. Understanding the tooth moving factors helps one to minimise the artificial tooth movements for harmonious occlusion.

Purpose: this study was conducted to evaluate the effect investing mediums on the tooth movement during denture processing.

Materials and methods: Thirty maxillary dentures made in heat cured acrylic resin were randomly grouped depending on the investing medium used- P-P-P group and P-S-P group. The transverse and anteroposterior distances were measured by digital calliper before and after denture processing. The magnitude of tooth movement was determined by difference between final and initial values.

Results: the tooth movement was significantly higher in plaster-stone-plaster group than that of plaster-plaster-plaster group. Anteroposterior tooth movement was significantly higher than transverse tooth movement in both the groups.

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Introduction:-

Proper denture fit is one of the requirements for the success of oral rehabilitation. Several factors that distort denture base and affect the tooth position decide the quality of the denture.

Acrylic resin remains the most commonly used material for denture base construction. . It has good physical, mechanical, and aesthetic properties, and it is easy to use with low-cost equipment.

The diverse number of processing variables influencing the quality of a complete denture is nature of investing medium, type of resin used, method of resin introduction, type of curing cycle and bench curing time. These factors cause distortion and alteration in tooth position. Tooth movement affects harmonious occlusion. Thus, harmonious occlusion requires remounting and selective grinding procedure In order to minimise the processing errors, several flasking methods, curing techniques and several materials have been studied.

Aims and Objectives:-

This study was conducted to evaluate the effect of investing medium on the tooth position during the processing of simulated complete maxillary dentures using different investing methods.

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Materials and Methods:-

The silicone mold was used to make thirty maxillary edentulous identical casts in stone. The 2mm thick record base was made of autopolymerising resin. An occlusal wax rim (height = 20 mm) was created in the buccal sulcus of the cast, and the height was reduced gradually to 10 mm in the second molar area.

Acrylic resin denture teeth arrangement was done on the cast. A wax-up was used to form the polished surfaces of the upper dentures. Replicate dentures were made using a silicone matrix. Two sprue holes were made in the resulting mold. After placing the artificial teeth and maxillary edentulous cast within the silicone matrix, the molten base plate wax is poured and allowed to cool prior to removal. The metallic reference points were placed on cingula of both lateral incisors and mesial triangular fossae of molars. The digital caliper (Mitutoyo Corporation, Kanagawa, Japan) was used to the transverse (interincisal and intermolar distances) and anteroposterior distances (right lateral incisor- molar distance, RIM and left incisor –molar distance LIM) at procuring and postcuring stages. The difference between the final and initial measurements indicates the amount of tooth movement.

The sample was categorised into two groups (n=15) depending on the investing medium used.

In plaster-plaster-plaster (P-P-P) group, the lower part of the flask was filled with the plaster. After applying the separating medium, middle part of the flask is filled with dental plaster upto incisal edges of anterior and cusp tips of the posterior teeth. The remaining part of the flask is also filled with plaster.

In plaster- stone- plaster (P-S-P) group, the same procedure is followed except the middle part is filled with dental stone.

The compression moulding technique was used to process the denture. The heat cured acrylic resin mixed in 3:1 polymer: monomer ratio was filled in the mold when it reached dough consistency. The flask was subjected to long polymerising cycle. Then, deflasking and decasting was carefully done after bench curing. The transverse and anteroposterior distances were measured again. The data collected was subjected to F-test and students paired t- test at significance level of 5%.

Results:-

The tooth movement occurred in all groups. The anteroposterior tooth movement is significantly greater than transverse tooth movement in all groups. The anteroposterior and transverse tooth movement in P-S-P group is significantly more than that occurred in P-P-P group.

Table No. 1:- Average tooth movement with standard deviation with respect to investing medium.

Investing medium	Transverse distance		Anteroposterior distance	
	Interincisor distance LI-LI	Intermolar distance M-M	Right lateral incisor-Molar distance RLI-RM	Left lateral incisor-Molar distance LLI-LM
P-P-P	0.0562± 0.0211	0.0274±0.1289	0.1139± 0.0121	0.1145 ± 0.0215
P-S-P	0.0713± 0.0317	0.0824 ± 0.0212	0.1479 ± 0.0114	0.1711 ± 0.0341

Discussion:-

This study showed that dental plaster used as investing medium results in smaller tooth displacement. It has been revealed by various studies that tooth movement occurs during and after processing denture. The understanding of the tooth moving factors may permit one to minimise occlusal adjustments while remounting and in patient's mouth.

Harder dental stone investing materials increase the difficulty of deflasking that induces stress within the resin which results in tooth movement upon decasting.

The setting expansion of investing medium results in tooth displacement. Disparity observed in the tooth movements of two investing mediums is attributed to difference in their setting expansion.

Conclusion:-

Within the limitations of this in vitro study results suggest that the investing method appears to be an important factor in efforts to control the magnitude of tooth movement.

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