International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 04-10-2019; Accepted: 05-11-2019
www.medicalsciencejournal.com
Volume 5; Issue 12; December 2019; Page No. 09-11

Assessment of efficacy of additional silicone and condensational silicone for the precision for duplicating master dies

Dr. Rohit Singh[1], Dr. Supriya Singh[2*], Dr. Kumar Anand[3], Dr. DK Singh[4], Aaysha Tabinda Nabi[5], Swapnil Singh[6]

[1] Senior Lecturer, Department of Prosthodontics, Patna Dental College and Hospital, Patna, Bihar, India
[2] Private Practitioner, Department of Oral Medicine and Radiology, Patna, Bihar, India
[3] Reader, Department of Oral Medicine and Radiology, Buddha Institute of Dental Sciences and Hospital Patna, Bihar, India
[4] Professor & HOD, Department of Prosthodontics, Patna Dental College and Hospital, Patna, Bihar, India
[5] Reader, Department of Periodontology, Buddha Institute of Dental Sciences and Hospital Patna, Bihar, India
[6] Post Graduate Student, Department of Periodontology, Buddha Institute of Dental Sciences and Hospital, Patna, Bihar, India

Abstract
Background: Accurate replication of tooth preparations and their arch positions require impression materials that exhibit good dimensional stability. The present study was conducted to assess additional silicone and condensational silicone for the precision for duplicating master dies.
Materials & Methods: The present study was conducted in the department of Prosthodontics. Two groups were made. In group I, addition silicone and in group II, condensation silicone was used. Two step impression techniques were used for both techniques and two master dies were made.
Results: In group I, addition silicone and in group II, condensation silicone was used. 15 impressions were obtained with both materials. A significant difference in values of margins was recoded in both groups ($P< 0.05$).
Conclusion: Authors found that additional silicone revealed better results as compared to condensation impression material.

Keywords: additional silicone, condensation, impression material

Introduction

Marginal adaptation of a cast restoration can influence its durability due to lower accumulation of plaques in margins, enhancing structural properties (stability, resistance, low thickness of cement, and etc.), and higher esthetics [1].

Accurate replication of tooth preparations and their arch positions require impression materials that exhibit good dimensional stability. Non-aqueous elastomeric impression materials, or elastomers, were developed as an alternative to natural rubber during World War II. There are currently four basic types of elastomeric impression materials in use in the dental profession: (1) polysulfi de, (2) condensation polymerizing silicone, (3) addition polymerizing silicone and (4) polyether. Several elastic impression material silicones are available for dental use: Synthetic elastomeric materials (polysulfide [PS], additional silicone [AS] and condensational silicone [CS], and polyether [PE]); and hydrocolloids. PE and silicones are accurate with high stability [2].

The polysulfides are good in surface detail reproduction but they are dimensionally unstable when stored for a longer period of time [3]. Polyvinyl siloxanes are highly accurate, have little dimensional change after setting. Accuracy of impressions with repeated pours is of interest clinically, because duplicate models are sometimes desired. The dimensions of a model from a second pour can be affected by continuing polymerization of impression material and/by distortion of the impression with removal of the first model [4]. The present study was conducted to assess additional silicone and condensational silicone for the precision for duplicating master dies.

Materials & Methods

The present study was conducted in the department of Prosthodontics. The study was approved from institutional ethical committee. We prepared an acrylic model of lower 1st molar tooth. We prepared some grooves on mesial, distal, lingual, and buccal surfaces of the model.

Two groups were made. In group I, addition silicone and in group II, condensation silicone was used. Two step impression techniques were used for both techniques and two master dies were made. A total of 30 successive impressions were then made, 15 for each of the two impression material. Dies were fabricated. These dies were assumed as the test duplicate dies. The marginal discrepancy was recorded in both the study groups. Results were tabulated. P value < 0.05 was considered significant.

Results

Table 1: Distribution of groups

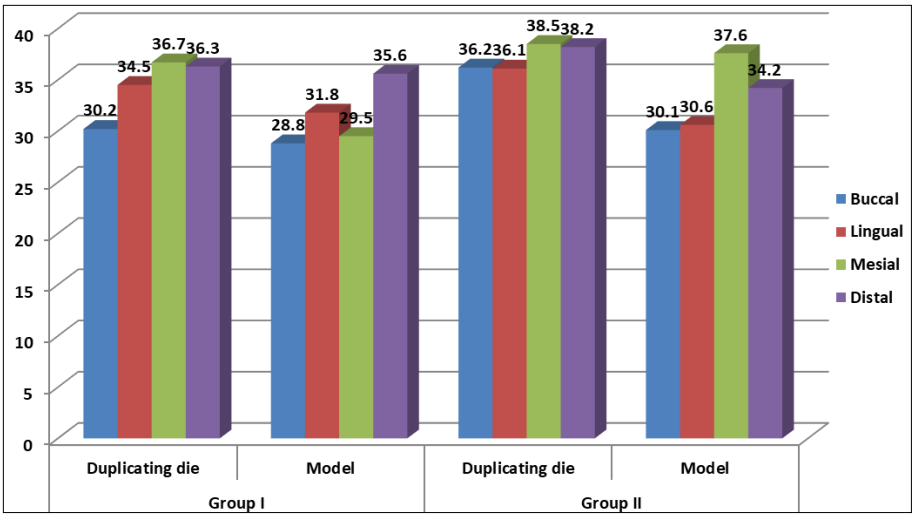
Groups	Group I	Group II
Materials	Addition silicone	Condensation silicone
Impression	15	15

Table I shows that in group I, addition silicone and in group II, condensation silicone was used. 15 impressions were obtained with both materials.

Table 2: Various margins prepared by different impression materials

Surface	Group I		Group II		P value
	Duplicating die	Model	Duplicating die	Model	
Buccal	30.2	28.8	36.2	30.1	0.02
Lingual	34.5	31.8	36.1	30.6	
Mesial	36.7	29.5	38.5	37.6	0.01
Distal	36.3	35.6	38.2	34.2	
P value	0.04		0.001		0.01

Table II, graph I shows significant difference in values of margins recoded in both groups (P< 0.05).



Graph 1: Margins prepared by different impression materials

Discussion

Polysuphides are widely used impression materials. Disadvantages of the polysulfides include the need to use custom-made rather than stock trays due to a greater chance of distortion, a bad odor, a tendency to run down the patient's throat due to lower viscosity and the lead dioxide materials that stain clothing [5]. The polyether being hydrophilic absorbs water or fluids. It is a rigid material with high modulus of elasticity which makes it extremely difficult to remove from undercut areas. High cost, short working and setting time and high stiffness after setting limit their use [6].

The addition silicones have overcome the disadvantage of polymerization shrinkage over the condensation silicone as there is no by-product release, condensation silicone has high polymerization shrinkage because of the release of alcohol by-product [7]. Loss of the by-product leads to measurable weight loss accompanied by shrinkage of the impression material on storage8. However, these days, a wide range of condensation silicones are marketed with claims of equally good results as addition silicones. In addition, various brands of condensation silicones available in the market are economically feasible in comparison to addition silicones [8]. The present study was conducted to assess additional silicone and condensational silicone for the precision for duplicating master dies.

In present study, in group I, addition silicone and in group II, condensation silicone was used. 15 impressions were obtained with both materials.

Johnson *et al*. [9] conducted a study in which two master dies were made by both impression materials. A total of 20 successive impressions were then made, ten for each of the two impression material. The marginal discrepancy was recorded in both the study groups. Significant results were obtained while comparing the mean discrepancy in between duplicated die and model in the condensation silicon group.

We found that there was significant difference in values of margins recoded in both groups (P< 0.05). Chen SY *et al*. [10]. evaluated the effects of (1) various impression materials, (2) different storage times and (3) the proportion of inorganic filler on the accuracy and stability of elastometric impression materials. The impression materials studied included three alginate impression materials (Algiace Z, CAVEX and Jeltrate), five commercial silicone impression materials (Aquasil, Exaflex regular type, Express, Coltex fine and Rapid liner) and two experimental silicone impression materials designed for this study (KE106A and KE106B). Impressions were made of 10 metal dies that mimicked prepared crowns. After an impression was taken, dental stone was immediately poured into the alginate impressions, while the silicone impressions was poured 30 min later and waited for 1 h for setting. The results showed that: (1) there was a significant interaction effect between materials and storage times on the accuracy of the impressions. (2) Two addition type silicone materials, Aquasil and Exaflex, had the greatest accuracy and stability. (3) The experimental material KE106A had the least accuracy in the first and second rounds and the alginate impression material CAVEX had the least accuracy in the third round. (4) The stabilities of CAVEX and Jeltrate were the least consistent of the 10 materials and decreased significantly with storage time.

Conclusion

Authors found that additional silicone revealed better results as compared to condensation impression material.

References

1. Ciesco JN, Malone WF, Sandrik JL, Mazur B. Comparison of elastomeric impression materials used in fi xed prosthodontics. J Prosthet Dent. 1981; 45:89-94.
2. O'Brien WJ. Dental Materials and their selection. 3rd ed. IL: Quintessence Publishing Co, Inc, 2002, p 90-112. 3. Council on Dental materials, Instruments and Equipment: Vinyl Polysiloxane impression material: A status report. J Am Dent Assoc. 1990; 120:595-6. 598,600.
3. Craig RG, Urquiola NJ, Liu CC. Comparison of commercial elastomeric impression materials. Oper Dent. 1990; 15(3):94-104.
4. McCabe JF, Storer R. Elastomeric impression materials. The measurement of some properties relevant to clinical practice. Br Dent J. 1980; 149(3):73-9.
5. Anusavice KJ. Phillips science of dental materials. 11th ed. 1st Indian reprint. Saunders Co, 2003, p. 224.
6. Tjan AH, Whang SB, Tjan AH, Sarkissian R. Clinically oriented evaluation of the accuracy of commonly used impression material. J Prosthet Dent. 1986; 56:4-8.
7. Thongthammachat S, Moore BK, Barco MT 2nd, Hovijitra S, Brown DT, Andres CJ. *et al*. Dimensional accuracy of dental casts: Influence of tray material, impression material and time. J Prosthodont. 2002; 11:98-108.
8. Ratnaweera PM, Yoshida K, Miura H, Kohta A, Tsuchihira K. A clinical evaluation of the agar alginate combined impression: dimensional accuracy of dies by new master crown technique. J Med Dent Sci. 2003; 50(3):231-8.
9. Johnson GH, Chellis KD, Gordon GE, Lepe X. Dimensional stability and detail reproduction of irreversible hydrocolloid and elastomeric impressions disinfected by immersion. J Prosthet Dent. 1998; 79(4):446-53.
10. Chen SY, Liang WM, Chen FN. Factors affecting the accuracy of elastometric impression materials. J Dent. 2004; 32(8):603-9.