

ORIGINAL RESEARCH

Comparative evaluation of Accuracy of Two Different Impression Materials in Making Duplicate Dies

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ABSTRACT

Background: The present study was conducted for Comparing the Accuracy of Two Different Impression Materials in Making Duplicate Dies. **Material and methods:** The study used two impression materials: Panasil and Speedex. Making duplicate dies. The institutional ethical committee provided prior approval. This study used a step-by-step impression procedure, followed by the pouring of dental stone. Stone casts were removed from the imprint and preserved until final setting. Ten impressions were made, five for each impression substance. Die fabrication was completed. The marginal discrepancy was measured on the mesial, distal, buccal, and lingual sides using the specified technique. **Results:** Two groups were formed. The first group comprised of panasil impression material (Group I) while the 2nd group comprised of speedex impression material (Group II). A significant difference was observed on buccal side in the two groups whereas on lingual side in group I. Substantial variation was also observed on mesial side in group I whereas on distal side in group II.

Conclusions: Panasil outperformed Speedex for die duplication accuracy.

Keywords: dies, impression, panasil, speedex, models

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INTRODUCTION

Achieving optimum function and esthetic of restorations is very important, especially in replacing a missing tooth. Furthermore, temporary restorations are essential for preservation of the tooth structure in the meantime of preparing cast models.^{1,2} 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.

There are several factors which can affect the accuracy of definitive impression like: Quality of preparation (undercuts and tapering), impression technique, soft tissue management, and quality of wax pattern and casting.³⁻⁷

The wettability of the impression material determines its ability to record fine details, which depends on its viscosity. The more the impression material wets the tissues, the more it will come in close contact with

them and capture fine details. The more viscous materials will have limited flow and very few wetting features.⁸ In fixed dental prostheses, an impression is expected to reproduce 20 to 70 microns and 100 to 150 microns in removable prosthodontics.

According to international standards, the impression material should record a line of 0.02 mm width or less, which is less than the width of a human hair.⁹ Hence, this study was conducted for Comparing the Accuracy of Three Different Impression Materials in Making Duplicate Dies.

MATERIAL AND METHODS

The study used two impression materials: Panasil and Speedex. Making duplicate dies. The institutional ethical committee provided prior approval. This study used a step-by-step impression procedure, followed by the pouring of dental stone. Stone casts were removed from the imprint and preserved until final setting. Ten impressions were made, five for each impression

substance. Die fabrication was completed. The marginal discrepancy was measured on the mesial, distal, buccal, and lingual sides using the specified technique. Results were collated and statistically analyzed. P-values less than 0.05 were considered significant.

RESULTS

Two groups were formed. The first group comprised of panasil impression material while the 2nd group comprised of speedex impression material.

Table 1: Mean discrepancies in between duplicated die and model in both groups on buccal and lingual side

Groups	Buccal side	P-value	Lingual side	P-value
Group I				
Duplicated die	36.53	0.02	37.55	0.43
Model	32.11		33.84	
Group II				
Duplicated die	38.69	0.03	36.23	0.01
Model	32.11		31.26	

There was observed a significant difference on buccal side in the two groups whereas on lingual side in group I. There was also substantial variation observed on mesial side in group I whereas on distal side in group II.

DISCUSSION

Majority of impression materials when handled appropriately are primed of yielding clinically satisfactory impressions.^{10,11} One considerate aspect that has not yet been researched in detail is the proper selection of the impression trays for implant impressions for completely edentulous situations.¹²⁻¹⁷ The accuracy of the resultant impressions, however, is contingent to the combination of the impression material and tray used. Moreover, the deformed trays may lead to distortion of impressions, which seems to be acceptable on visual examination and is found deficient only during insertion of the respective prosthesis.¹⁸

Although a number of impression materials are manufactured with a variety of different consistencies, comprehensive evaluation is necessary to document the rigidity and accuracy of these materials, particularly those employed for direct implant impression technique. Apart from good dimensional stability, the ideal impression material should meet other criteria, such as appropriate setting time, flow properties, mechanical strength, accuracy, compatibility with cast materials, safety, ease of manipulation, low cost, and disinfectability. Depending on the application, materials with optimal properties are selected. The analysis of the properties of a dental impression material cannot be limited to the properties of the material itself, in its native form, but must also take into account the impact of time, as well as storage and disinfection conditions, on the material characteristics.¹⁹

Morgano SM et al²⁰ evaluated the ability of five different impression techniques to make duplicate dies of two different types of tooth preparation. One mandibular second premolar Ivorine tooth was prepared for a complete crown and one for an onlay. A master impression was made of each tooth preparation with the use of five impression techniques for a total of 10 master impressions, and a master die was made from each of these impressions. Castings were made

on these master dies, and the fit of each casting was verified on the respective Ivorine tooth. Marginal openings of the castings on the master dies were recorded under magnification at four predetermined points. Five successive impressions, with the use of each impression material, were then made of each tooth preparation for a total of 50 test impressions, and 50 test dies were made from these impressions. The fit of the respective casting was evaluated under magnification for each test die at the four predetermined points, and marginal openings were recorded. Differences between the marginal discrepancies of the casting on the master die and on the test die were tabulated and the results were statistically analyzed. Results indicated that none of the impression materials was capable of producing exact replicas. Polysulfide rubber performed significantly better than two materials for the production of duplicate dies with the complete crown preparation; and polyvinyl siloxane used with a putty-light body, single-stage technique produced mean marginal discrepancies that were significantly greater than the other four techniques when used for the onlay preparation. Qadiri SY et al²¹ evaluated the efficacy of different impression materials in making duplicating dies. The present study comprised of two impression materials placed in group I (Panasil) and group II (speedex) used for making duplicating dies. 10 successive impressions were then made, 5 for each of the impression material. Fabrication of the dies was done. The marginal discrepancy was recorded with the use of the described measuring technique in mesial, distal, buccal and lingual side. There was significant difference on buccal side in both groups while on lingual side in group I ($P < 0.05$). There was significant difference on mesial side in group I while on distal side in group II ($P < 0.05$). Panasil proved to be better in terms of accuracy in making duplicating dies as compared to speedex.²¹

CONCLUSION

From the above results, the authors concluded that Panasil outperformed Speedex for die duplication accuracy.

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