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Retentive forces of two mandibular base plates fabricated from compound and silicone: Study

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Abstract

Success of complete dentures largely depends on accuracy of impression. In fabrication of mandibular complete denture, border molding of an individual tray is an essential step in impression making. It can also trace the future denture's periphery by molding the peripheral of the individual tray and by asking the patient to make functional trimming exercises. The individual tray obtained from a preliminary impression are border molded with modeling compound, and final impression is completed with easily flowable impression material such as zincoxide eugenol paste. By using this border molding and peripheral tracing impression technique, resultant mandibular complete denture favors good retention and stability even in resorbed alveolar ridge. Most prosthodontists accepted this method as a standardized method for complete denture construction. But it is time consuming and often difficult for beginners to master as it require skill and experience. In this study, high viscosity silicone (putty) and light body silicone have been introduced as a new border molding material. It was found that the retention of two base plates resulted from impression making with these two border molding materials were not statistically significant (mean 367 gf for compound and 368 gf for silicone). Silicone impression material has an excellent elasticity and acceptable working time in the mouth during functional trimming. It also has good dimensional stability, acceptable taste and ease of manipulation for every dentist.

Keywords: Retentive forces, mandibular base plates and compound and silicone

1. Introduction

Success of complete dentures largely depends on accuracy of impression (Hayakawa, 2003) [3]. Making accurate final impression for complete dentures is a multistage process that involves a preliminary impression, a final specialized or individualized final impression tray and a final border impression (Heartwell, 1986 and Zarb, 1990). In fabrication of mandibular complete denture, peripheral tracing with tracing compound of an individual tray is an essential step in impression making (Levin, 1984 and Zarb *et al.*, 1997) [4, 11]. Most prosthodontists accepted this method as a standardized method for complete denture construction. But it is time consuming and often difficult for beginners to master as it requires skill and experience (Hayakawa, 2003) [3]. Silicone impression material has excellent elasticity, acceptable working time, good dimensional stability, acceptable taste and ease of manipulation for every dentist. The purpose of this study was to compare the retentive forces of two mandibular base plates thus fabricated from two peripheral tracing impression materials, compound and silicone.

Material and Methods

The primary impression was made with impression compound (Hiflex Impression Compound) then constructed the acrylic close-fitting special tray and molded along the periphery with tracing compound for standard technique and heavy-bodied silicone (Speedax, coltene, whaledent) for research technique. Final impression was made with zincoxide eugenol (Synident Zincogenol) for compound tracing and light bodied silicone for silicone tracing. The two base plates were constructed for each technique in a patient. Retentive forces of these two base plates were measured in the patient's mouth by using push- pull gauge. Statistical comparison of test results was performed by using t-test.

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Fig 1, 2: Peripheral Tracing with tracing compound

Retention values of two base plates fabricated from the casts obtained from two impression materials, (mean 367 gf for compound, standard technique and 368 gf for silicone) were not significant.

Figure 1. Comparison of retentive forces of two base plates which obtained from different materials



Fig 3: Peripheral Tracing with silicon

T-test

Group statistics

Material used	N	MEAN	Std. Deviation	Std. Error mean
Compound	10	367.000	45.71652	14.45683
Silicone	10	368.000	56.72546	17.93817

Independent Sample Test

Discussion

Border molding impression trays by modeling plastic has been used since 1907 (Sanjeev, 2012) [7]. Around 1950, border molding with tracing compound was accepted as standardized technique by most prosthodontists (Craddock, 1951) [2]. Various surveys showed modeling plastic impression compound and zinc oxide eugenol impression paste is most popular material used for complete denture impression. But there is distinct trend for increasing use of polyvinyl siloxane and polyether for border molding procedures and impression of edentulous arches. In literature, various author reported the use of elastomer for border molding and final impression. Woelfel *et al.*, (1963) [10] reported that it required an average of 17 placements to obtained a maxillary final impression using modeling compound as the border molding material. It became the major drawback of this technique. Smith *et al.*, (1979) [8] described a technique using a polyether impression material for border molding the final impression trays. The major advantages of this technique were that the border molding could be accomplished in one-step and the patient's functional movements were utilized to form the borders. Tan *et al.*, (1996) [9] concluded that polyether impression material required less time to complete the border molding process, border recorded were longer and less operator variability when compared with modeling compound. Lu *et al.*, (2004) [5] and Appelbaum *et al.*, (1984) [11] concluded that polyvinyl siloxane putty and light body impression material are well suited for making complete denture impression. Good results are obtained with less expenditure of time as well as less discomfort and inconvenience for the patient, especially in the hands of an inexperienced operator. Using silicone as a peripheral tracing impression material was first introduced by Smith (1979) [8]. It has the advantages of simultaneous molding of all borders with one insertion of the tray, easy technique,

patient's comfort and good dimensional stability (Rizk, 2008) [6]. Additional superior advantages to the standardized compound tracing technique were uniform consistency and accurate reproduction of undercut areas. This study compared the retention of two denture base plates obtained from tracing compound with zinc oxide eugenol and silicone putty with light body wash. It was found that both retentions were satisfactory and no statistically significant difference between two materials. Because of its advantages, silicone are definitely going to replace the traditional impression materials.

Conclusion

Silicone may applicable as peripheral tracing impression material in complete denture construction alternative to the standardized technique with tracing compound.

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