## **ORIGINAL ARTICLE**

### COMPARATIVE ANALYSIS OF TWO BORDER MOLDING TECHNIQUES AND MATERIALS ON MAXILLARY COMPLETE DENTURE RETENTION- AN IN-VIVO STUDY

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#### **ABSTRACT:**

**Background** - Without question, the conventional border molding procedures using modelling compound have served the dental profession well and will continue to serve the profession for many years, but has many limitations. Therefore, it is important that the profession continuously strives to develop new procedures aimed at improving accuracy, convenience, and patient acceptance. **Purpose** - This study was performed on 20 healthy edentulous subjects to compare the retention of complete dentures made by using two different border molding materials and border molding techniques i.e. green stick with incremental technique and heavy bodied polyvinylsiloxane with simultaneous technique. Material and method- In this study, retentive values were evaluated for sectional border molding using modelling compound (Group A) and single step border molding using heavy bodied polyvinylsiloxane (Group B) after fabricating trail denture bases using a specially designed retention apparatus and a digital force gauge.

**Reults** - There was a statistically significant difference in retention between the two materials. Heavy body polyvinylsilloxane showed the higher mean value. However, on clinical evaluation the retention received by both the denture bases was acceptable. **Summary and conclusion** - Within the limitation of this clinical study border molding with heavy bodied polyvinyl siloxane using simultaneous technique provided better retention as compared to border molding with modelling compound using incremental technique. **Keywords**- border molding, green stick, polyvinylsiloxane, impression, retention.

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#### INTRODUCTION

The fabrication of conventional complete denture is an indirect prosthetic process. Early in the treatment sequence, an analogue of oral conditions must be developed to proceed with denture construction. The degree to which the analogue accurately represents a detailed simulation of oral conditions, both anatomically and mechanically, determines in larger part quality of therapeutic outcome. One important aspect of this oral simulation involves making impressions of the denture bearing and peripheral structures.<sup>1</sup>

Border molding an important procedure in complete denture construction since it promotes the development of border seal which is necessary for the maintenance of contact of the denture border with the adjacent vestibular tissues during rest as well as in functional activity and providing retention.<sup>2</sup>

Impression modeling plastic has been used for border molding impression trays since 1907 but it has certain limitations. Recently, as an alternative to the conventional method where borders were molded with modelling compound, polyvinyl siloxane putty is recommended in view of its ideal physical properties, simplicity, accuracy and convenience to the patient and clinician.<sup>3</sup>

The raised purpose of this study was to compare the retention of complete dentures made by using different border molding materials and border molding techniques. Where green stick compound with incremental technique and putty rubber base with simultaneous molding were used.

#### MATERIAL AND METHOD

Study was conducted on 20 healthy edentulous subjects with well-formed alveolar ridges including proper height and thickness, no severe Gupta R et al. Two Border Molding Techniques and Materials on Maxillary Complete Denture Retention.

undercuts or bony exostosis and no signs of inflammation, ulceration, or hyperplasia.

#### Making edentulous impressions

Primary impression of maxillary edentulous ridge was made with impression compound using edentulous non-perforated stock tray and the cast was poured in Dental Stone (Type III). After retrieval of the primary cast two custom trays (1 and 2) were fabricated in auto-polymerizing acrylic resin by dough method and reduced 2 mm short of the reflections for muscle trimming.

# Border molding with low fusing impression compound and fabrication of master casts

The sectional/incremental method was used for border molding with low fusing compound (green stick) using custom tray 1. Final impression was made using Zinc oxide eugenol paste.Complete maxillary impression was poured in dental stone (Type III).

#### Border molding with heavy bodied addition silicone (putty) impression material and fabrication of master casts

The single-stage/simultaneous border molding was done with heavy bodied addition silicone (putty) using custom tray 2.Final impression was made using light bodied polyvinyl silloxane. The completed maxillary impression was poured in dental stone (Type III).

#### Fabrication of trail denture bases

Trail bases were constructed using autopolymerizedpolymethylmethacrylate. A 19 gauge wire loop was placed on denture base in the centre of the vault and secured in position with the help of autopolymerising acrylic resin material.

#### **Measurement of retention**

A specially designed apparatus consisting of a metallic stand and a digital force gauge was used to measure retention values. The patient was seated upright in front of the testing device in a comfortable position. The chin of the patient was placed quite firmly in the chin rest. The test denture base attached to nylon thread was rinsed thoroughly with water prior to insertion in the patient's mouth to minimize the variable factors of retention which could be influenced by a change of salivary content and firmly seated on the foundation. Force gauge attached to other end of the nylon thread was slowly pulled down in vertical direction until the denture base was dislodged and peak value was recorded (in grams) for both denture bases.<sup>34</sup>





Figure 1: Retention measuring apparatus with Force gauge

#### RESULTS

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The results of this study are shown in table I and fig.2.Data was presented as means and standard deviation (SD) values. The significance level was set at  $P \le 0.05$ . Statistical analysis was performed using Two-Tailed independent T test. The mean force required to dislodge the upper trial dentures bases was 1497.9gms for green stick compound and metallic oxide wash and 1946.317 gms for putty and light body rubber base wash. There was a statistically significant difference in retention between the two materials. Putty and light body rubber base showed the higher mean value. However, on clinical evaluation the retention received by both the denture bases was acceptable.

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**Table I:** The means (gm), standard deviation values and results of Two-tailed independent T test for the comparison between the two impression materials

Green stick com	pound and Zinc	Putty	and	light	bodied	
oxide eugenol paste (Group A)		polyvinylsiloxane (Group B)			p- value	
Mean	SD	Mean		SD		
1497.9	±478.0279	1946.317		±526.453	39	0.0076



**Figure 2:** Denture retention obtained from green stick compound and metallic oxide (group A) and Putty and light body polyvinylsiloxane (group B)

#### DISCUSSION

Without question, the standard edentulous impression procedures have served the dental more profession well and will continue to serve the profession for many years. However, it is important that the profession continuously strives to develop new procedures aimed at improving accuracy, convenience, and patient acceptance. The area of impressions in complete-denture prosthodontics is no exception.

Border molding and impression making techniques are numerous. The original material used for this purpose was modeling compound. Modeling compound is still effectively used today for this purpose by many dentists, but has many limitations compared to the simultaneously molding all borders. Materials like light polymerized resin, cold cure resin, perio pack, tissue conditioner and elastomers were reported to be used for single step border molding. But elastomeric impression materials are most commonly used substitute for low fusing compound. The introduction of elastomeric impression materials has made possible new techniques of recording impression for complete denture construction.<sup>3</sup>

This approach has several advantages like simplicity, ease of manipulation, decreased discomfort to the patient, short chair time and accurate reproduction of undercut areas, acceptable tear strength and sufficient elasticity. Itmore appropriate materials to be used for the older patient and for the patient with undercuts, notably dry mouth or impaired cough. Thus it is clear that the recent advances in impression materials has resulted in simplified approaches to impression making in removable prosthodontics.<sup>5, 6</sup>

#### CONCLUSION

This in-vivo study was conducted to compare the retention of denture bases obtained by two different border molding materials i.e. low fusing impression compound and heavy bodied polyvinylsiloxane and two different border molding techniques i.e. Incremental and simultaneous border molding using a specially designed retention measuring apparatus.

Within the limitations of the study following conclusions were drawn:

- 1. There was statistical significant increase in the retention of denture bases obtained by using heavy bodied polyvinylsiloxane and simultaneous border molding technique as compared to conventional technique, using low fusing impression compound and sectional border molding.
- 2. In view of limitations of using low fusing compound for border molding like short manipulation time, questionable uniformity in consistency, tedious manipulation, heavy bodied polyvinylsiloxane was a better material.

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