

## Original Article

### Comparative Evaluation of Dentures Fabricated Using Different Impression Materials for Border Molding

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#### ABSTRACT:

**Background:** In complete denture prosthodontics, the final impression stage plays a pivotal role in the success of a complete denture. prosthodontics. There are various factors associated with the retention of complete dentures, which may be broadly grouped as biological, physical and mechanical. These factors of retention can be achieved by means of an accurate border molding followed by an accurate final impression. **Aim of the study:** To compare dentures fabricated using different impression materials for border molding. **Materials and methods:** The present study was conducted in the Department of Prosthodontics of the Dental institution. For the study, selection of 25 healthy edentulous patients was done from the patients reporting to OPD clinic. It was made sure that alveolar ridge of the patients was well formed with satisfactory height and thickness. Patients having severe undercuts or bony exostoses and signs of inflammation, ulceration or hyperplasia were excluded from the study. Two acrylic resin custom trays were fabricated on the primary cast using autopolymerising acrylic resin and were labelled Tray 1 and Tray 2. The custom trays were reduced by 2 mm on all the edges to record muscle movements. **Results:** Two trial denture bases were constructed for each patient using two different border moulding techniques, green stick compound with zinc oxide eugenol and putty with polyvinylsiloxane. The mean retention force for Green Stick compound and Zinc oxide eugenol paste was  $1622.44 \pm 395.28$  gm and for Putty and Light bodied polyvinylsiloxane was  $1904.48 \pm 511.22$  gm. **Conclusion:** Within the limitations of the study we conclude that the dentures fabricated using simultaneous border moulding technique with heavy bodied polyvinyl siloxane has better retention force as compared to dentures fabricated using incremental border moulding technique with green stick compound.

**Keywords:** Border molding, complete denture, retention, prosthodontics.

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#### INTRODUCTION:

In complete denture prosthodontics, the final impression stage plays a pivotal role in the success of a complete denture. The final impression procedure for a complete denture entails capturing the vestibule through border molding procedure and then making an impression of the edentulous arch.<sup>1,2</sup> Border molding a custom tray to adapt it closely to the tissues of the vestibule before making the final impression is a time-honored procedure in complete denture prosthodontics. There are various factors associated with the retention of complete dentures, which may be broadly grouped as biological, physical and mechanical. These factors of retention can be achieved by means of an accurate border molding followed by an accurate final

impression.<sup>3,4</sup> Border molding is the shaping of the border areas of an impression tray by functional or manual manipulation of the tissue adjacent to the borders to duplicate the contour and size of the vestibule. Terminating the denture borders on soft resilient tissue will allow the mucosa to move with the denture base during functional and thereby maintain peripheral seal. The method of obtaining such peripheral seal is border molding by which the shape of the border of the tray is made to conform accurately to the contour of buccal and labial vestibules. This essential requirement of the tray's fit ensures an optimal peripheral seal. The goal is to provide a denture flange that correctly supports, but does not distort the tissues while also creating a border sealing contact with the boundary tissues without

impingement. Horizontal forces and lateral torquing of the maxillary denture can be resisted only by adequate border seal.<sup>5, 6</sup>Hence, we planned the study to compare dentures fabricated using different impression materials for border molding.

**MATERIALS AND METHODS:**

The present study was conducted in the Department of Prosthodontics of the Dental institution. For the study, selection of 25 healthy edentulous patients was done from the patients reporting to OPD clinic. It was made sure that alveolar ridge of the patients was well formed with satisfactory height and thickness. Patients having severe undercuts or bony exostoses and signs of inflammation, ulceration or hyperplasia were excluded from the study. For making primary impressions of maxillary ridge, impression compound was used with non-perforated stock tray. The Dental Stone (type III) was used for pouring cast. Two acrylic resin custom trays were fabricated on the primary cast using autopolymerising acrylic resin and were labelled Tray 1 and Tray 2. The custom trays were reduced by 2 mm on all the edges to record muscle movements.

**Border moulding with low fusing compound (green stick):**

The tray 1 was used for border moulding with green stick compound using sectional method. Zinc oxide eugenol paste was used for final impression. The master cast was poured using Dental stone (Type III).

**Border moulding with heavy bodied addition silicone (putty):**

The tray 2 was used for border moulding using single stage border moulding with heavy bodied addition silicone. Light bodied polyvinyl siloxane was used for final impression. The master cast was poured using Dental Stone (Type III).

**Construction of trial base dentures:**

The trial bases were constructed on the master cast using autopolymerising acrylic resin. A stainless steel wire no. 19 was used to make a loop and was stabilised in the centre of maxillary trial denture. This loop was fabricated for the measurement of retention of denture base using a specialised apparatus with digital force guaze and a metallic loop which can be engaged into the loop of denture base. The force required to displace the denture base was measured using digital force guaze for each patient. This force was called as Retention force. For measurements of retention forces, patient was advised to sit upright and the denture after thoroughly cleaning with running water was placed in the oral cavity of patient. The retention force was measured as explained above for each patient.

The statistical analysis of the data was done using SPSS version 20.0 for windows. The Student’s t-test and Chi-square test were used to check the significance of the data. The p-value less than 0.05 was predetermined as statistically significant.

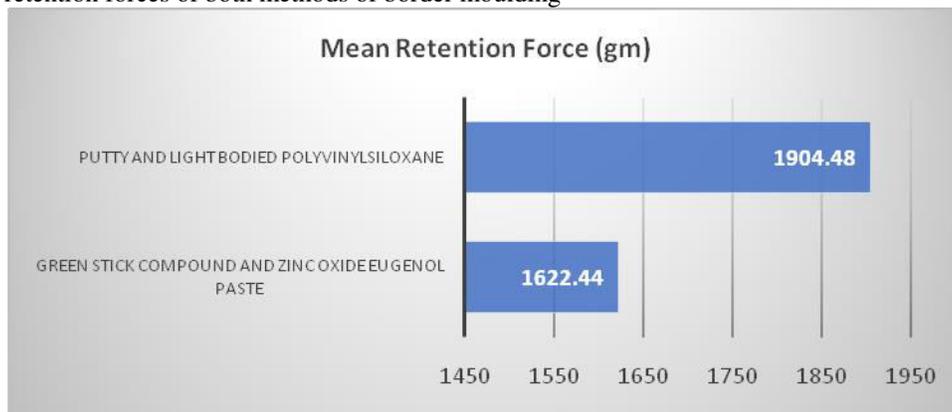
**RESULTS:**

In the present study, a total of 25 patients were included. Two trial denture bases were constructed for each patient using two different border moulding techniques, green stick compound with zinc oxide eugenol and putty with polyvinylsiloxane. Table 1 shows the comparative analysis of mean retention forces of both methods of border mouldings. The mean retention force for Green Stick compound and Zinc oxide eugenol paste was 1622.44±395.28 gm and for Putty and Light bodied polyvinylsiloxane was 1904.48 ± 511.22 gm. The retention force of the trial denture base constructed using Putty and Light bodied polyvinylsiloxane was higher as compared to trial denture base constructed using Green Stick compound and Zinc oxide eugenol paste. The result was statistically significant (p<0.05) [Fig 1].

**Table 1:** Mean retention forces of both methods of border moulding

Method of border moulding	Mean Retention Force (gm)	P-value
Green Stick compound and Zinc oxide eugenol paste	1622.44 ± 395.28	0.001
Putty and Light bodied polyvinylsiloxane	1904.48 ± 511.22	

**Figure 1:** Mean retention forces of both methods of border moulding



## DISCUSSION:

In the present study, we compared retention of dentures achieved by border molding with different techniques and materials. A total of 25 patients were involved in the research. We observed that the retention of dentures fabricated using simultaneous border moulding technique with heavy bodied polyvinyl siloxane was better as compared to dentures fabricated using incremental border moulding technique with green stick compound and zinc oxide eugenol. The results were significant with similar studies conducted by authors. Kaur S et al determined the effect of border molding on the retention of the maxillary denture base. Two special trays, one with full extensions to the periphery and one 2 mm short from the borders were made on the cast obtained from the preliminary impression. Border molding was done on the tray which was short from borders. On both trays, the final impression was made with zinc oxide eugenol impression paste. Heat cure denture bases were fabricated on the prepared casts and retention was measured using specially designed instrument. Mean force with border molding (2765.0 g) was larger than mean force without border molding (1805.0 g) at  $P < 0.01$  level. In terms of percentage, too, the mean improvement (59.4%) in force of dislodgement was statistically highly significant. The results of this study suggested that the dentures made with border molding will provide better retentive force than the dentures made without border molding. Chandu G et al evaluated retention of complete denture base with different types of posterior palatal seals. Ten male patients between the age group of 50 years to 60 years were selected for the study. After the primary and secondary impressions were taken, five casts were made including a cast without posterior palatal seal, a cast with single bead posterior palatal seal, a cast with double bead posterior palatal seal, a cast with butterfly shaped posterior palatal seal, and a cast with posterior palatal seal with low fusing compound by functional method. It was observed that retention increased up to 108% in the posterior palatal seal with low fusing compound with functional method and the posterior palatal seal that was obtained by using functional method provided greater retention than a denture base without posterior palatal seal. It was concluded that the incorporation of a posterior palatal seal is important for obtaining optimum retention of the maxillary complete denture.<sup>7,8</sup>

Arora AK et al analyzed the effect of different materials and techniques in current use on peripheral shaping of complete denture impression. The present study was conducted to compare and evaluate the maxillary border morphology produced using tissue conditioner as control and low fusing impression compound, Polyether, Pattern resin and periphery wax as border molding materials. The study was carried out on 15 denture wearer patients with well formed, rounded edentulous maxillary arch with adequate width and height. On each patient, border moldings were done, with tissue conditioner which was loaded on the borders of previous maxillary denture of the patient (control group),

low fusing impression compound (Group 1), polyether (Group 2), Pattern resin (Group 3) and Peripheral wax (Group 4), respectively on special tray made for the patient. Sulcus width height and area was then measured for each group using stereomicroscope. Based on the study it is concluded that the polyether was the best material for border molding which will give most accurate borders to a denture. Yarapatneni R et al compared the retention between sectional border molding using low fusing greenstick compound and single step border molding using condensation silicone (putty) impression material in three stages- A. Immediately following border molding, B. After final impression and C. With the finished permanent denture base. In this study evaluation of retentive values of sectional border molding (Group I) (custom impression trays border molded with green stick compound) and single step border molding (Group II) (border molding with condensation silicone (putty) impression material). In both techniques definitive wash impression were made with light body condensation silicone and permanent denture base with heat cure polymerization resin. Group II was significantly higher than Group I in test-A. Group I was significantly higher than Group II in test -B. The t-value infers that there was significant difference between Group I and Group II. Group II was higher than Group I in test -C. It was concluded that border molding custom tray with low fusing green stick compound provided similar retention as compared to custom impression tray with condensation silicone in permanent denture base.<sup>9,10</sup>

## CONCLUSION:

Within the limitations of the study we conclude that the dentures fabricated using simultaneous border moulding technique with heavy bodied polyvinyl siloxane has better retention force as compared to dentures fabricated using incremental border moulding technique with green stick compound.

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