Original Article

Comparative evaluation of reproducibility of peripheral tissues produced by different border molding materials in edentulous patients: An *in vivo* study

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Abstract

Aim: The aim of the study is to analyze the effect of different materials and techniques in current use on peripheral shaping of complete denture impression.

Methods: 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.

Results and Conclusions: 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.

Key Words: Border molding, complete dentures, functional molding, stereomicroscope

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INTRODUCTION

Appropriate peripheral extension and accurate recording of tissue detail in final impression are indispensible to success of complete denture.

Border molding is a process by which the shape of the borders of the tray is made to conform accurately to contours of labial and buccal vestibule. This essential refinement of the tray's fit ensures optimal peripheral seal. It has often been erroneously referred to as muscle trimming. Main objective of border molding is maximal extension and accuracy of peripheral borders with no functional impingement of the tissues. This will create peripheral seal, around denture margins to prevent ingress of air thus providing retention. Fisher,[1] klein and Broner[2] all emphasized the need to seal the denture periphery in order to obtain retention.

Border molding an impression tray before securing the final impression is a time honored procedure in complete denture fabrication. Low fusing compound has been made use for border molding impression trays since it was introduced by green brothers in 1907. However, border molding using low fusing impression compound usually requires separate applications of the material to different sections of the tray borders which can be quite messy. Manipulation of the border tissues which demands a great

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deal of experience and judgment on operators part to conform thermoplastic material to vestibule. Stage by stage or incremental border molding leaves much to be desired since only a part of functional depth of the vestibular sulcus and associated musculature molds to the periphery of the tray during each insertion. Ideally the material should contact the entire vestibular sulcus area at one insertion and not mold the periphery of the tissues initially in one area and subsequently the remaining areas in stages.

Many other materials such as Vinyl polysiloxane; perio pack; light polymerized resin; waxes exist to record the functional and physiologic borders of the denture.

A material which will allow simultaneous moldings of all borders has two general advantages: The number of insertions of the trays for maxillary and mandibular border molding could be reduced to two, a great time and motion advantage. Development of all borders simultaneously avoids propagation of errors caused by a mistake in one section affecting the border contours in another section.

Smith *et al*., advocated the use of polyether base impression material for border molding of complete denture impression. With this technique, there is simultaneous border molding of all the borders of impression with a single insertion of the tray.[3]

The most functional and physiologic border are recorded using materials that would continuously flow for an extended period of time. However among the available materials only tissue conditioner exhibits this property. This would mean that all the border molding should be done using tissue conditioner. However, its use needs denture base or old denture, which is not always available or practically possible in every patient.

Therefore, the need exists to determine which of the available materials for border molding would be most close to accurate recording of border width and height as compared to tissue conditioner.

On similar lines, a study was planned to evaluate the border morphology produced by border molding using four different border molding materials.

METHODS

A total of 15 edentulous patients of age group between 40 and 70 years were selected in Department of Prosthodontics and Crown and Bridge in DAV Dental College, Yamunanagar. The patients who required/wanted maxillary complete denture were selected for this study. The patients were well-informed about the study, and ethical clearance was obtained. The patients were selected according to:

Inclusion criteria

- Well-formed edentulous maxillary arch (well-rounded, adequate width and height)
- Patients wearing old maxillary dentures.

Exclusion criteria

- Patients with undercuts
- Excessive ridge resorption
- Flabby anterior ridge
- Papillary hyperplasia
- Poor neuromuscular control.

Selection of maxillary stock tray and primary impression

Primary impression of the maxillary arch was made with impression compound and cast was poured in dental stone which was used to fabricate custom trays.

Fabrication of custom trays

Four custom trays on maxillary cast (extending from buccal frenum to buccal frenum) were made with auto polymerizing acrylic resin. 0.5 mm thick spacer wax was adapted 4 mm short of sulcus. Then over the spacer, tin foil was adapted. For achieving uniform thickness of the custom trays, single sheet of base plate wax was adapted over tin foil and flasking was done. After placing flask under the bench press for 45 min, when the plaster was set, dewaxing was done, thus creating a uniform space for the packing of autopolymerizing acrylic resin. Now for fabricating custom tray, spacer wax was adapted, and windows for two tissue stops were made at the region of lateral incisors [Figure 1]. Now tin foil was adapted, and autopolymerizing acrylic resin was packed over it. After placing the flask under the bench press for 45 min, tray was retrieved. Similarly, spacer wax and tin foil was adapted, and autopolymerizing acrylic resin was packed for the other three trays. On the cast from the deepest point of sulcus a line 2 mm short of sulcus was marked and taking this line as reference, trays were trimmed and were finished. Tray handle was made. Similarly remaining 3 trays were fabricated and finished [Figure 2].

Border molding and impression procedures

Labial flange of the existing maxillary denture was trimmed 2 mm short of the sulcus between buccal frenum to buccal frenum. Tissue conditioner (Temporary soft liner; Dentsply) was mixed according to the manufacturer's recommendations and was applied on labial flange. In order to perform functional border molding movements for recording labial vestibule patient was instructed to smile, yawn, whistle, speak "ooo" and "eeee" in regular fashion and then patient was asked to pucker the mouth for 5 s. The patient was instructed to continue regular activities at home with denture and was asked to report after 24 h with functionally molded denture flange [Figure 3].

The cast was poured in die stone (Kalrock; Kalabhai). A total of 15 patients were selected, and 15 casts were obtained which were considered as a control group.

After 24 h on the second visit of the patient, border molding of first tray was done with low fusing impression compound (DPI Pinnacle) in stick form which was fused by dry heat and applied on the borders of the labial flange of the tray. Tray was tempered in the water bath and carried to the patient's mouth for border molding. In order to perform functional border molding movements for recording labial vestibule, patient was instructed to smile, yawn, whistle, speak "ooo" and "eeee" in regular fashion and then patient was asked to pucker the mouth for 5 s. Spacer was removed, and tray adhesive was applied on the tray and wash impression was made with addition silicone (Express XT Light Body; 3M ESPE) [Figures 3 and 4]. Impressions were beaded and boxed and poured in die stone (Kalrock; Kalabhai). The casts so obtained were considered as Group 1 casts.

Similarly, border molding was done with Polyether medium bodied consistency (Impregnum, 3M ESPE). Polyether material was mixed and then syringed on the borders of the labial flange of the tray. In order to perform functional border molding movements for recording labial vestibule patient was instructed to smile, yawn, whistle, speak "ooo" and "eeee" in regular fashion and then patient was asked to pucker the mouth for 5 s. Spacer was removed, and tray adhesive was applied on the tray and wash impression was made with addition silicone [Figure 4] (Express XT Light Body; 3M ESPE). Impressions were beaded and boxed and poured in die stone (Kalrock; Kalabhai). The casts so obtained were considered as Group 2 casts.

For the third tray, border molding was done using Pattern Resin (GC, Tokyo, Japan). Powder and liquid were mixed according to the manufacturer's instruction and applied on the borders of the tray. In order to perform functional border molding movements for recording labial vestibule, patient was

Figure 1: Flasked primary cast with spacer and tissue stops

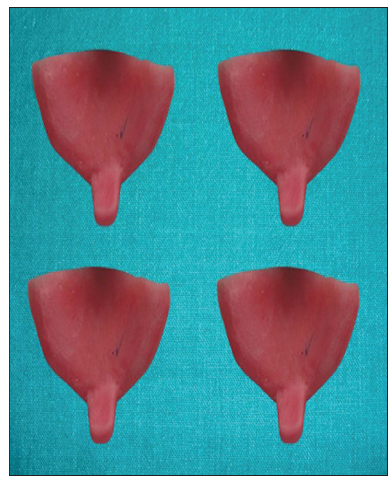


Figure 2: Four trays with handles for border molding

Figure 3: Functionally molded denture with tissue conditioner from buccal frenum to buccal frenum

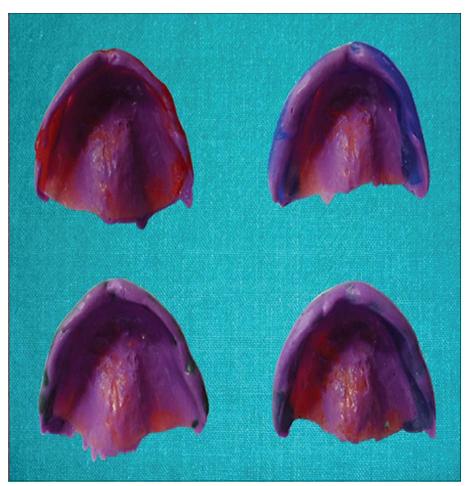


Figure 4: Border molded tray with all four border molded materials and final impression

instructed to smile, yawn, whistle, speak "ooo" and "eeee" in regular fashion and then patient was asked to pucker the mouth for 5 s. Spacer was removed, and tray adhesive was applied on the tray and wash impression was made with addition silicone (Express XT Light body; 3M ESPE) [Figure 4]. Impressions were beaded and boxed and poured in die stone (Kalrock; Kalabhai). The casts so obtained were considered as Group 3 casts.

For the fourth tray, Periphery Wax (Carmel: Canada) was softened in warm water (54°C) to a consistency which will stick to the tray but will allow easy molding by hand. In order to perform functional border molding movements for recording labial vestibule, patient was instructed to smile, yawn, whistle, speak "ooo" and "eeee" in regular fashion and then patient was asked to pucker the mouth for 5 s. Spacer was removed, and tray adhesive was applied on the tray and wash impression was made with addition silicone (Express XT Light Body; 3M ESPE) [Figure 4]. Impressions were beaded and boxed and poured in die stone. The casts so obtained were considered as Group 4 casts.

Beading and boxing the impression

The border molded impression trays were put on the bench top, and points were marked 2 mm below from the highest point of border along the periphery with compass. All these points were joined to form a line 2 mm below the border. A beading wax was then placed in the line to achieve 2 mm uniform border width. All the beaded impression were boxed and poured with die stone (Kalrock; Kalabhai).

Sectioning the cast and contour measurement

Casts were retrieved, and clear vacuum formed sheet was adapted on the cast. A string was adapted along the crest of the ridge. The entire string length was then measured with the scale and divided in to five equal intervals. The strings with four marks were then placed on the cast and marks were transferred on the cast. Vacuum formed template was placed on top of it [Figure 5]. Holes were made on the template according to the markings on the cast. This template with holes at equal intervals was used for transferring marks on other casts on which lines were drawn for sectioning of casts [Figure 6]. The casts were sectioned along these lines to obtain five sections of equal dimensions naming them as A, B, C, D, and E, respectively, from left to right [Figure 7].

Under stereomicroscope (with accuracy of 0.001 mm) height was measured from the horizontal projection of the ledge of ridge to the lowest point of the labial sulcus. Similarly, width was measured from the horizontal projection of the ledge [Figure 8]. Each group (control and group 1–4) consisted of 15 patients. For each patient, cast was sectioned into five equidistant sections naming them as A, B, C, D, E. Each section was studied for width and height under stereomicroscope. Mean of all five sections was taken as final reading for that section.

Figure 5: Marks transferred on vacuum sheet which will be used to transfer marks on other four cast

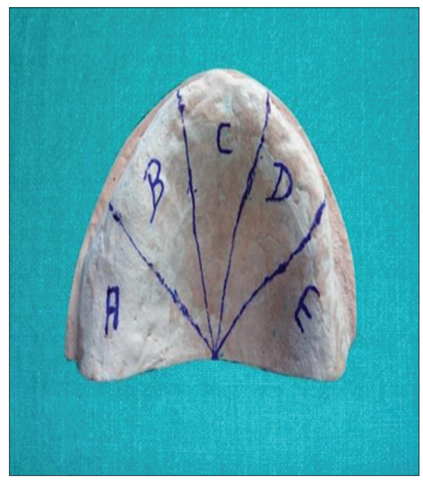


Figure 6: Lines drawn on the cast dividing it into five equal sections (a-e)

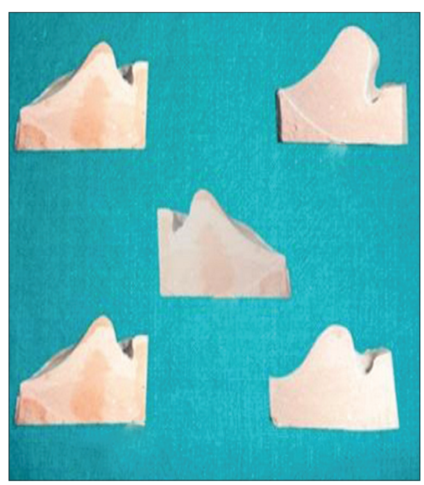


Figure 7: Five sections

Area for a single section was calculated by product of mean of width and height of that section.

Total area was measured as the cumulative average of the entire area. The average measurement of the total area of all the five sections was taken as final measurements for the material in those patients. Data collected were tabulated and subjected statistical analysis.

RESULTS

After compilations of the data, appropriate statistics were applied. All data were analyzed using the Statistical Package for Social Sciences (SPSS) for Windows, version 15.0 (SPSS Inc., Chicago, USA). The following descriptive statistical analyses were used in the analysis of the present study.

- One-way analysis of variance (ANOVA): To test the equality of means (more than two means) of width, height and area ANOVA was used. ANOVA is a general method for studying sampled-data relationships. The purpose is to test for significant differences between class means of width, height and area of sulcus and this is done by analyzing the variances. ANOVA signifies whether difference of values between groups is significant or not. For the significance within groups *post-hoc* Bonferroni test was used
- *Post-hoc* Bonferroni test: A *post-hoc* test is conducted after the completion of ANOVA and is done in order to determine whether the differences of mean of width, height and area of sulcus within the four groups are significant or not
- Level of significance: "P" is level of significance: $P > 0.05$ - not significant $P < 0.05$ - significant.

Width

The mean width of the sulcus in Group 2 (14.132 ± 2.47 mm) was closest to the control group (14.335 ± 3.28 mm) whereas Group 1 (17.638 ± 2.47 mm) was the farthest [Table 1 and Graph 1]. One-way ANOVA analysis showed that mean sulcus width obtained by border molding with four different materials was significant ($P = 0.004$) between groups [Table 2]. Multiple comparisons of different groups when compared with control group using *post-hoc* Bonferroni test, shows that the difference of mean of width between Group 1 and control group (3.303 mm) was significant ($P = 0.016$). Comparisons with other groups were nonsignificant [Table 3]. Difference of mean of width of sulcus obtained with low fusing impression compound (Group 1), and polyether (Group 2) (3.506 mm) was significant ($P = 0.009$) [Table 4].

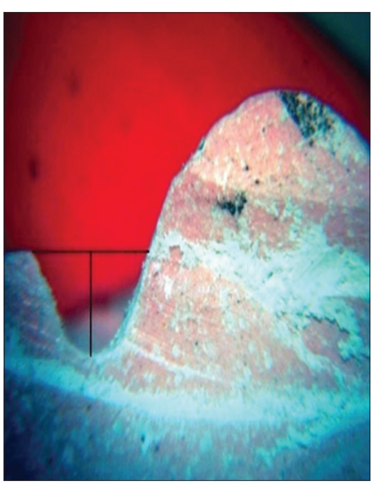


Figure 8: Sections under stereomicroscope

Height

The mean height of the sulcus in Group 2 (14.702 ± 1.997 mm) was closest to the control group (15.076 ± 1.039 mm) whereas Group 1 (13.651 ± 2.846 mm) was the farthest [Table 5 and Graph 2]. One way ANOVA analysis showed that mean sulcus height obtained by border molding

Table 1: Mean of width of sulcus in different groups (mm)

Groups	*n*	Mean	SD	SE	95% CI for mean		Minimum	Maximum
					Lower bound	Upper bound		
Control	15	14.335	3.286	0.848	12.514	16.155	6.820	19.450
1	15	17.635	2.477	0.639	16.266	19.010	11.200	19.500
2	15	14.132	2.472	0.636	12.763	15.501	8.450	16.070
3	15	15.835	2.673	0.690	14.355	17.396	8.800	18.370
4	15	16.612	3.036	0.783	14.931	18.205	9.100	18.670
Total	75	15.711	3.044	0.351	15.010	16.41141	6.820	19.500

SD: Standard deviation, SE: Standard error, CI: Confidence interval

Table 2: ANOVA

Width	Sum of squares	*df*	Mean square	*F*	*P*
Between groups	133.919	4	33.480	4.246	0.004
Within groups	551.990	70	7.886		
Total	685.909	74			

ANOVA: Analysis of variance

Table 3: Multiple comparison of width of sulcus in control group with other four groups using *post-hoc* Bonferroni test

Comparison	Mean difference	*P*
Control group versus Group 1	3.303	0.016
Control group versus Group 2	0.203	1.000
Control group versus Group 3	1.500	0.590
Control group versus Group 4	2.277	0.184

Table 4: Multiple comparison of width within groups using *post-hoc* Bonferroni test

Group 1 versus 2	3.506	0.009
Group 1 versus 3	1.833	0.406
Group 1 versus 4	1.020	0.854
Group 2 versus 3	1.702	0.465
Group 2 versus 4	2.480	0.122
Group 3 versus 4	0.773	0.942

with four different materials was significant (P = 0.000) between groups [Table 6]. Multiple comparisons of different groups, when compared with the control group using *post-hoc* Bonferroni test shows that the difference of mean of height between Group 4 and control group (2.765 mm) was significant (P = 0.011). Comparisons with other groups were nonsignificant [Table 7]. The difference of mean of height of sulcus obtained with low fusing impression compound (Group 1) and periphery wax (Group 4) (4.190 mm) was significant (P = 0.000) and between polyether (Group 2) and periphery wax (Group 4) (3.138 mm) was also significant (P = 0.003) [Table 8].

Area

The mean area of the sulcus in Group 2 (211.452 ± 55.205 mm) was closest to control group (216.582 ± 53.833 mm^2) whereas Group 4 (303.823 ± 86.531 mm^2) was farthest [Table 9 and Graph 3]. One-way ANOVA analysis showed that mean sulcus area obtained by border molding with four different materials was significant between groups. Statistical analysis reveals that comparison of the difference among the groups is significant (P = 0.001). This means that none of

Table 5: Mean of height of sulcus in different groups (mm)

Group	n	Mean	SD	SE	95% CI for mean		Minimum	Maximum
					Lower bound	Upper bound		
Control	15	15.076	1.059	0.273	14.487	15.662	12.450	16.600
1	15	13.651	2.846	0.734	12.075	15.227	8.800	21.000
2	15	14.702	1.997	0.516	13.596	15.814	10.300	16.600
3	15	15.570	2.173	0.561	14.366	16.773	9.750	17.250
4	15	17.841	2.762	0.713	16.314	19.371	10.970	19.920
Total	75	15.368	2.605	0.300	14.768	15.967	8.800	21.000

SD: Standard deviation, SE: Standard error, CI: Confidence interval

Table 6: ANOVA

Height	Sum of squares	*df*	Mean square	*F*	*P*
Between groups	144.496	4	36.124	7.065	0.000
Within groups	357.913	70	5.113		
Total	502.409	74			

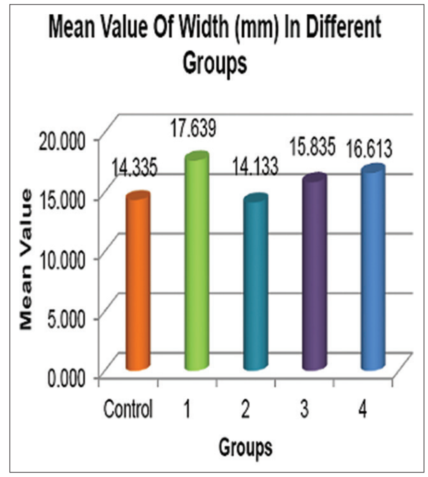
ANOVA: Analysis of variance

Table 7: Multiple comparison of height of sulcus of control group with other four groups using *post-hoc* Bonferroni test

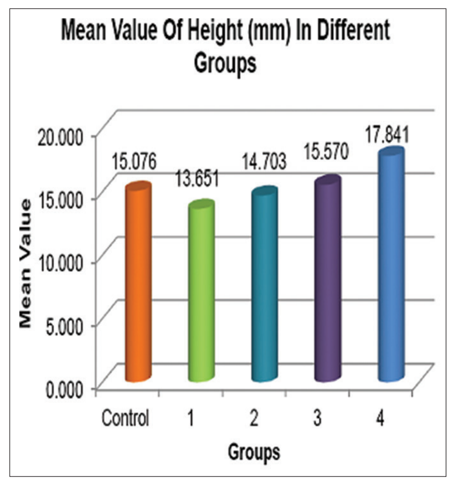
Comparison	Mean difference	*P*
Control group versus group 1	1.424	0.425
Control group versus group 2	0.373	0.991
Control group versus group 3	0.490	0.975
Control group versus group 4	2.765	0.011

Table 8: Multiple comparison of height within groups using *post-hoc* Bonferroni test

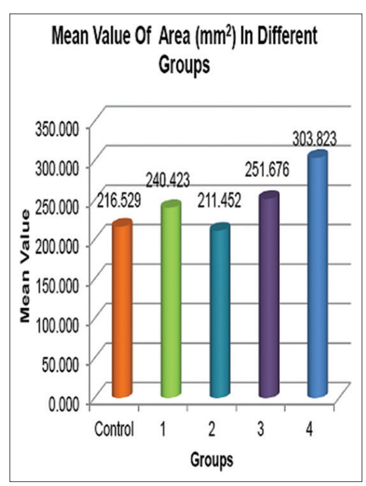
Group 1 versus 2	1.051	0.708
Group 1 versus 3	1.916	0.150
Group 1 versus 4	4.190	0.000
Group 2 versus 3	0.867	0.831
Group 2 versus 4	3.138	0.003
Group 3 versus 4	2.273	0.057



Graph 1: Comparing width of sulcus with different border molding materials



Graph 2: Comparing height of sulcus with different border molding materials



Graph 3: Comparing area of sulcus with different border molding materials

Table 9: Mean of area of sulcus in different groups (mm²)

Group	*n*	Mean	SD	SE	95% CI for mean		Minimum	Maximum
					Lower bound	Upper bound		
Control	15	216.528	53.883	13.917	186.689	246.368	104.482	302.448
1	15	240.423	50.990	13.165	212.185	268.660	98.560	298.420
2	15	211.452	55.205	14.253	180.880	242.023	91.851	257.120
3	15	251.675	65.177	16.828	215.581	287.770	85.800	301.268
4	15	303.823	86.531	22.342	255.903	351.742	99.827	362.544
Total	75	244.780	70.321	8.1200	228.601	260.960	85.800	362.544

SD: Standard deviation, SE: Standard error, CI: Confidence interval

the four test materials records the border morphology better than tissue conditioner [Table 10]. Multiple comparisons of different groups, when compared with the control group using *post-hoc* Bonferroni test shows that the difference of mean of the area between Group 4 and control group (87.294 mm) was significant ($P = 0.003$). Comparisons with other groups was nonsignificant [Table 11]. The difference of mean of the area of sulcus obtained with polyether (Group 2) and periphery wax (Group 4) (92.371 mm) was significant ($P = 0.002$) [Table 12].

Table 10: ANOVA

Area (mm²)	Sum of squares	*df*	Mean square	*F*	*P*
Between groups	81,922.852	4	20,480.713	5.048	0.001
Within groups	284,017.526	70	4057.393		
Total	365,940.378	74			

ANOVA: Analysis of variance

Table 11: Multiple comparison of area of control group with other four groups using *post-hoc* Bonferroni test

Comparison	Mean difference	*P*
Control group versus Group 1	23.894	0.842
Control group versus Group 2	5.076	0.999
Control group versus Group 3	35.146	0.559
Control group versus Group 4	87.294	0.003

Table 12: Multiple comparison of area of sulcus within groups using *post-hoc* Bonferroni test

Group 1 versus 2	28.971	0.725
Group 1 versus 3	11.252	0.989
Group 1 versus 4	63.401	0.060
Group 2 versus 3	40.224	0.423
Group 2 versus 4	92.371	0.002
Group 3 versus 4	52.147	0.177

DISCUSSION

A frequent error during border molding is operator himself trying to mold the vestibular tissues around the periphery of the tray by forcing various movements of lips and cheeks. Pulling the cheeks and lips do not involve muscular contraction of these tissues. When true muscle contraction takes place, the length of muscle is reduced, and belly formation occurs. Hence, passive method of border molding is not truly functional or physiological.

Furthermore, according to Jankelson and Radke[4] conventional manipulative movements of the cheeks and lips during the impression procedures will inevitably result in under extensions of the borders when the muscles return to their resting lengths. On the contrary, the denture borders should lie passively against the surrounding, draping musculature in its relaxed state. The more intimate the relationship of the border to the musculature, the greater will be the retention. In view of these facts and the findings, in the present study, functional border molding was done as an alternative to the currently employed conventional approaches.

The measurements of the exact extent of limiting structure cannot be done by any intraoral means and hence tissue conditioners were employed as control. Tissue conditioner is a material that flows for a period of time and gives the exact border morphology of the tissues as shown by Abdel-hakim *et al*.[5] The material flows continuously under pressure at a rate inversely proportional to time, becoming stiffer but never losing its resiliency. Maintenance of viscoelastic property is key to its clinical success to be used as functional impression material. A functional impression material should flow readily under functional stress, with minimum elastic recovery ensuring continual adaptation to underlying soft tissues as they are altered under stress. Functional impressions are usually removed from patient's mouth after a few days. Recent studies recommend shorter periods of 24 h to obtain optimum results.

Many different materials have been tried for border molding in the past. Bolouri[6] described the technique of border molding using wax and self-cure acrylic resin. Jones and Sobieralski[7] reported an alternative technique of border molding using acrylic resin to conventional border molding using green stick compound. Kirk and Holt[8] described one-step border molding technique using perio-pack. Allen and Worrollo[9] described a technique for border molding with green stick compound heated in the microwave oven. Chaffee *et al*.[10] described a technique for border molding edentulous impressions using vinyl polysiloxane material. Olivieri *et al*.[11] described a technique for border molding using light polymerized resin. Solomon[12] studied the single stage silicone border molded closed mouth impression technique. This study describes an active closed mouth impression technique with one stage border molding using putty silicone material as a substitute for low fusing compound. Mittal *et al*.[13] stated an impression technique with one stage border molding using putty silicone material as substitute for low fusing compound and light body silicone as substitute for low fusing compound and light body silicone as substitute for metallic oxide paste. Furthermore, Kinra *et al*.[14] presented an innovative impression technique for complete dentures. A single stage border molding using putty silicone impression material is presented as an alternative to conventional border molding. Qureshi and Rashid[15] critically evaluated the materials and procedures used for functional peripheral molding of special trays. It was concluded that use of thermoplastic compound should be kept to minimum due to availability of simpler technique and easy to handle and accurate modern materials like polyether for single step border molding, nonbrittle waxes and light polymerized resin requiring less armamentarium McCarthy and Moser[16] in his study proved tissue conditioner to be ideal functional impression material.

Krysinski and Prylinski[17] observed that anterior segment of the impression was most reproducible as in this area muscles have fibers directed perpendicular to the border of impression when compared to the buccinator muscle with its horizontal fibers. Hence, anterior labial sulcus was selected for study.

The borders recorded with low fusing impression compound were wider but shorter than polyether. As low fusing impression compound is not thixotropic material, it slumps because of gravity and no manipulation was done by the operator to push the material into the sulcus. Further as it lacks thixotropicity, it cannot maintain its height when bulk is added along the border. The subsequent functional movements would be less effective in reducing the thickness of the borders because of short working time and high viscosity of low-fusing impression compound.

Mean of height of sulcus of Group 4 (periphery wax) was farthest from the control group as periphery wax does not flow freely, when at mouth temperature. Thus, periphery wax does not give accurate borders when functional molding is done as it needs to be softened repeatedly outside mouth in warm water. Width and height of sulcus of Group 3 (pattern resin) were of the intermediate value when compared with other groups and control group as pattern resin has sufficient working time of 2 min and has good flow characteristics. It's working time and flow is not as good as polyether, so values are intermediate.

When the difference in the means of different groups were observed, border surface area recorded using tissue conditioner that is, control group (216.529 mm) and low fusing impression compound that is, Group I (240.423 mm) was of intermediate value when compared with other groups. The difference between border area values of tissue conditioner and low fusing impression compound may be because of the heat involved in the manipulation of low-fusing impression compound. Heat can prevent the patient's co-operation in performing functional movements, it tends to be messy, and it is difficult to determine the consistency and proper temperature.

The technique of using impression compound for border molding is usually divided into steps where borders are molded in separate sections. Because of the number of insertions required, such a technique can be tedious and difficult. Molding the borders with low fusing impression compound distorted the tissues more than those molded by tissue conditioner. This is because peripheral tissues are readily displaceable with least manipulation.

It was seen that border surface area of polyether (211.452 mm) was closest in dimension to that of tissue conditioner (216.528 mm) as listed in Table 9. This observation could be due to the fact that the polyether gives optimum working time and exhibits good flow characteristics which help in recording the borders accurately.

As the border molding performed with polyether is a single step procedure, it has two advantages. (1) Number of insertions of trays for border molding could be reduced which is a great time and motion advantage. (2) Development of all borders simultaneously avoids propagation of errors.

The mean border area value for pattern resin (Group 3) was 251.676 mm which was of the intermediate value when compared with other groups. This can be attributed to the fact that pattern resin exhibits good flow characteristics also it releases minimum heat as compared to autopolymerizing acrylic resin, so it does not interfere with functional border molding. The only practical difficulty with pattern resin is rigidity that contraindicates its use in case of undercuts and difficulty in recovery of cast. The mean border area value for periphery wax 303.823 mm which was largest when compared with other groups. This can be attributed to the fact that the periphery was softened with warm water outside the mouth, and it does not flow properly at mouth temperature so it becomes hard again before functional molding can be completed. Literature is scanty on the use of waxes as border molding material. This observation can be attributed to the fact that waxes have a good flow at a temperature higher than that of the mouth so do not flow properly in the mouth. Periphery wax, unlike low fusing impression, is not brittle and can easily be trimmed with a knife. It reduces the chair side time, but this method is technique sensitive.

The removal of the tray from the mouth may cause distortion of wax if not done carefully and when deep undercuts are present if the bulk of wax at the borders of the tray is insufficient. Periphery wax permits the unattached peripheral mucosa to move when registered and not be imprisoned by the use of materials that have a short flow time. The border seal that is produced in this manner will enhance retention.

CONCLUSIONS

Thus within the limitations of the study it was concluded that:

- Mean border height, width and area obtained by the polyether was found out to be most close to control the group
- Mean width of borders obtained by the polyether was closest and green stick was farthest from the control group.
- Mean height of borders obtained by the polyether was closest and of the periphery wax was farthest from the control group
- Mean area of borders obtained by the polyether was closest and of the periphery wax was farthest from the control group.

Hence, 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.

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