

Better Material for Final Impression in Complete Dentures: An *In Vivo* Study

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Abstract

Introduction: The impression making is the first and the basic structure-forming unit in complete dentures. The impression basically is a negative replica of border-sealing area, denture-bearing area, and denture-stabilizing area of the oral tissues of the mouth. The purpose of the present study is to find the better material for carrying out the secondary impression in complete dentures.

Aim: 30 patients were divided in three subgroups of 10 patients. One group was having 10 complete denture prostheses with the secondary impression made with zinc oxide-eugenol (ZOE) paste, other group with 10 prostheses with addition silicone light body consistency, and remaining 10 patients with polyether as a secondary impression material.

Materials and Methods: In intergroup comparison for bubbles, group 3 recorded minimum amount followed by group 2 and maximum bubbles were found in group 1. In intergroup comparison for cracks, group 1 had maximum cracks, followed by group 3 and least in group 2.

Result: Analysis of variance was carried out, and all the three groups were found to be significant at $P < 0.05$ for the amount of bubbles and cracks in impressions. All the three materials tested can be used satisfactorily for secondary impression purpose.

Conclusion: Impression made of polyether material developed least bubbles, and maximum were developed by ZOE. Complete dentures made by all the three materials tested had no significant difference in patient satisfaction level.

Key words: Bubbles, Cracks, Eugenol, Impression, Prosthesis

INTRODUCTION

A complete denture is a mechanical device that serves the purpose to restore the missing dentition and rehabilitate its function. The prime requirement of a successful complete denture is the ability to record maximum tissue details for proper support and trace the borders properly for retention purpose.¹ The impression making is the first and the basic structure-forming unit in complete dentures which is carried on by the impression compound, heavy putty, or high viscosity alginate. A special tray is fabricated,

and peripheral tracing of borders is carried out using low fusion impression compound or additional silicone putty consistency which is followed by scrapping of the relief wax and taking out a wash impression or secondary impression with the zinc oxide-eugenol (ZOE), addition silicone light body, or polyether material.² These materials are used interchangeably by the dentist depending on the availability, cost, or requirement. The purpose of the present study is to find the better material for carrying out the secondary impression in complete dentures. Null hypothesis states no difference in carrying out secondary impressions with any of the three materials tested in the study (Figure 1).

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MATERIALS AND METHODS

The study was carried out on 30 patients that reported to the Indira Gandhi Govt. Dental College, Jammu. All the subjects were divided in three subgroups of 10 patients in each group (Table 1). One group was having 10 prostheses with

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secondary impression made with ZOE paste (Figure 2), other group with 10 prostheses with secondary impression made

Table 1: Inclusion criteria

Inclusion criteria
Age <75 years
Absence of any systemic disease
Absence of any abnormality
Absence of any tori or palatal defect



Figure 1: Materials used

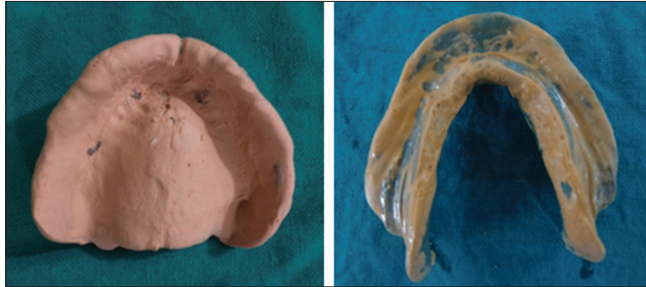


Figure 2: Secondary impression made with zinc oxide-eugenol paste

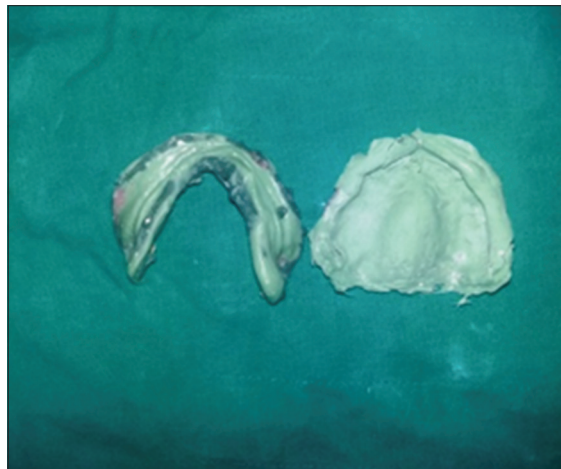
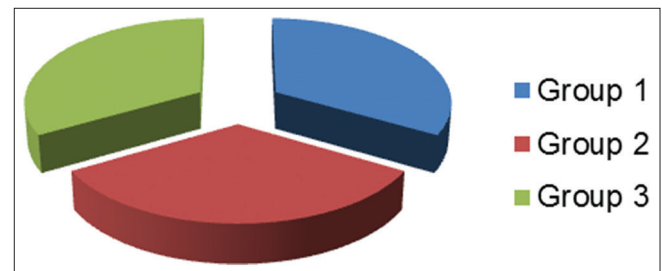


Figure 3: Secondary impression made with addition silicone paste

with addition silicone light body consistency (Figure 3), and remaining 10 patients with polyether as secondary impression material (Figure 4). Inclusion criteria were followed, and patients were informed about the objective of the study followed by consent by the patient. Primary impressions were made with impression compound (DPI Pinnacle), and casts were poured in type 2 gypsum. Complete spacer design advocated by Boucher was fabricated, and special trays were fabricated with autopolymerizing acrylic resin. Peripheral tracing was carried out using greenstick compound, and 3 vent holes in the midline were made in maxillary trays, whereas 2 in canine region in mandibular trays were made. The secondary impression was carried out for all the 30 dentures depending on the group they were segregated. Minute cracks and bubbles were calculated with the help of scanning microscope at the power of $\times 10$. Jaw relations were carried out for all the complete dentures, followed by trial and insertion of the dentures. On insertion, the patient was interviewed about fit, pinching, and other complaints. Post insertion complaints were welcomed after 24 h of insertion. Data were collected and statistically analyzed.

RESULTS

The mean values and median values were calculated for each group (Graph 1). Standard deviation was calculated, and data



Graph 1: Distribution setup

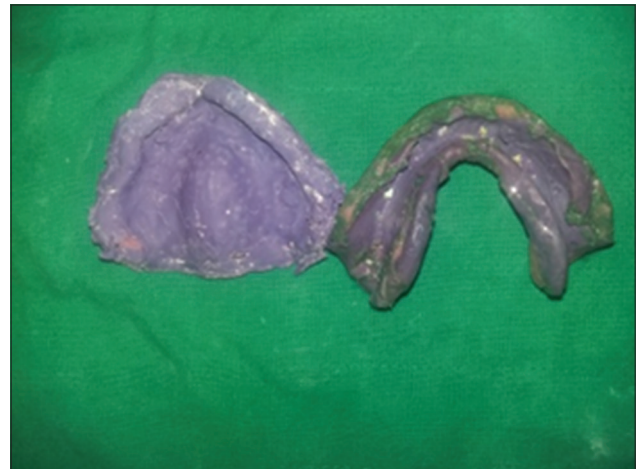


Figure 4: Secondary impression made with polyether material

were analyzed with ANOVA. In intergroup comparison for bubbles, group 3 (58) recorded minimum amount followed by group 2 (64), and maximum bubbles were found in group 1 (94). Analysis of variance was carried out, and all the three groups were found to be statistically significant at $P < 0.05$ for the amount of bubbles in impressions (Tables 2-4).

In intergroup comparison for cracks, group 1 had maximum cracks, followed by group 3 and least in group 2.

Table 2: Observational values of bubbles in three groups

ZOE	Light body	Polyether
8	4	8
11	7	9
5	3	5
9	8	7
10	5	4
6	4	2
8	9	6
10	11	9
12	5	5
14	8	3

ZOE: Zinc oxide eugenol

Table 3: Statistics for bubble calculation

Subject	Group 1	Group 2	Group 3	Total
N	10	10	10	30
$\sum X$	93	64	58	215
Mean	9.3	6.4	5.8	7.1667
$\sum X^2$	931	470	390	1791
SD	2.7101	2.5906	2.4404	2.9371

SD: Standard deviation

Table 4: Statistics for bubble calculation

Source	SS	Df	MS	F
Between treatments	70.0667	2	35.0333	
Within treatments	180.1	27	6.6704	
Total	250.1667	29		5.25208

$P < 0.05$

Table 5: Observational values of cracks in three groups

ZOE	Light body	Polyether
3	0	2
5	4	5
2	2	3
7	1	2
1	1	5
3	2	2
6	0	1
9	3	0
4	4	1
1	1	2

ZOE: Zinc oxide eugenol

The results were found to be statistically significant at $P < 0.005$ (Tables 5-7).

DISCUSSION

An accurate impression is the backbone of prosthodontics. The impression basically is a negative replica of border sealing area, denture bearing area, and denture stabilizing area of the oral tissues of the mouth.³ Three different philosophies for impression making, namely, mucocompressive, mucostatic, and selective pressure are there in market. With time and various studies, only selective pressure is the philosophy mainly applied. The philosophy states to have a primary impression with mucocompressive material, followed by relieving of selective areas and performing the peripheral tracing, followed by secondary impression or wash impression with a mucostatic material.⁴⁻⁶ The mucostatic materials used include ZOE, addition silicone in light body consistency, or polyether medium body.⁷⁻¹² The purpose of the present study is to find the better material out of the three materials tested in the study. Null hypothesis that no difference exists in the three materials tested in the study stands rejected as a positive association is found between all the three materials at $P < 0.05$ for cracks as well as bubbles (Graphs 2 and 3). The study was designed taking in care the inclusion criteria and other influencing factors. All the dentures were fabricated by dental graduates under the guidance of senior prosthodontist. All the other steps in fabrication were carried out in a similar fashion to avoid any chances of error in the study. Polyether recorded lowest number of bubbles followed by addition silicone and highest in ZOE. Furthermore, addition silicone recorded the lowest number of cracks followed by polyether and maximum in ZOE. Himkat¹³ conducted a similar study and found both ZOE and elastomers ideal materials for achieving secondary impressions. Qanungo *et al.*¹⁴ also conducted a study to evaluate border molding with ZOE and addition silicone and found addition silicone

Table 6: Statistics for cracks calculation

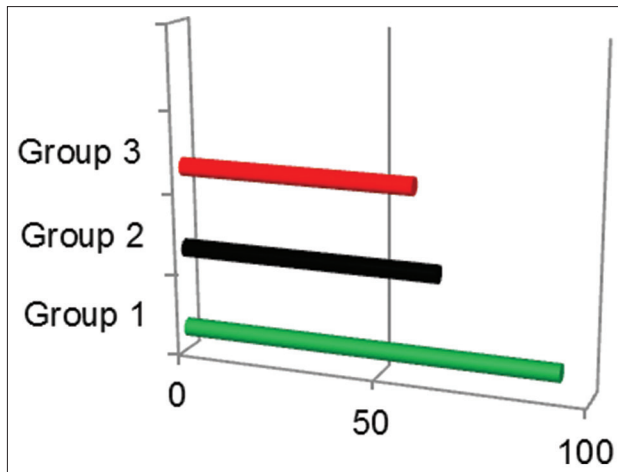
Subject	Group 1	Group 2	Group 3	Total
N	10	10	10	30
$\sum X$	41	18	23	82
Mean	4.1	1.8	2.3	2.7333
$\sum X^2$	231	52	77	360
SD	2.6437	1.4757	1.6364	2.1645

SD: Standard deviation

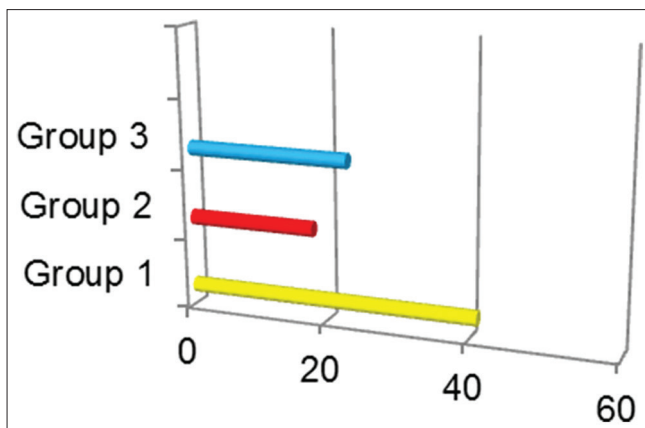
Table 7: Statistics for cracks calculation

Source	SS	Df	MS	F
Between treatments	29.2667	2	14.6333	
Within treatments	106.6	27	3.9481	
Total	135.8667	29		3.70638

$P < 0.005$



Graph 2: Mean values of amount of bubbles in three groups



Graph 3: Mean values of amount of cracks in three groups

to be better. A study¹⁵ compared ZOE and type 1 gypsum and found it better than ZOE. An interesting point noticed in the study was that all the dentures constructed by all the three groups were found to be satisfactory in patient questionnaire. Furthermore, since the detail reproduction of addition silicones and polyether is better than ZOE paste, fewer bubbles and fewer cracks were found in the study which further strengthens the present study. Eight out of 10 patients of group 1 complained of soreness after impression making due to the presence of eugenol in the ZOE paste. The limitations of the study include fewer study subjects and non-inclusion of patient satisfaction score. Further studies are directed to study monophasic materials, exploration of any new materials to practice. The use of ZOE paste should be avoided in patients with eugenol sensitivity.

CONCLUSION

1. All the three materials tested can be used satisfactorily for secondary impression purpose.
2. Impression made of polyether material developed least bubbles, and maximum were developed by ZOE.
3. Impression made of addition silicone material developed least cracks and maximum were developed by ZOE.
4. Complete dentures made by all the three materials tested had no significant difference in patient satisfaction level.

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