

## ORIGINAL RESEARCH

### Comparative analysis of two techniques for post space impression

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#### ABSTRACT:

**Background:** Endodontically treated teeth usually require a post for the die reconstruction and the application of a fixed dental prosthesis (FDP) in order to handle tooth structure loss due to the endodontic treatment itself. **Aim of the study:** To compare two techniques for post space impression. **Materials and methods:** The present study was conducted in the Department of Prosthodontics of the Dental institutions. For the study, a total of 8 maxillary central incisors were kept in NaOCl solution for 2 days to remove any debris. The post space is prepared in the root canal with a number three peeso reamer leaving four mm of gutta percha at the apex and enlarged up to five number peeso reamer. Custom trays to carry medium body polyvinylsiloxane impression materials are made to recover post space impressions. Two different techniques are used to obtain the impression of post space using light body polyvinylsiloxane impression material. **Results:** We used two techniques and studied 10 samples for each. We observed that there were 47 impressions without voids in technique 1 and 46 impressions without voids in technique 2. The total length of prepared post space was 8 mm. completeness of impressions (maximum length of post space covered) was maximum in technique 1. **Conclusion:** Within the limitations of the present study, it can be concluded that technique 1 was more efficacious as compared to technique 2 for impression of post space.

**Keywords:** Polyvinylsiloxane impression, endodontic treatment, post impression

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#### INTRODUCTION

Endodontically treated teeth usually require a post for the die reconstruction and the application of a fixed dental prosthesis (FDP) in order to handle tooth structure loss due to the endodontic treatment itself. In fact such teeth are exposed to a higher fracture risk compared to vital teeth.<sup>1,2</sup> The difference between the metallic custom-cast post and the dentin elastic modulus has been proved to be responsible for a stress concentration in the cement layer with a consequent possible restoration failure or even root fracture (3). For this reason, different prefabricated post materials have been introduced, as well as new cementation system to increase the longevity of the restoration.<sup>3</sup> A variety of impression materials have been suggested for implant impressions such as impression plaster, hydrocolloids and elastomers with four basic types of polysulfides, polyether, condensation silicones and polyvinyl siloxane which is also known as addition silicones.<sup>4</sup> Polysulfides show good reproduction of surface details; however they are not dimensionally stable

if stored for longer period of time. Significant disadvantage of condensation silicones is their shrinkage due to evaporation of volatile by products released in polymerization reactions.<sup>5</sup> Property of impression material to prevent positional distortion between implant analogues caused by accidental displacement of impression copings is a key factor; therefore polyvinyl siloxane and polyether have been suggested as materials of choice. Polyether has been recommended for implant impressions because of its dimensional stability, rigidity, tear resistance and hydrophilicity.<sup>6</sup> Hence, the present study was conducted to compare two techniques for post space impression.

#### MATERIALS AND METHODS

The present study was conducted in the Department of Prosthodontics of the Dental institutions. The ethical clearance for the study was approved from the ethical committee of the hospital. For the study, a total of 8 maxillary central incisors were kept in NaOCl solution

for 2 days to remove any debris. After washing them with saline, the teeth were mounted on a plaster box. The teeth were prepared for PCM metal crowns. Endodontic treatment of the teeth was completed and root canals were obturated with gutta percha pin points. The post space is prepared in the root canal with a number three peeso reamer leaving four mm of gutta percha at the apex and enlarged up to five number peeso reamer. Custom trays to carry medium body polyvinylsiloxane impression materials are made to recover post space impressions. Two different techniques are used to obtain the impression of post space using light body polyvinylsiloxane impression material.

**Technique 1:** in this technique, we inserted a 24-gauge anesthetic needle which acts as a vent held in post space with the help of a tweezer. Then we injected light body polyvinylsiloxane impression materials into the post space using disposable tips. The anesthetic needle is removed and a 26-gauge orthodontic reinforcement wire inserted into the post space filled with the light body impression material to prevent distortion of the impression. The custom tray filled with medium body polyvinylsiloxane impression material is placed over the light body impression material and the whole impression of post space recovered.

**Technique 2:** A 24-gauge anesthetic needle vent is used but reinforcement wire is not used.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

**RESULTS**

We used two techniques and studied 10 samples for each. This gives in total 50 samples were evaluated using three and a half magnifications for following parameters:

1. Presence of voids
2. Completeness of impression

Table 1 shows number of samples without voids. We observed that there were 47 impressions without voids in technique 1 and 46 impressions without voids in technique 2. Table 2 shows completeness of impression (in mm) in each impression technique. The total length of prepared post space was 8 mm. completeness of impressions (maximum length of post space covered) was maximum in technique 1.

**Table 1: Number of samples without voids**

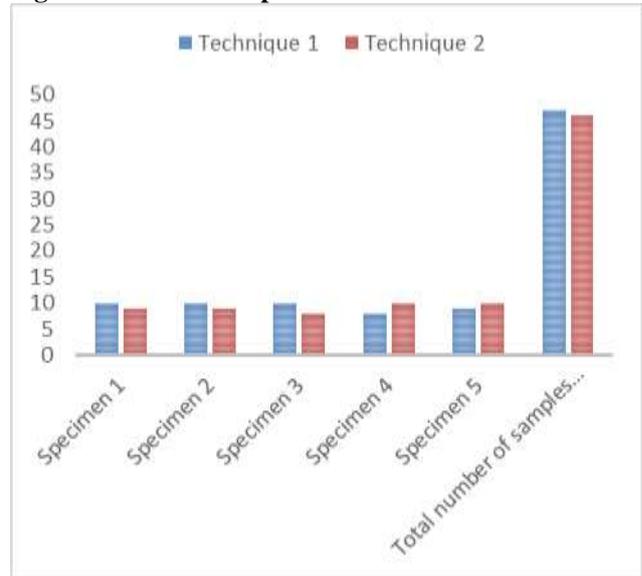
Technique	Specimen 1	Specimen 2	Specimen 3	Specimen 4	Specimen 5	Total number of samples without voids
Technique 1	10	10	10	8	9	47
Technique 2	9	9	8	10	10	46

**DISCUSSION**

In the present study, we observed that number of impressions without voids was more in technique 1 specimens as compared to technique 2 specimens. Similarly, technique 2 was more efficacious in

completeness of impression of post space. The results were compared with previous studies from literature.

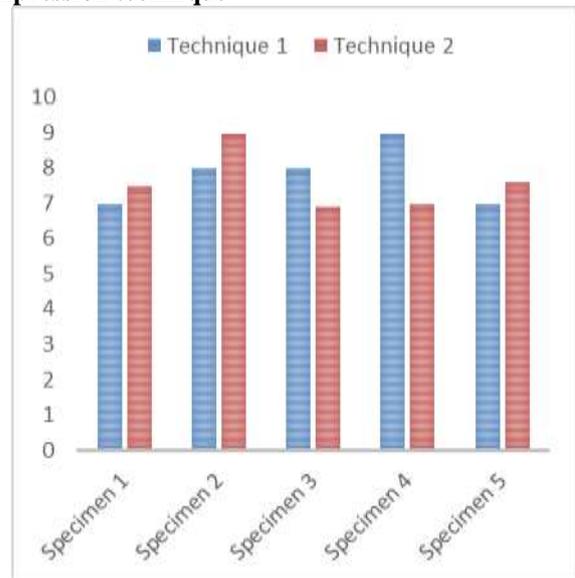
**Fig 1: Number of samples without voids**



**Table 2: Completeness of Impression (in mm) in each impression technique**

Technique	Specimen 1	Specimen 2	Specimen 3	Specimen 4	Specimen 5
Technique 1	7	8	8	9	7
Technique 2	7.5	9	6.9	7	7.6

**Fig 2: Completeness of Impression (in mm) in each impression technique**



Parameshwari G et al evaluated the effects of 0o, 15o and 25o implant angulations on impression accuracy in simulated master casts of unilateral partially edentulous situation using different impression materials and tray selections. 30 replicas of a resin matrix (control) containing four implant analogues placed unilaterally from the midline till the region of second molar at an

angulation of 0°, 00, 150 and 250 to the vertical axis of the ridge respectively were obtained by using three impression techniques (stock metal tray, closed custom tray, and open nonsplinted custom tray) and two different impression materials (Polyvinyl-siloxane and polyether). Specific dimensions of the resultant casts were measured using coordinated measuring microscope. The casts obtained from all three impression techniques had significant differences in dimensions as compared to that of master model irrespective of impression materials. Comparing the techniques with regard to the parallel implants, no statistical significant difference was observed with custom tray techniques (closed/open). Whereas while comparing parallel versus non parallel, open tray technique showed superior accuracy compared to closed tray technique as the angulation increased more than 15 degrees. It was concluded that the influence of material and technique appeared to be significant for highly non axial implant angulations, and increased angulation tended to decrease impression accuracy. The open tray technique was more accurate with highly nonaxially oriented implants for the small sample size investigated. Patil R et al evaluated and compared two impression techniques in terms of their dimensional accuracies to reproduce implant positions on working casts. A master model was designed to simulate a clinical situation. Impressions were made using four techniques: (1) Stock open tray (SOT) technique; (2) stock closed tray (SCT) technique; (3) custom open tray (COT) technique; and (3) custom closed tray (CCT) technique. Reference points on the hexagonal silhouette of the implant on master model and onto the analogs of the obtained master casts were compared after using the four impression techniques. Measurements were made using an optical microscope, capable of recording under 50x magnifications. The means and standard deviations of all the groups and subgroups were calculated and statically analyzed using analysis of variance (ANOVA) and Tukey's test. The open tray impressions showed significantly less variation from the master model and all the techniques studied were comparable. They concluded that all the techniques studied shown some distortion. COT showed the most accurate results of all the techniques.<sup>7,8</sup>

Tafti AF et al compared the accuracy of open-tray and snap-on impression techniques in implants with different angulations. In this experimental study: A reference acrylic resin model of the mandible was fabricated. Four implants were positioned with the angles of 0°, 10°, 15°, and 25° in the model. Ten impressions were prepared with open-tray technique and ten impressions were made using snap-on technique. All impressions were made from vinyl polysiloxane impression material. Linear ( $\Delta x$ ,  $\Delta y$ , and  $\Delta r$ ) and angular displacements ( $\Delta\theta$ ) of implants were evaluated using a coordinate measuring machine. Measured data were then analyzed using two-way analysis of variance and Tukey's test. The results showed that the accuracy of open-tray impression technique is significantly different from snap-on technique in  $\Delta x$  ( $P = 0.003$ ),  $\Delta y$  ( $P = 0.000$ ),  $\Delta r$  ( $P = 0.000$ ), and  $\Delta\theta$ . Implants

with 25° angulation are significantly less accurate than 0°, 10°, and 15° implants in  $\Delta x$ ,  $\Delta y$ ,  $\Delta r$ , and  $\Delta\theta$ . Fifteen-degree implants are less accurate than 0° and 10° ones in  $\Delta\theta$ . It was concluded that snap-on technique is less accurate than open-tray technique, and the accuracy of 25° implant is less than that of 0°, 10°, and 15° implants. Tabesh M et al compared implant impression precision for different materials and techniques. A model of edentulous maxilla containing four implants inserted by All-on-4 guide was constructed. Seventy two impressions using polyether (PE), polyvinyl siloxane (PVS), and vinyl siloxanether (VSE) materials with direct and indirect techniques were made ( $n=12$ ). Coordinates of implants in casts were measured using coordinate measuring machine (CMM). Data were analyzed with ANOVA; t-test and Tukey test were used for post hoc. With two-way ANOVA, mean values of linear displacements of implants were significantly different among materials and techniques. One-way ANOVA and Tukey showed significant difference between PE and VSE, PE and PVS in direct technique, and between PVS and PE, PVS and VSE in indirect technique. One-way ANOVA and t-test showed significant difference between the two techniques in PVS groups and in PE groups. Two-way ANOVA showed mean values of rotational displacement of implants were significantly different among materials. One-way ANOVA and Tukey test showed significant difference between PVS and PE and between PVS and VSE in indirect groups. On the basis of the results, when deciding on the material to make an impression of implants, PE is recommended for direct technique while PE and VSE are recommended for indirect technique. Recommended technique for VSE is either direct or indirect; and for PE and PVS is direct.<sup>9,10</sup>

## CONCLUSION

Within the limitations of the present study, it can be concluded that technique 1 was more efficacious as compared to technique 2 for impression of post space.

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