

ORIGINAL RESEARCH

Comparative evaluation of accuracy of two different implant impression techniques

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ABSTRACT:

Background: The use of dental implants to rehabilitate partially and completely edentulous patients is a routine procedure in today's time. The height and width of the residual alveolar ridge, the mandibular nerve, and the nasal and maxillary sinus are anatomic aspects to be considered in placing dental implants. Hence; the present study was undertaken for comparatively evaluating the accuracy of two different implant impression techniques. **Materials & methods:** Two impression techniques were studied as followed: Group A: Polyvinyl siloxane impressions (putty and light body) using stock metal tray, and Group B: Polyether impressions (medium body) using stock metal tray. The impression posts were connected to implant analogues with the screws tightened manually such that their flat surfaces were facing buccally. The longer impression posts were connected to the anterior analogues and shorter were connected to the posterior analogues. A self-calibration test was performed to determine the accuracy obtained by the single evaluator. **Results:** Mean error among the specimens of Group A was 0.0315 while mean error among the specimens of Group B was 0.0291 respectively. While comparing the mean error among the two study groups, non-significant results were obtained. **Conclusion:** Both the impression techniques can be used with equal effectiveness in implant procedures.

Key words: Implant, Impression

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Introduction

The use of dental implants to rehabilitate partially and completely edentulous patients is a routine procedure in today's time. There have been numerous clinical studies to support the long term effectiveness of this modality. Although the prognosis is expected to be good with a success rate of approximately 97-99%, but failures do occur. They are mostly attributed to the imprecise surgical or prosthodontic technique.¹⁻³

Dental implants have become the treatment of choice in many situations where missing teeth require functional and esthetic replacements. It is important to place the implants parallel to each other wherever possible. The advantage of placing implants parallel to each other is, the polymerized impression can be removed from the mouth without significant resistance. Moreover, it is not always possible to place

implants absolutely parallel to each other. The height and width of the residual alveolar ridge, the mandibular nerve, and the nasal and maxillary sinus are anatomic aspects to be considered in placing dental implants.^{4,6} Hence; the present study was undertaken for comparatively evaluating the accuracy of two different implant impression techniques.

Materials & methods

The present study was planned with the aim of assessing and comparing the accuracy of two different implant impression techniques. An edentulous mandibular cast with four implant analogues in the anterior region and a metallic insert in the posterior region was used as the reference model. Two impression techniques were studied as followed:

- Group A: Polyvinyl siloxane impressions (putty and light body) using stock metal tray, and
- Group B: Polyether impressions (medium body) using stock metal tray

The impression posts were connected to implant analogues with the screws tightened manually such that their flat surfaces were facing buccally. The longer impression posts were connected to the anterior analogues and shorter were connected to the posterior analogues. Measurements were made using co-ordinated measuring microscope capable of measuring in X-, Y-, and Z- axes. A self-calibration test was performed to determine the accuracy obtained by the single evaluator. All the results were recorded in Microsoft excel and were subjected to analysis by SPSS software.

Results

In the present study, we assessed the accuracy of two different implant impression techniques. Two impression techniques were studied as followed: Group A: Polyvinyl siloxane impressions (putty and light body) using stock metal tray, and Group B: Polyether impressions (medium body) using stock metal tray. Mean error among the specimens of Group A was 0.0315 while mean error among the specimens of Group B was 0.0291 respectively. While comparing the mean error among the two study groups, non-significant results were obtained.

Table 1: Comparison of mean error among both the study groups

Group	Mean error	SD	p- value
Group A	0.0315	0.011	0.485
Group B	0.0291	0.019	

Discussion

Oral rehabilitation of partial and complete edentulism with osseointegrated implants has presently become a conventional treatment and its longitudinal effectiveness as one of the viable treatment modalities has been proven by several clinical studies. Nevertheless, the advent of implant dentistry has exemplified the urgency for a precisely fitting final prosthesis. Since endosseous implants are functionally ankylosed, they are in direct contact with the bone, as a result lack inherent mobility of the periodontal ligament. On the contrary natural teeth have the ability to resist horizontal, vertical, and rotational forces because of the stress bearing capacity of the periodontal ligament.^{6- 9}Hence; the present study was undertaken for comparatively evaluating the accuracy of two different implant impression techniques.

In the present study, we assessed the accuracy of two different implant impression techniques. Two impression techniques were studied as followed:

Group A: Polyvinyl siloxane impressions (putty and light body) using stock metal tray, and Group B: Polyether impressions (medium body) using stock metal tray. Mean error among the specimens of Group A was 0.0315 while mean error among the specimens of Group B was 0.0291 respectively. Tandon A et al compared the effect of closed tray and open tray impression technique with polyvinyl siloxane and polyether as impression materials on the dimensional accuracy of implant definitive casts. The Co-ordinate measuring machine was used to evaluate the dimensional accuracy of the casts, then tested at the Tata Autocomponents-Interiors and Plastic Division (IPD), Pune. A total of 60 implant definitive casts were made. A total of 30 casts were made using each impression technique. These casts were further subgrouped wherein, 15 casts were made using polyvinyl siloxane as the impression material and 15 casts were made using polyether.: Both the open tray and closed tray impression technique are comparable to each other and there is no statistically significant difference between the two. Also, the impression materials are equally good for impression making of implants (p>0.05). Either of the impression techniques and material used in the study can be used to make implant definitive casts.¹⁰

In the present study, while comparing the mean error among the two study groups, non-significant results were obtained. Siadat H et al compared the dimensional and angular accuracy of impressions using full-arch versus sectional tray and Vinyl Polysiloxane versus Vinyl Polyether Siloxane in angulated implants. Four implants were placed in dental areas #19, #21, #28 and #30 of a Kennedy class I mandibular acrylic model with 30° lingual angulation. Twenty sectional and 20 full-arch open trays were made on the primary cast. Impressions were taken using Vinyl Polysiloxane and Vinyl Polyether Siloxane (n=10 in 4 groups); and were poured with type IV dental stone. Type of tray had no significant effect on the dimensional and angular accuracy of impressions (p >0.05). Type of impression material significantly affected linear displacement (Δr) (P <0.05); but it did not significantly affect the rotational displacement (P >0.05). Vinyl Polysiloxane yielded more accurate impressions of angulated implants.¹¹ Patil R et al 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 open tray impressions showed significantly less variation from the master model and all the techniques studied were comparable. All the techniques studied shown some distortion. COT showed the most accurate results of all the techniques.¹²

Conclusion

Both the impression techniques can be used with equal effectiveness in implant procedures.

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