Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Evaluation of accuracy of open tray implant impression

[1]Muzzamil Gulzar Jan, [2]Ifrah Ashraf

[1]Post graduate, Department of Prosthodontics Crown and Bridge, Govt Dental College, Srinagar, India;
[2]BDS, Vananchal Dental College and Hospital, Jharkhand, India

ABSTRACT:
Background: A critical requirement for a long-term implant success is an accurate and passively fitting prosthesis in dental implant prosthesis. The present study was conducted to assess accuracy of open tray implant impression. **Materials & Methods:** Impression trays were filled with poly ether, and then the two impression techniques such as open tray (group I) and closed tray (group II) were compared. **Results:** Dimensional changes at point A was 145.2 µ and 124.5 µ, at B was 144.8 µ and 129.5 µ, at C was 145.1 µ and 128.2 µ, at D was 144.3 µ and 131.5 µ, at E was 145.9 µ and 132.4 µ and at F was 145.1 µ and 131.8 µ respectively. The difference was non- significant (P> 0.05). **Conclusion:** Open tray method yielded more dimensional changes as compared to closed tray method.
Key words: Closed tray, Dimension, Open tray

Received: 16 September, 2021 Accepted: 20 October, 2021

Corresponding author: Muzzamil Gulzar Jan, Post graduate, Department of Prosthodontics Crown and Bridge, Govt Dental College, Srinagar, India

This article may be cited as: Jan MG, Ashraf I. Evaluation of accuracy of open tray implant impression. J Adv Med Dent Scie Res 2021;9(11):19-21.

INTRODUCTION

Dimensional changes occur due to the contraction in the impression material which is initiated by polymerization reaction with formation of volatile materials and byproducts, pressure applied during impression and conventional impression techniques. Making a precise mold of implant is necessary for passive fitness. Passive fitness is the term used to address fitting status of the implant in which implant body shows adequate fitting for simultaneous adaptation and remodeling.[1]

A critical requirement for a long-term implant success is an accurate and passively fitting prosthesis in dental implant prosthesis. The first step in achieving a passive fit is transforming the intraoral relationship of implants through impression procedures. Many factors affect the accuracy of the implant impression including impression methods, impression materials, impression trays, implant angulation and depth, impression coping modification, and implant connection.[2]

There are two different impression techniques are traditionally used for transferring the impression copings from the implant to the impression: direct (open tray) technique and indirect (closed tray) technique. The copings are connected to the implants, and an impression is made and removed from the mouth, leaving the copings in the mouth.[3] Subsequently, the copings are removed and connected to the implant analogs, and then the coping-analog assemblies are inserted in the impression before pouring the definitive cast. The clinical situations which indicate the use of the closed tray technique are when the patient has limited interarch space, tendency to gag, or if it is too difficult to access an implant in the posterior region of the mouth and angulated implants.[4] The present study was conducted to assess accuracy of open tray implant impression.

MATERIALS & METHODS

The Present study comprised of a steel model with 8 cm in diameter and 3 cm in height were produced with 3 holes devised inside to stabilize 3 implants. The central implant was straight and the other two implants were 15° angled. The two angled implants had 5 cm distance from each other and 3.5 cm from the central implant. Dental stone, high strength (type IV) was used for the main casts. Impression trays were filled with poly ether, and then the two impression techniques such as open tray (group I) and

closed tray (group II) were compared. To evaluate positions of the implants, each cast was analyzed by CMM device in 3 dimensions (x,y,z). Differences in the measurements obtained from final casts and laboratory model were analyzed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of technique used

Groups	Group I	Group II
Methods	Open tray	Closed tray
Number	12	12

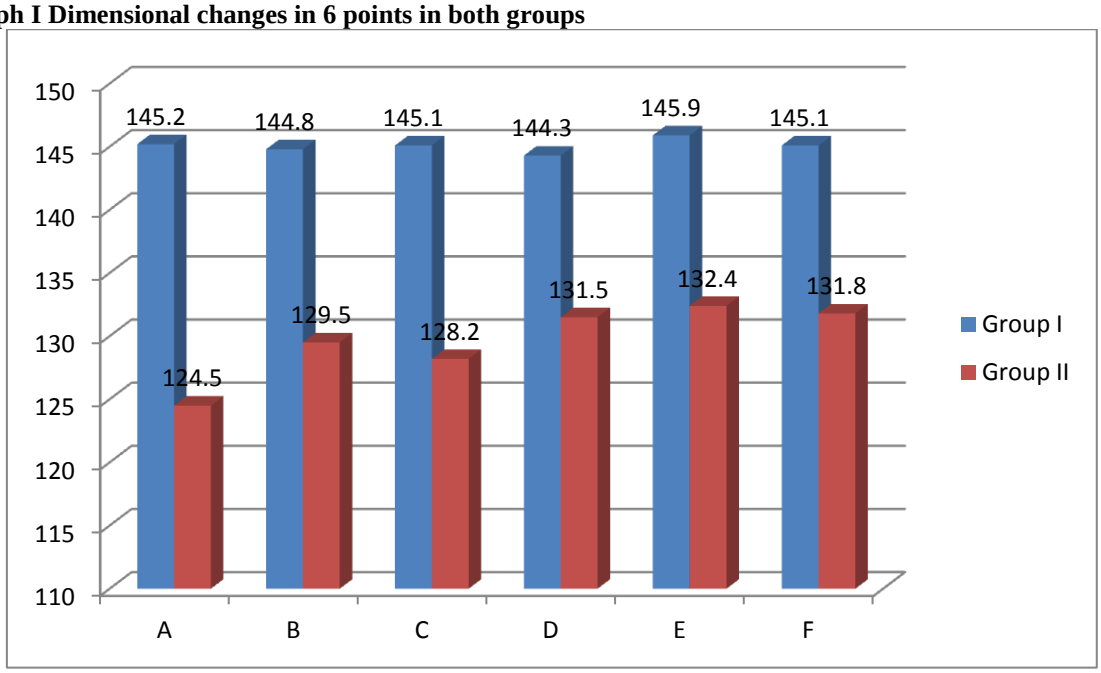
Table I shows that in group I impression open tray and in group II closed tray method was used.

Table II Dimensional changes in 6 points in both groups

Points	Group I	Group II	P value
A	145.2	124.5	0.01
B	144.8	129.5	0.09
C	145.1	128.2	0.08
D	144.3	131.5	0.07
E	145.9	132.4	0.41
F	145.1	131.8	0.60

Table II, graph I shows that dimensional changes at point A was 145.2 µ and 124.5 µ, at B was 144.8 µ and 129.5 µ, at C was 145.1 µ and 128.2 µ, at D was 144.3 µ and 131.5 µ, at E was 145.9 µ and 132.4 µ and at F was 145.1 µ and 131.8 µ respectively. The difference was non- significant (P> 0.05).

Graph I Dimensional changes in 6 points in both groups



DISCUSSION

Making a superstructure with passive fitness is one of the main objectives during implant-based prosthesis. Preparation of a precise mold with stable dimensions prior to casting is necessary to achieve this passive fitness. However, failing to attain this passive fitness will acquire stress on implants which can finally direct to fracture of the implant components and failure of the treatment.[5] The forces created in the implant due to non passive nature of the superstructure is able to resorb the bone surrounding the implant and cause ischemia within peri-implant tissue and subsequent healing with non mineral tissue around the implant, mechanical fracture, loosening of the implant components and fracture of the restoration.[6]

If it is too difficult to access in the posterior region of the mouth, or when the patient has limited interarch space or tendency to gag, the closed tray technique is used.[7] Advantages of this technique are time saving, easier for the operator, and more comfortable for the patient compared to the direct technique. The worst disadvantage of the indirect technique is discrepancy in returning the coping to the original position.[8] Both techniques may be uncomfortable for the patient and the clinician while the impression copings are being screwed and unscrewed intraorally. Slight movement of the copings may result in deformation of the impression material while unscrewing the guide pins from the impression copings during tray removal or replacing the coping-analog assemblies in the impression tray.[8] The present study was conducted to assess accuracy of open tray implant impression.

In present study in group I impression open tray and in group II closed tray method was used. Burns et al[10] checked the accuracy of open tray implant impressions comparing polycarbonate stock impression trays and rigid custom-made impression trays to make implant fixture-level impressions. Gold cylinder pairs, splinted by gold bars (reference frameworks) were constructed on an aluminum typodont. Polyether impressions were made of 2 pairs

of Brånemark 3.75-mm diameter fixtures mounted in an aluminium typodont, with 3 stock impression trays, 3 close-fit custom trays, and 3 spaced custom impression trays, by use of an open tray technique. The casts produced were assessed for accuracy by attaching the reference frameworks with alternate single screws and measuring the vertical fit discrepancy of these reference frameworks to the analogs within the working cast using a traveling microscope. The results showed that the mean fit accuracy, as measured by vertical fit discrepancy, of casts from the stock trays (23 ± 20 μm) were statistically significantly less (P<.001) than the spaced custom trays (12 ± 10 μm) or close fit custom trays (11 ± 10 μm). The difference in median gap size for analogs with a 20-mm separation was 10 μm.

We observed that dimensional changes at point A was 145.2 μ and 124.5 μ, at B was 144.8 μ and 129.5 μ, at C was 145.1 μ and 128.2 μ, at D was 144.3 μ and 131.5 μ, at E was 145.9 μ and 132.4 μ and at F was 145.1 μ and 131.8 μ respectively. Balouch et al[11] found closed tray impression technique was significantly different in dimensional accuracy when compared with open tray method. Dimensional changes were 129 ± 37μ and 143.5 ± 43.67μ in closed tray and open tray, while coefficient of variation in closed- tray and open tray were reported to be 27.2% and 30.4%, respectively.

Tafti et al[12] 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 (Δx, Δy, and Δr) and angular displacements (Δθ) of implants were evaluated using a coordinate measuring machine. The results showed that the accuracy of open-tray impression technique is significantly different from snap-on technique in Δx (P = 0.003), Δy (P = 0.000), Δr (P = 0.000), and Δθ (P = 0.000). Implants with 25° angulation are significantly less accurate than 0°, 10°, and 15° implants in Δx, Δy, Δr, and Δθ. Fifteen-degree implants are less accurate than 0° and 10° ones in Δθ.

CONCLUSION

Authors found that open tray method yielded more dimensional changes as compared to closed tray method.

REFERENCES

1. Choi JH, Lim YJ, Yim SH, Kim CW. Evaluation of the accuracy of implant-level impression techniques for internal-connection implant prostheses in parallel and divergent models. Int J Oral Maxillofac Implants 2007; 22: 761-768.
2. Sazgara H, Nahidi R. Comparison of implants' impression techniques accuracy in close tray method using special and stock trays. Dent J Shahid Beheshti Univ Med Scien 2009; 26: 346-354.
3. Herbst D, Nel JC, Driessen CH, Becker PJ. Evaluation of impression accuracy for osseointegrated implant supported superstructures.J Prosthet Dent 2000; 83: 555-561.
4. Vigolo P, Majzoub Z, Cordioli G. Evaluation of the accuracy of three techniques used for multiple implant abutment impressions. J Prosthet Dent 2003; 89: 186-192.
5. Prithviraj DR , Pujari ML, Garg P , Shruthi DP. Accuracy of the implant impression obtained from different impression materials and techniques: review. J Clin Exp Dent 2011; 3: 106-111.
6. Brånemark PI. Osseointegration and its experimental background. J Prosthet Dent 1983; 50: 399-410.
7. Del'Acqua MA, Arioli-Filho JN, Compagnoni MA, Mollo Fde A Jr. Accuracy of impression and pouring techniques for an implant-supported prosthesis. Int J Oral Maxillofac Implants 2008; 23: 226-236.
8. Choi JH, Lim YJ, Yim SH, Kim CW. Evaluation of the Accuracy of Implant- Level Impression Techniques for Internal Connection Implant Prostheses in Parallel and Divergent Models. Int Oral Maxillofac Implants 2007; 22: 761-786.
9. Walker MP, Ries D, Borello B. Implant cast accuracy as a function of impression techniques and impression material viscosity. Int J Oral Maxillofac Implants 2008; 23: 669- 674.
10. Burns J, Palmer R, Howe L, Wilson R. Accuracy of open tray implant impressions: an in vitro comparison of stock versus custom trays. The Journal of prosthetic dentistry. 2003 Mar 1;89(3):250-5.
11. Balouch F., Jalalian E., Nikkheslat M., Ghavamian R., Toopchi Sh., Jallalian F., Jalalian S. Comparison of Dimensional Accuracy between Open-Tray and Closed Tray Implant Impression Technique for 15° Angle Implants. J Dent Shiraz Univ Med Sci, Sept. 2013; 14(3): 96-102.
12. Tafti AF, Hatami M, Razavi F, Ebadian B. Comparison of the accuracy of open-tray and snap-on impression techniques of implants with different angulations. Dent Res J 2019;16:413-20.