International Journal of Research in Health and Allied Sciences

Journal home page: www.ijrhas.com

Official Publication of "Society for Scientific Research and Studies" [Regd.]

ISSN: 2455-7803

Original Research

Accuracy of the One-Stage and Two-Stage Impression Techniques

[1]Dr. Sahil Sarin, [2]Dr. Sipra Salaria

[1]Associate Professor, Department of Prosthodontics, Dasmesh Institute of Research and Dental Sciences, Faridkot, Punjab, India;
[2]Assistant Professor, Department of Oral Medicine and Radiology, Dasmesh Institute of Research and Dental Sciences, Faridkot, Punjab, India

ABSTRACT:
Background: To study the accuracy of one-stage and two-stage impression techniques. **Materials & Methods:** A synthetic model of a molar tooth was crafted in a resin laboratory using a standard procedure for creating complete dental crowns. The impression process was conducted ten times using both a one-stage technique and a two-stage technique, each time utilizing an appropriate tray. Statistical analysis was performed using an independent t-test, and the obtained data were processed using SPSS software. **Results:** In the case of the mesial region, the p-value was determined to be 0.01. The mean marginal gap resulting from the one-stage technique was found to be greater than that of the two-stage technique. **Conclusion:** There is higher accuracy for two-stage impression technique than for the one-stage impression technique.
Keywords: one-stage, two-stage, impression.

Received: 18 October, 2022 Accepted: 21 November, 2022

Corresponding Author: Dr. Sipra Salaria, Assistant Professor, Department of Oral Medicine and Radiology, Dasmesh Institute of Research and Dental Sciences, Faridkot, Punjab, India

This article may be cited as: Sarin S, Salaria S. Accuracy of the One-Stage and Two-Stage Impression Techniques. Int J Res Health Allied Sci 2022; 8(6):78-80.

INTRODUCTION

An accurate impression will result in accurate dental marginal adaptation of casting restorations and eventually contribute to the longevity of the restoration. On the other hand, marginal gap in this stage results in a prosthesis with improper adaptation. One important group of impression materials is elastomers, among which polyethers and silicons (condensation and addition) are more common in fixed prosthesis impression. [1,2]The impression process includes careful transfer of the patient's soft and hard tissues to laboratory and is a major part of fixed prosthetic treatments. Since the patient's soft and hard tissues are transferred, having anatomic knowledge about periodontal tissues, making an accurate impression especially in the finish line, and using proper impression materials and an appropriate impression technique are important in making a suitable and accurate impression.[3] The impression technique determines the restoration of finish line. Moreover, the significance of margin in the longevity of restoration and the effect of impression technique on marginal adaptation of restoration indicate the necessity of applying an accurate impression technique. The accuracy of impression techniques is revealed when restoration with suitable marginal adaptation and minimum gap is obtained.[4] The mechanical and bonding characteristics are also significantly influenced by the marginal fit. [5,6]

Controversy exists regarding the greater effect of the impression material or impression technique on the accuracy of impressions.[7] Silicon materials have different consistencies for use in different impression techniques. Several impression techniques are available, which differ in terms of the type of impression material and spacers used.[8] In the two-step technique, first, a putty impression is made to provide space for the light body, and then, the final impression is made using the light body. Several methods can be employed to create space in the two-step technique. [9] One suggested strategy for this purpose is to make a putty impression, relieve (cut out) the putty material at the finish line, and make a final impression with the light body.[9] In the one-step technique, the base and catalyst of the putty material are mixed in ratios recommended by the manufacturer. Then, the light

body is injected around the prepared tooth by a syringe, and the putty is applied in a tray. [10] There are several problems with both of these two-step impression techniques. The first issue is the fact that the thickness of the light body cannot be practically controlled, and we may observe that in some marginal impression areas, the putty has pushed aside the light body and the margin is recorded by the putty. The second reason is that the composition of putty contains materials of high elasticity, which can be exposed to hydraulic pressure and change; this change would not be apparent until the casting made from the mold has resided. [10] Hence, this study was done to evaluate the accuracy of one-stage and two-stage impression techniques.

MATERIALS & METHODS

A synthetic model of a molar tooth was crafted in a resin laboratory using a standard procedure for creating complete dental crowns. The model featured a prepared tooth structure with a finishing line that was 1 mm deep and had a convergence angle of 3-4°. The impression process was conducted ten times using both a one-stage technique and a two-stage technique, each time utilizing an appropriate tray. The aim was to assess the marginal gap, which refers to the vertical distance between the edge of the restoration and the finishing line of the prepared tooth, in four specific regions (mid mesial, distal, buccal, and lingual), using a stereomicroscope and following established guidelines. Statistical analysis was performed using an independent t-test, and the obtained data were processed using SPSS software.

RESULTS

Two different impression techniques, namely one-stage and two-stage, were employed to create impressions. The average marginal gap for each technique was calculated and compared. In the case of the mesial region, the p-value was determined to be 0.01. The mean marginal gap resulting from the one-stage technique was found to be greater than that of the two-stage technique. Notably, a statistically significant distinction was observed between the two impression techniques in various areas, including mid mesial, distal, and lingual regions, as well as the overall average across all surfaces ($p < 0.05$).

Table 1: Descriptive statistics

Marginal gap	Mesial	Lingual	Distal	Buccal
One stage Mean	110.4	99.4	94.3	106.12
Two stage Mean	95.28	77.05	69.45	93.42
P – value	0.01	0.005	0.005	0.3

DISCUSSION

One- and two-stage impression techniques are acceptable for many clinicians, and no significant difference has been reported in most of the studies.[4] Therefore, given the diversity of ideas about the impression technique, the effect of various factors on the treatment outcome, and the notion that application of the most accurate impression technique requires repeated impression in special cases due to inaccurate preparation finish line, the current research was conducted to evaluate and compare the accuracies of one- and two-stage impression techniques. In most in vitro studies similar to the present study, the prepared and standardized dies have been desirably used to evaluate the accuracy of copings, since 40 gypsum dies were made from one dental model, and precise control was exerted on preparation parameters like convergence rate of axial walls and preparation finish line.[11] Hence, this study was done to evaluate the accuracy of one-stage and two-stage impression techniques.

In the present study, two different impression techniques, namely one-stage and two-stage, were employed to create impressions. The average marginal gap for each technique was calculated and compared. In the case of the mesial region, the p-value was determined to be 0.01. The mean marginal gap resulting from the one-stage technique was found to be greater than that of the two-stage technique. A study by Jamshidy L et al, the results of independent test showed that the mean value of the marginal gap obtained by one-stage impression technique was higher than that of two-stage impression technique. Further, there was no significant difference between one- and two-stage impression techniques in mid buccal region, but a significant difference was reported between the two impression techniques in MDL regions and in general. The findings indicated higher accuracy for two-stage impression technique than for the one-stage impression technique.[12]

In the present study, a statistically significant distinction was observed between the two impression techniques in various areas, including mid mesial, distal, and lingual regions, as well as the overall average across all surfaces ($p < 0.05$). Another study by Franco EB et al, impressions ($n = 10$) of a stainless steel die simulating a complete crown preparation were performed using a polyether (Impregum Soft Heavy and Light body) and a vinyl polysiloxane (Perfectim Blue Velvet and Flexi-Velvet) in two consistencies, in one or two (without relief) steps. The single-step technique resulted in slightly larger dies, while the 2-step technique without relief produced significantly smaller dies, when compared to the

original stainless steel die. Stone dies obtained from 2-step polyether impressions were significantly smaller when compared to dies obtained from 2-step vinyl polysiloxane impressions (Impregum 2-step: −290.94 ± 71.64 μm; Perfectim 2-step: −201.86 ± 28.58 μm). No significant differences were observed in dies obtained from either polyether or vinyl polysiloxane with the single-step technique (Impregum single-step: 63.52 ± 16.60 μm; Perfectim single-step: 79.40 ± 14.11 μm). Higher discrepancies were detected for the 2-step impression technique without relief for the investigated materials.[13] Hafezeqoran A et al, the impressions were made by condensation and addition silicone (one-stage and two-stage impressions). The dimensional accuracy of all four materials techniques of impression (diameter, height, and the distance between dies) was the same in different times of impression. Dimensional accuracy of the die diameter and distance between dies in one-stage (Speedex) condensation silicon and one-stage (Panasil) addition silicone did not differ significantly, and their one-stage method developed more accurate casts compared to the two-stage method of the same impression material. The height of the casts prepared from the one-stage method through Speedex and Panasil did not differ significantly from the two-stage method of the same impression material.One-stage condensation silicone and one-stage addition silicone material techniques offered the maximum dimensional accuracy in the obtained casts. The time of impression did not have any significant effect in the accuracy of any of the four impression material techniques.[14]Vitti et al. evaluated the dimensional accuracy of stone casts based on the impression material and three impression techniques. They found that stone casts had high dimensional accuracy, and one-stage and two-stage putty-wash impression techniques and monophase light-body impression technique were not significantly different for marginal gap. [15]Among the 2-step procedures, the introduction of the hydraulic and hydrophobic impression technique has given a new perspective for impression taking. It is a 2-step dual-arch technique in which a preliminary impression made with a high-consistency material is relined with a lower-consistency material, both especially developed for the executing of this technique. According to this technique, the high-hardness property of the high-consistency vinyl polysiloxane is supposed to generate a hydraulic pressure that propels the low-consistency impression material into the sulcus and all the internal aspects of the preparation, eliminating the need for packing retraction cord or using die spacers.[16]

CONCLUSION

There is higher accuracy for two-stage impression technique than for the one-stage impression technique.

REFERENCES

1. Torabi K., Vojdani M., Adimi S. Dimensional accuracy in multiple casting with three different elastomeric impression materials. Journal of Islamic Dental Association of Iran . 2009;21(1):8–15.
2. Amini P., Tavallaei M. Effects of rewash on the accuracy of stone dies produced by putty-wash technique. Journal of Kerman University of Medical Sciences . 2013;20(2):169–178.
3. Aslani P. Teaching ‘the failures’, leading to ‘success’. Proceedings of the 52th Congress of Iranian Dental Association; May 2012; Tehran, Iran.
4. Nili M., Alighorbani R. Effect of the second wash in one-and two-step impression technique on marginal adaptation. Journal of Isfahan Dental School. 2012;8(2):126–135.
5. Sailer I., Pjetursson B. E., Zwahlen M., Hämmerle C. H. A systematic review of the survival and complication rates of all-ceramic and metal-ceramic reconstructions after an observation period of at least 3 years. Part II: fixed dental prostheses. Clinical Oral Implants Research. 2007;18(supplement 3):86–96.
6. Felton D. A., Kanoy B. E., Bayne S. C., Wirthman G. P. Effect of in vivo crown margin discrepancies on periodontal health. The Journal of Prosthetic Dentistry. 1991;65(3):357–364
7. Levartovsky S., Levy G., Brosh T., Harel N., Ganor Y., Pilo R. Dimensional stability of polyvinyl siloxane impression material reproducing the sulcular area. Dental Materials Journal . 2013;32(1):25–31.
8. Donovan T. E., Chee W. W. A review of contemporary impression materials and techniques. Dental Clinics of North America . 2004;48(2):445–470.
9. Chee W. W., Donovan T. E. Polyvinyl siloxane impression materials: a review of properties and techniques. The Journal of Prosthetic Dentistry . 1992;68(5):728–732.
10. Anusavice K. J., Shen C., Rawls H. R. Phillips’ Science of Dental Materials . Amsterdam, Netherlands: Elsevier Health Sciences; 2012.
11. Alhavaz A., Jamshidy L. Comparison of the marginal gap of zirconia-fabricated copings generated by CAD/CAM and Copy-Milling methods. Dental Hypotheses. 2015;6(1):23–26.
12. Jamshidy L, Mozaffari HR, Faraji P, Sharifi R. Accuracy of the One-Stage and Two-Stage Impression Techniques: A Comparative Analysis. Int J Dent. 2016;2016:7256496.
13. Franco EB, da Cunha LF, Herrera FS, Benetti AR. Accuracy of Single-Step versus 2-Step Double-Mix Impression Technique. ISRN Dent. 2011;2011:341546.
14. Hafezeqoran A, Rahbar M, Koodaryan R, Molaei T. Comparing the Dimensional Accuracy of Casts Obtained from Two Types of Silicone Impression Materials in Different Impression Techniques and Frequent Times of Cast Preparation. Int J Dent. 2021 Sep 27;2021:9977478.
15. Vitti R. P., Silva M. A. B., Consani R. L. X., Sinhoreti M. A. C. Dimensional accuracy of stone casts made from silicone-based impression materials and three impression techniques. Brazilian Dental Journal. 2013;24(5):498–502.
16. Hoos JC. A problem-solving impression technique. Dentistry Today. 1996;15(9):54–57