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Digital Evaluation of the Dimensional Accuracy of Four Different Implant Impression Techniques

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ABSTRACT

Aims: The aim of this study was to compare the dimensional accuracy of four different implant impression techniques of a mandibular edentulous model with five parallel implants. **Materials and Methods:** Five dental implants were placed in an edentulous mandibular model in parallel. A total of forty impressions were obtained using four different impression techniques. In Group 1 (G1) and Group 2 (G2), closed tray impressions with and without plastic caps, respectively, were used. In Group 3 (G3) and Group 4 (G4), open tray impressions with a direct splinted technique and an improved direct splinted technique, respectively, were used. All the impressions were poured with Type IV dental stone. Master model and study casts were scanned with a laser optical scanner and aligned by observing the superpositions of the anatomical landmarks using a software program. **Statistical Analysis Used:** Fifty measurements of the apical, coronal, and angular discrepancies of the master and study casts were obtained ($n = 50$) and statistically analyzed using a one-way analysis of variance and *post hoc* (least significant difference) and Friedman's tests. **Results:** The lowest accuracy was obtained from G2 when the angular (1.48°), coronal ($0.32 \mu\text{m}$), and apical ($0.14 \mu\text{m}$) deviations were tested ($P < 0.05$), whereas no statistically significant differences were found among the other groups ($P < 0.05$). **Conclusions:** In cases with five parallel mandibular implants, improved accuracy was achieved using the direct splinted technique, the improved direct splinted technique, or the closed tray impression technique with snap on plastic caps.

KEYWORDS: *Implant impression plastic caps, impression accuracy, improved direct splinting technique, indirect technique, three-dimensional optical scanning*

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INTRODUCTION

The passive fit of an implant-supported prosthesis is crucial for long-term treatment success. One of the most important steps in achieving an accurate, passively fitting prosthesis is the first step, which involves transferring the intraoral position of implants through impression procedures. An impression should reproducibly and precisely record the antirotational mechanism of the implants to ensure that a master cast that exactly duplicates the clinical condition is obtained. Therefore, the accuracy of this cast is dependent on the impression procedure and the implant master cast technique.^[1-4]

Conventionally, implant impressions are prepared using either direct (open tray, pick-up) or indirect (closed tray, transfer) technique. The accuracy of different impression techniques has been compared in numerous studies, although the results have not always been consistent.^[5-21] Regarding the impression procedures, it has been reported that the open tray (pick-up, direct) technique is more precise and predictable than the closed tray technique.^[5,9-13,17] The direct technique allows the

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