

## Introduction

Fabrication of a surveyed crown under an existing RPD requires designing a crown pattern that duplicates the coronal anatomy of the existing tooth including all undercut and non- undercut areas and occlusal rest seats. The aim of this study was to evaluate the accuracy of surveyed crown design duplication with CAD/CAM technology compared with the conventional methods in partially edentulous Kennedy class III arch form in an in vitro study.

## Materials and Methods

A maxillary dentiform with Kennedy Class III partial edentulism was used (missing teeth #4,13,14). Tooth #3 was prepared, and a PFM surveyed crown was fabricated and cemented with the appropriate contours to receive an Akers-type clasp: distal rest, circumferential direct retainer and reciprocal arm. A cast chrome-cobalt RPD framework was fabricated using conventional methods. The existing PFM crown was replaced by the surveyed study crowns for comparison. 10 PFM crowns were fabricated using a conventional method and 10 Zirconia crowns were fabricated using CAD/CAM method. The vertical position of HOC and crown thicknesses were measured in six spots (MB, B, DB, MP, P, DP) on each crown.

## Results

The results of the present study indicated that CAD/CAM technology provided superior accuracy of surveyed crown design duplication compared to the conventional method. In terms of HOC vertical

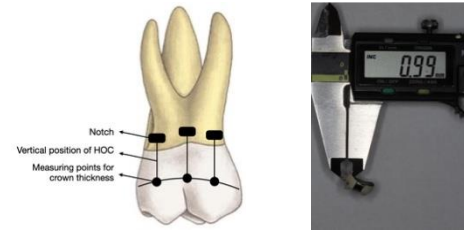


Figure 1. Illustration of vertical position of HOC and crown thickness

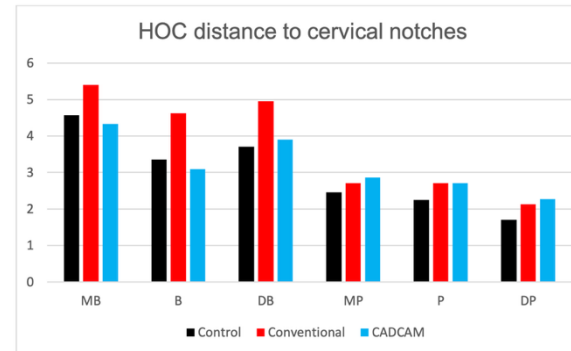


Figure 2. Comparison of HOC Distance Between the Different Groups

| Group        | MB (mm)      | B (mm)       | DB (mm)     | MP (mm)     | P (mm)      | DP (mm)     |
|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| Conventional | 0.83 ± 0.37  | 1.27 ± 0.64  | 1.23 ± 0.48 | 0.25 ± 0.39 | 0.46 ± 0.38 | 0.42 ± 0.45 |
| CAD/CAM      | -0.23 ± 0.76 | -0.25 ± 0.24 | 0.19 ± 0.28 | 0.4 ± 0.38  | 0.46 ± 0.3  | 0.57 ± 0.26 |
| P value      | 0.000        | 0.000        | 0.000       | 0.222       | 0.499       | 0.225       |

Table 1. Changes In the Vertical Position of HOC to the Cervical Notches in Each Group

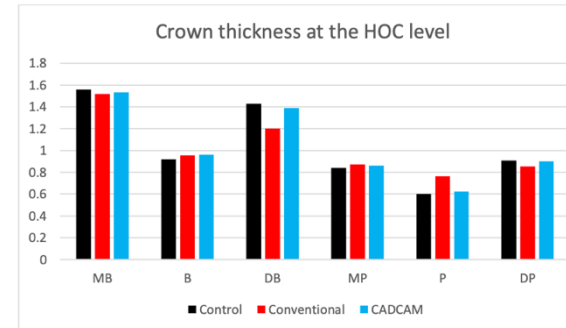


Figure 3. Comparison of Crown Thickness at the HOC Level

| Group        | MB (mm)      | B (mm)      | DB (mm)      | MP (mm)     | P (mm)      | DP (mm)       |
|--------------|--------------|-------------|--------------|-------------|-------------|---------------|
| Conventional | -0.04 ± 0.12 | 0.03 ± 0.09 | -0.23 ± 0.1  | 0.03 ± 0.08 | 0.16 ± 0.08 | -0.05 ± 0.09  |
| CAD/CAM      | -0.02 ± 0.03 | 0.04 ± 0.02 | -0.04 ± 0.02 | 0.02 ± 0.03 | 0.02 ± 0.02 | -0.008 ± 0.05 |
| P value      | 0.362        | 0.413       | 0.000        | 0.339       | 0.000       | 0.091         |

Table 2. Changes in the Crown Thickness at the HOC Level in Each Group

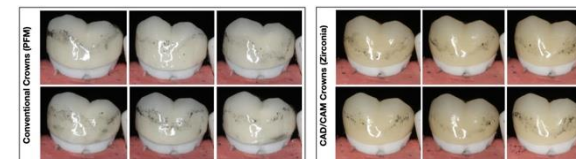


Figure 4. Visual Assessment of Crown Morphology in Conventional And CAD/CAM Groups

position, CAD/CAM crowns were significantly more accurate than the conventional crowns on the buccal side of the crown. On average, the HOC on the conventional crowns was  $0.83 \pm 0.37$ ,  $1.27 \pm 0.64$ , and  $1.23 \pm 0.48$  mm higher than the control crown on the MB, B, and DB sites, respectively. On the lingual side, there was no significant difference between the two methods. In terms of the crown thickness, both methods yielded relatively similar results. The largest difference in crown thickness between test and control crowns was found in the DB site of the conventional group where the crowns were significantly thinner than the control.

## Conclusion

CAD/CAM technology provided **slightly superior** accuracy of surveyed crown design duplication. In terms of **HOC vertical position**, CAD/CAM crowns were significantly more accurate only on the buccal side. In terms of the **crown thickness**, both methods yielded relatively similar results.

## References

- Lee, J.-H., Fabricating a crown under an existing removable partial denture with impression scanning and CAD-CAM technology. The Journal of Prosthetic Dentistry, 2020. 124(2): p. 148-152.
- Yoon, T.-H. and W.-G. Chang, The fabrication of a CAD/CAM ceramic crown to fit an existing partial removable dental prosthesis: a clinical report. The Journal of Prosthetic Dentistry, 2012. 108(3): p. 143-146.