COMPUTERIZED DESIGN AND FABRICATION OF GOLD CROWN

ACCE - 46

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Abstract

Traditionally, cast high-noble dental crowns have been manufactured using conventional impressions, followed by lost-wax and metal casting techniques. However, the advancements in digital systems in dentistry have allowed us to challenge these conventional methods for the acquisition, design, and fabrication of dental restorations. The aim of this study is to present a clinical report of the fabrication of a cast gold crown using a fully digital approach.

Clinical Considerations

57-year-old female patient presents to Penn Dental Medicine with a chief complaint “my crown fell off.” Upon clinical and radiographic examination, existing porcelain fused to metal (PFM) crown on tooth #31 had been de-bonded most likely due to recurrent caries on the mesial ((Figures 1-4).

Figure 1. PFM buccal view.

Figure 2. PFM lingual view.

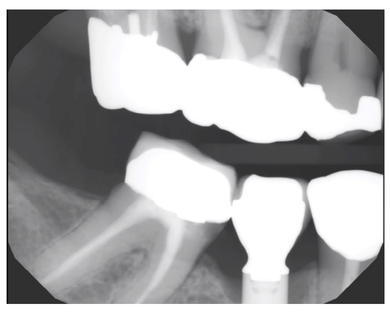

Figure 3. Pre-treatment radiograph (ON).

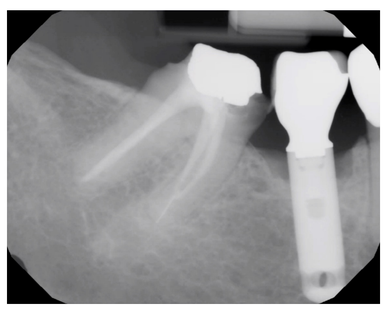

Figure 4. Pre-treatment radiograph (OFF).

Given the patient’s heavy bruxism, occlusal wear of other existing porcelain restorations, and opposing existing gold crowns, gold was the material of choice for the new crown to be fabricated.

It was discussed with the patient that the existing contact with the implant crown on tooth #30 was not ideal and that it could affect the long-term prognosis of the new crown on tooth #31 given its mesial inclination and the current shape of #30 crown. The patient decided not to replace #30 crown, originally placed in 1994, but agreed to its re-contouring to improve the new contact with #31.

After the removal of the failed PFM crown and existing mesial decay, the tooth was re-prepared maintaining the existing amalgam core, reducing the margins gingivally, and choosing a chamfer marginal design (Figure 5).

Figure 5. Preparation of tooth #31 and re-contoured implant crown of tooth #30

Results

A CAD/CAM system was used for the design and fabrication of the crown. Digital scans were obtained using CEREC Omnicam Dentsply Sirona (Figures 6-8).

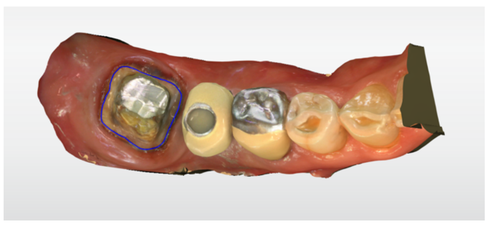

Figure 6. Preparation scan lower arch.

Figure 7. Preparation scan upper (opposing) arch.

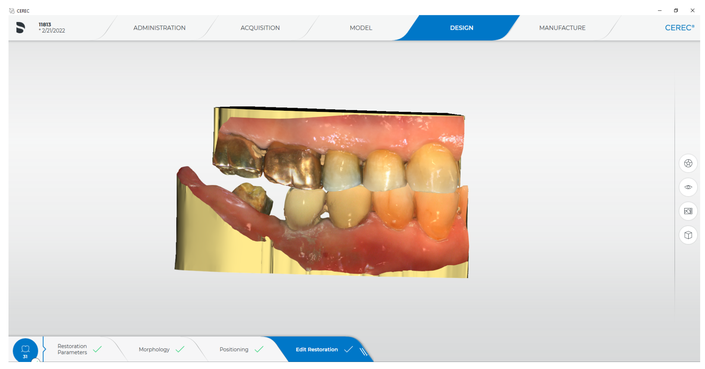

Figure 8. Buccal view scan.

The Zhan Technique laboratory in Miami, FL used to design the final restoration and print the 3D models. The Argen company used these to mill the final restoration in high noble yellow full cast alloy with 58%Au (Figures 9-10).

Figure 9. Occlusal view final crown.

Figure 10. Intaglio view final crown.

Upon delivery, minimal adjustment was needed on lingual cusps, optimal contact with the implant crown on tooth #30 was obtained and verified using floss, and margins were tightly sealed as verified in pre-cementation radiograph (Figure 11). Finally, 3M RelyX Universal Resin Cement was used for delivery (Figure 12).

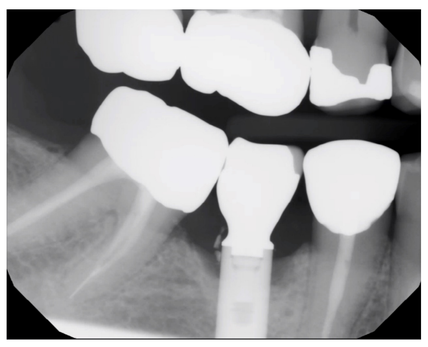

Figure 11. Pre-cementation radiograph.

Figure 12. Occlusal view delivery.

Conclusions

The combination of full digital workflow with milled high-noble restoration resulted in an improved marginal fit and reduced occlusal adjustments, in contrast to the previously used porcelain fused to metal material in a patient with parafunctional habits, specifically bruxism. In addition, the entire restorative and laboratory steps were simplified by the use of digital technologies such as scanners, printers, and milling.

References

1. The Argen Company -- https://argen.com/store/products/4086#/

Acknowledgements

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