

Gingival Response to Crowns: A 3-Year Report

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“Clinical Showcase” is a series of pictorial essays that focus on the technical art of clinical dentistry. The section features step-by-step case demonstrations of clinical problems encountered in dental practice. If you would like to propose a case or recommend a clinician who could contribute to this section, contact editor-in-chief Dr. John O’Keefe at jokeefe@cda-adc.ca.

When crowns are made with poor marginal fit, an adverse gingival response, particularly inflammation and edema, is sure to follow. However, if poorly fitting crowns are later replaced with properly fitted crowns, the gingival tissue can heal and the damage can be reversed. Dentists can now select from a wide variety of nonmetallic restorations. The restorations that are suitable for cases with demanding esthetic requirements include all-porcelain crowns and porcelain veneers, which are associated with clinical success and long service when used in the anterior region of the mouth.¹⁻³ They offer life-like esthetic results that can be highly satisfying for both the patient and the dentist. In the following clinical case, such restorations were used to address an adverse gingival response combined with a severe esthetic problem caused by improper use of porcelain-bonded-to-metal crowns.

Clinical Case

A 25-year-old otherwise healthy man presented with unsightly and failing porcelain-fused-to-metal crowns on his maxillary central incisors and asked the practitioner to improve their appearance (Fig. 1).

The gingival length of the crowns was mismatched by 2 mm, and 1 crown looked wider in mesiodistal dimension than the other. From the facial perspective, metal was evident at the incisal edges, perhaps because of wear. The crown margins were poorly fitted, and there was extensive hyperplasia and inflammation of the gingival tissues. The colour of the porcelain veneer was too yellow and did not match that of adjacent teeth, and the glaze layer was partially lost.

Assessment of the periodontal pocket depth on the buccal aspects of the central incisors revealed that gingivectomy to bring the margins of the gingival tissues of both teeth to the same level would leave sufficient depth for adequate biologic width.

The maxillary lateral incisors were too small relative to the central incisors, which resulted in lack of harmony in the set-up of the anterior teeth. Radiographic examination revealed that 1 of the 2 central incisors had previously undergone endodontic treatment.

Treatment: Plan and Execution

Following removal of the old crowns, tooth 11 was to undergo post and core build-up. Gingivectomy was to be carried out to optimize clinical crown length for

Figure 1: Facial view of the anterior teeth shows 2 porcelain-fused-to-metal crowns on the maxillary central incisors. The crowns have undergone incisal wear, which has revealed the metal backing. Partial loss of the glaze layer has resulted in a granular surface texture. The 2 crowns do not match in terms of either height or width. The gingival tissues are inflamed and hyperplastic because of the ill-fitting margins. The lateral incisors appear much smaller than the central incisors (contrary to what would usually be expected), which creates a lack of harmony in the set-up of the anterior teeth.





Figure 2: The 2 old crowns were sectioned and removed. When the crown was removed from tooth 11, the core became dislodged, so it was also removed.



Figure 3: After scaling, gingivectomy was carried out to increase the clinical crown length of tooth 21 to match that of tooth 11. Tooth 11 was restored with a nonmetallic post and a composite core build-up and was then re-prepared to receive an all-porcelain crown with a wrap-around shoulder finish line. Tooth 21 underwent the same re-preparation. Teeth 12 and 22 were prepared to receive porcelain veneers.



Figure 4: The 2 all-porcelain crowns and the 2 porcelain veneers as received from the laboratory.



Figure 5: The fitted surfaces of the 2 porcelain crowns. The core was made of an aluminum oxide-based porcelain.



Figure 6: Immediate postoperative view following cementation of the 2 porcelain crowns and the 2 porcelain veneers. Although there is significant improvement in tooth esthetics at this point, the gingival tissue has not completely recovered, and there is evidence of gingival hyperplasia.



Figure 7: Postoperative view 3 years after placement of the crowns and the porcelain veneers. There is better healing of the gingival tissues and proper shaping of the interdental papilla between teeth 11 and 12.

teeth 11 and 21. Both of these teeth were to be re-prepared to receive all-porcelain crowns. Teeth 12 and 22 were to be prepared to receive porcelain veneers that would increase their size (for better harmony with the central incisors).

Scaling and polishing was carried out to remove calculus and stain. When the 2 old crowns were removed, the core material on tooth 11 was also dislodged (**Fig. 2**). Gingivectomy was performed to increase the clinical crown length of tooth 21 to match that of tooth 11. Tooth 11 received a nonmetallic fibre post secured with resin cement and composite core build-up. As planned, diamond burs were used to re-prepare teeth 11 and 21 with a 1.2-mm finish line all around the shoulder. Similarly, teeth 12 and 22 were prepared to receive

porcelain veneers (**Fig. 3**). Double retraction cords were placed around the crown margins of teeth 11 and 21 before use of a silicon impression material and a stock tray to take an impression. Tooth shade was determined in daylight with a shade guide. Porcelain crowns with aluminum oxide core were made for teeth 11 and 21, with matching feldspathic porcelain veneers for teeth 12 and 22 (**Figs. 4 and 5**). The 2 crowns were first secured with a resin cement that had performed well under laboratory testing conditions.⁴ The try-in paste of the resin cement was tested with the 2 veneers to determine the optimum colour match, and the 2 veneers were then cemented with the appropriately shaded cement. Although some manufacturers of all-porcelain crowns are highly confident



Figure 8: Close up view of the left side.



Figure 9: Close up view of the right side.



Figure 10: Lingual view shows shaping of the interdental papilla between teeth 11 and 21 is ideal.

of the strength of their products, to the point that they do not recommend the use of resin cement for cementation, research has shown that microleakage occurs when resin cement is not used, and this may cause recurrent caries over the long term.⁵ Facial photography of the restored teeth (Fig. 6) immediately after the procedure showed significant improvement in the esthetics of the teeth relative to the preoperative view, but the gingival tissues had not yet completely recovered and there was evidence of some remaining gingival hyperplasia. A facial view obtained 3 years after placement of the crowns and the porcelain veneers (Figs. 7–9) provided evidence of proper healing of the gingival tissue between teeth 11 and 21 and proper shaping of the interdental papilla. A lingual view obtained at the same time showed ideal shaping of the interdental papilla between teeth 11 and 21 (Fig. 10).

This clinical case demonstrates the consequences of poor-quality crown restorations with badly fitting margins and for which there was no attempt to control dimensional matching. Although the age of the porcelain-fused-to-metal crowns was unknown, over the years they had broken down and become extremely unsightly. When the replacement crowns were planned, provision was made to ensure that the crowns would be matched in size (by gingivectomy to increase the length of the clinical crown of tooth 21). The original preparations were refined to ensure definitive finish lines that would be easy for the technician to follow. The impression-taking procedure was carried out carefully, with proper gingival retraction to ensure that all important details of the margins were captured by the impression material. The margins of the new crowns were ideally fitted

to the finish lines of the preparations. This aspect is important because it eliminates the causes of gingival irritation and promotes proper healing of the gingival tissues.

This case provides clear evidence that if the interproximal gingival spaces are not violated by overextension of the crown margins, proper healing of the gingival tissues can occur.

Conclusion

The preparation of crown restorations with proper marginal fit and appropriate dimensions results in healthy gingival tissues and satisfactory esthetic results. ✦

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