



Professional Resources

Advanced Magnification for Improved Quality Control: Balancing the Art, Science, and Business of Dentistry

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The use of a microscope helps the clinician and technician achieve the BALANCE between the ART, SCIENCE, and BUSINESS of dentistry. Having the opportunity to visualize the preparation, fabrication, and placement of restorations fulfills the art. Using science-based principles for design and cementation helps ensure longevity. Providing prosthetic replacements that offer aesthetics and longevity for our patients gives our practices the important business aspect for growth and profit.

Improved visualization results in an improvement in quality for the dentist. Being able to see greater detail when preparing teeth, inspecting impressions, and finishing the final restorations will result in greater doctor and patient satisfaction. The ability to "see what you are doing" will assure that the preparation and final insertion will be done to the maximum of the doctor's ability.

The microscope was traditionally used during endodontic procedures to allow clinicians to find canals that were previously difficult to find and that may have been committed to a surgical corrector (Figure 1). Use of microscopes for improved visualization of the operative field has increased the application of these devices within the general dental office. Improved vision increases the ability to provide improved dentistry. The following two cases demonstrate the use of the microscope in the preparation and insertion of anterior restorations. The images provided are not used to demonstrate the complete documentation of the cases, but to show how valuable the increased visual acuity is in the preparation and finishing of the cases.

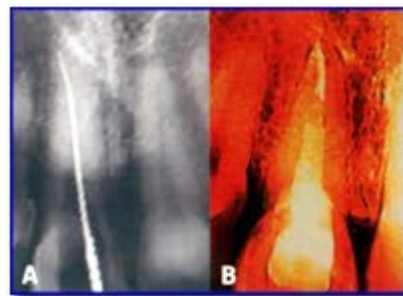


FIGURE 1A. Magnified radiograph demonstrates instrumentation of the existing root canal space.

1B. Postoperative evaluation demonstrates complete root canal fill.

CASE PRESENTATIONS

Case 1

A 40-year-old male patient presented for restoration of the maxillary region (**Figure 2**). Since the patient desired a conservative preparation design in order to maintain as much natural tooth structure as

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possible, porcelain veneers with minimal reduction were selected. A diamond bur (856-020, SS White Burs, Lakewood, NJ) was used to complete the preparations without the removal of decay to gain the initial outline form (**Figures 3 and 4**). A caries detector solution was used to locate microleakage around the preexisting restorations and the decay was removed (**Figure 5**). The preparations were readdressed once the decay was removed and polished using finishing burs (OS1, FT9, Brassler USA, Savannah, GA) to develop smooth margins (**Figures 6 and 7**). Impressions were taken using the hydrophilic and hydrophobic (H&H) technique (J. Morita, Irvine, CA) without cord retraction (**Figures 8 and 9**). The microscope allowed the clinician to clearly observe the need to retake the impression as noted on the distal aspect of tooth #8(11). Magnification of the final restoration assured an excellent marginal finish (**Figure 10**).



Figure 2. CASE 1. Preoperative facial view upon presentation. The preexisting composite restorations were defective, and the patient desired a conservative restoration using porcelain veneers.



Figure 3. The veneer preparation was performed using rotary handpieces and diamond burs under increased magnification to ensure proper reduction.



Figure 4. Magnified view of the preparations. Note the precise ending of the finish line without wounding the gingiva as well as the distal anatomy of tooth #8(11).



Figure 5. The microscope was used to visualize decay removal and to ensure complete removal of the defective tooth anatomy.



Figure 6. The final tooth reduction was evaluated. Note the existence of striations in the preparations.



Figure 7. The preparations were polished under high magnification to allow for finishing without injury to the surrounding gingiva.



Figure 8. Magnified image of impression showing incomplete capture of the tissue margins.



Figure 9. Magnified view of the anterior veneer preparations.



Figure 10. Postoperative evaluation following delivery and cementation of the final restorations. Marginal integrity was evaluated at x30 magnification to ensure proper integration.

Case 2

A 15-year-old female patient presented for restoration of the maxillary region (**Figure 11**). Teeth #7(12) and #10(22) were missing and required orthodontic treatment as well as restoration with cantilevered pontics. The patient desired conservative restoration of the anterior region using porcelain veneers. The cantilevers were scheduled for placement on the lingual aspects of teeth #6(13) and #11(23).



Figure 11. CASE 2. Preoperative facial view of the patient upon presentation. Teeth #7(12) and #10(22) were missing and aesthetic restoration of the entire anterior region was desired.

Restorative Procedure

Bone sounding and bipolar tissue removal (Bident, Philadelphia, PA) were performed to ensure minimal damage to the gingival tissue. Tissue healing and tooth preparations were evaluated under high magnification and care was taken during final polishing to prevent damage to the soft tissues (**Figure 12**). While the issue of cantilevers for missing teeth has been the subject of literature and beyond the scope of this article, please note the design of the lingual retainer preparation, which was used to provide mechanical and chemical retention (**Figure 13**).

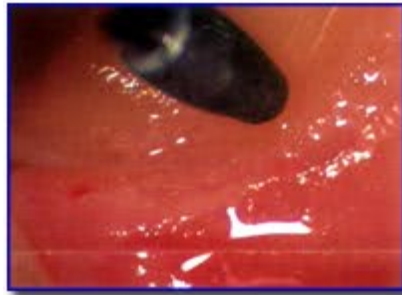


Figure 12. The veneer preparations were modified with a finishing bur under high magnification, taking care to preserve the soft tissue margins.



Figure 13. Occlusal view of the veneer preparation demonstrates placement of cantilever design for mechanical and chemical retention.

Impressions were obtained using the H&H technique to allow for accurate reproduction of the prepared structures (**Figures 14 and 15**). Preoperative photographs and impressions were forwarded to the laboratory to allow development of working models (**Figure 16**), and the cantilever pontics were fabricated with a gold arm on the lingual aspect of the preparations (**Figure 17**). Upon return of the definitive restorations, the teeth were cleaned using pumice and water and acid-etched prior to the application of a primer (Panavia, Kuraray, New York, NY). The final insertion of these restorations was performed using a dual-cured resin cement (Panavia F, Kuraray, New York, NY) according to the manufacturer's instructions. The veneers were finished and bite adjusted in excursive movements and the final finish verified with high magnification (**Figure 18**). The final polishing was performed using a diamond polishing kit (ET, Brasseler USA, Savannah, GA) and rubber discs, points, and cups (One Gloss, Shofu, Menlo Park, CA). The definitive restorations were inserted with great patient satisfaction (**Figure 19**).



Figure 14. Magnified view of the impression taken using the H&H technique demonstrates marginal detail and accuracy.



Figure 15. The tooth preparations and location of the edentulous spaces were accurately captured and evaluated prior to forwarding the impressions to the laboratory.



Figure 16. Impressions were forwarded with preoperative photographs to allow laboratory fabrication of a preoperative stone model of the patient's existing condition.

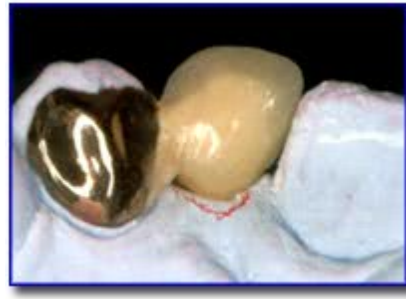


Figure 17. The cantilever pontic was fabricated with a gold lingual arm and evaluated under increased magnification to ensure proper fit prior to delivery.



Figure 18. The definitive restoration was seated intraorally and polished using finishing burs (ET, Brasseler USA, Savannah, GA).



Figure 19. Postoperative facial view demonstrates aesthetic integration of the definitive veneers and pontic restorations.

CONCLUSION

Incorporation of increased magnification allows the user improved visualization of the surgical field. Both clinicians and technicians can use this tool to ensure development of aesthetic and functional restorations for any type of treatment indication. Evaluation of the existing structures can be facilitated with ease to allow proper diagnosis and treatment planning. Tooth preparation, impression taking, and maintenance of the gingival architecture can be carefully implemented using this tool to allow accuracy and precision during the clinical protocol. Laboratory fabrication is also facilitated using magnification, as the working models and restorations can be carefully evaluated to determine proper fit prior to intraoral delivery. Use of increased magnification allows the restorative team to clearly communicate any existing structures and details that must be reproduced in the restoration, for consistent and reliable results.

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