

# Clinical Realities

## CONSERVATIVE RESTORATION OF COMPROMISED POSTERIOR TEETH WITH DIRECT COMPOSITES: A 7-YEAR REPORT

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Reproduction of the natural performances of intact teeth (biomimetics) represents a driving force in restorative dentistry. So-called “biomimetic” treatments require a global understanding of natural tooth structure, biology, morphology, and external shape. Analysis of cuspal flexure and plastic yielding in posterior teeth has permitted chief advances in the performance of the tooth/restorative complex. Subclinical cuspal microdeformation (below the threshold of chair-side observation) has been identified since the 1980s, and it is now well accepted that intact teeth demonstrate cuspal flexure as a result of their morphology and occlusion. Restorative procedures can increase cuspal flexure under occlusal load, which can result in altered strength, fatigue fracture, and cracked tooth syndromes. Such knowledge has allowed the development of numerous methods to improve fracture resistance of teeth with full or partial coverage, and — more recently — conservative adhesive techniques. The present article addresses one end of the spectrum in which freehand composite materials can be utilized simply and efficiently for the treatment of compromised, endodontically treated posterior teeth.

### Patient Presentation

A 49-year-old female patient presented for prosthetic rehabilitation with full-coverage crown restorations and ceramic inlays. Tooth #16(28) was structurally weak and demonstrated an uncertain prognosis due to furcation lesions. Endodontic treatment was indicated and the buccodistal root required removal. When pulpless teeth are treated with traditional prosthodontic procedures (rather than more conservative adhesive techniques), various types of posts and cores must be placed. This, in turn, may generate numerous complications (eg, cracks and root fractures). It is now established that both the biomechanical properties and the moisture content of nonvital teeth are not significantly different from those of vital teeth. The loss of tooth structure thus becomes the primary cause of failure, not the effect of pulp removal on the remaining tooth. In this case presentation, the extreme structural weakness of a compromised tooth could be partially compensated by the radically conservative approach combined to a selective bonding technique. Since a post system was not utilized, the remaining sound tissues were maintained. The success of this choice transpires through 7 years of clinical service.



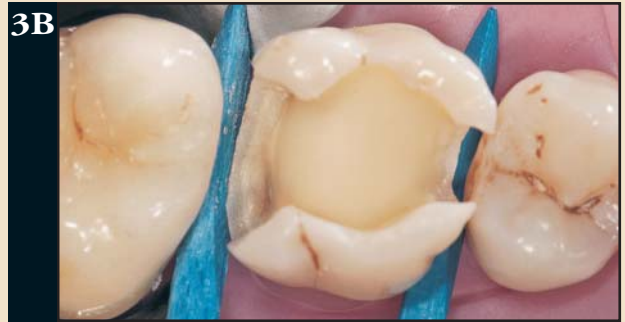
**Figure 1A.** Baseline immediate postoperative view following placement of a large mesio-occlusal distal (MOD) direct composite restoration.



**Figure 1B.** Postoperative occlusal view at 7-year follow-up. No major alterations can be detected.

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**Figures 2A,B,C.** Endodontic treatment had been performed on tooth # 16(28). Furcation lesions in relation to the distobuccal root were surgically eliminated and the preexisting filling material was removed. An apical opening of the pulp chamber that occurred as a result of root resection was visible.

**Figures 3A,B,C.** Wooden wedges were immediately placed in order to ensure progressive displacement of the adjacent teeth and to secure the future interdental contact surfaces. A limited amount of amalgam was condensed to fill the gingival floor and obtain a perfect seal of the resection opening. A traditional glass-ionomer cement (deTrey, Dentsply/Caulk, Milford, DE) was used as a liner to fill the main cavity volume; a maximum amount of enamel was thus preserved. Selective bonding of the restoration was used, ie, the acid-etch technique was performed only on the marginal enamel and dentin.

**Figures 4A,B,C.** Stratification of the composite material was performed following implementation of the "sandwich technique." Hybrid composite (Herculite XRV, Kerr/Sybron, Orange, CA) with shades similar to natural enamel was placed and characterized with intense stains (Kolor+ Plus, Kerr/Sybron, Orange, CA). This internal buildup was subsequently covered with a semitranslucent hybrid material (Brilliant Incisal, Coltene/Whaledent, Mahwah, NJ). Each cusp and anatomical lobe was cured separately to facilitate the elaboration of a sophisticated morphology and a functional masticatory surface. Radiographic analysis was performed to determine the sound situation of tooth and supporting tissues.

**Figures 5A,B,C.** Comparative occlusal views taken preoperatively and immediately postoperatively (baseline) demonstrated aesthetic integration and staining that matched the natural occlusal sulcus of the adjacent teeth.

**Figures 6A,B,C.** Radiographic and clinical views were obtained during the 7-year follow-up evaluation. No recurrent decay or major alterations of the restoration were noted. The composite material demonstrated excellent optical behavior and cracks were not evident in the surrounding enamel, despite the extreme size of the restoration and presence of an antagonistic metal-ceramic fixed partial denture. Endodontic and periodontal conditions remained stable. The successful integration of this direct composite restoration might be related to the incorporation of selective bonding, the presence of marginal enamel, and the glass-ionomer lining that was utilized to limit or absorb the shrinkage of the overlying composite material.

### Acknowledgment

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