Porcelain Jacket Crowns: Back to the Future Through Bonding

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More than 50 years before bonding to tooth structure (and especially to dentin) was available, metal-free porcelain restorations were used in the anterior dentition and cemented without adhesion, ie, so-called porcelain jacket crowns.[1] Those restorations yielded favorable esthetic results at the cost of high failure rates, due to the lack of cohesion between the brittle restorative material and the tooth. Their popularity recovered in the early 1990s,[2,3] when fourth-generation dentin bonding agents were introduced to the cementation procedure, significantly strengthening the restored teeth[3] and leading to very high patient satisfaction.[4] Later in the same decade, the dentin bonding procedures were further optimized.[5,6] Significant improvements of the dentin bond stability were obtained through the immediate dentin sealing (IDS) technique, which involves the application of the dentin adhesive to the freshly cut dentin before making the final impression.[7] The ability of feldspathic porcelain to be etched and silanated to produce reliable resin bonding makes it the perfect material for use with the IDS technique. Further, the porcelain bond has been refined by meticulous post-etching cleaning techniques and heat drying of the silane.[8–11]

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More recently, the strength of the technique was advanced by the concept of preheating,[12] allowing the use of regular, highly filled microhybrid restorative composites as luting agents, which provide superior mechanical properties, better color stability, and ease of delivery of the restoration.

This article presents the case of a 35-year-old female patient with existing porcelain-fused-to-metal crowns and significant darkening of the gingiva surrounding the restorations. This strong "umbrella effect"[13] generated by the metal substructure and dark underlying dentin was resolved by the combination of the walking bleach technique, adhesively retained core buildups, and porcelain jacket crowns. No radicular posts were used. This therapeutic approach also permitted the maximum conservation of intact tooth substance. The advanced use of the refractory die technique in an alveolar cast[14] is also presented.

1a

1b

1c

Figs 1a to 1c Preoperative views. Note the gray umbrella effect of the gingiva.[13]

2a

2b

3a

3b

4

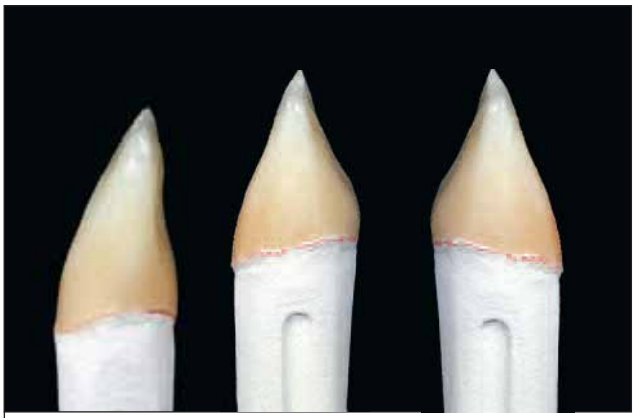
Figs 2a and 2b Intraoral views after removal of the existing crowns. A fair amount of intact dentin allowed the stabilization of provisional crowns and the use of nonvital bleaching.

Figs 3a and 3b Intraoral views at the end of the bleaching process (walking bleach technique using sodium perborate and hydrogen peroxide for 3 sessions). The placement of adhesive composite resin core buildups was delayed for 2 weeks to allow the leaching of peroxide and recovery of the potential dentin bond strength.

Fig 4 Core buildups (Optibond FL dentin adhesive, Kerr, Orange, CA, USA; Miris[2] composite resin, Coltène/Whaledent, Cuyahoga Falls, OH, USA).

8a

8b



9

Figs 8a and 8b Fabrication of the jacket crowns using the refractory die technique (Creation CC porcelain, Jensen, North Haven, CT, USA; Orbit Vest refractory material, GC America, Alsip, IL, USA). Note the careful segmentation (vertical separations) of the opaque dentin and regular dentin buildup to allow the decoupling of the porcelain shrinkage stress and prevent crack formation during cooling.

Fig 9 Finished primary dentin buildup.

10a

10b

Figs 10a and 10b *(a)* Application of the last porcelain layer in the form of a thin enamel skin. *(b)* Completed restorations on the alveolar cast.

Figs 11a and 11b Finished refractory-die–generated porcelain jacket crowns and veneer.

12a

12b

Figs 12a to 12c Delivery procedures. Appropriate isolation of the preparation margins was obtained by the placement of a deflection cord. Airborne-particle abrasion of the tooth preparation (30-µm aluminum oxide) *(a)* followed by etching, rinsing, and drying *(b)*. The preparation and fitting surface of the restoration were coated with adhesive resin (Optibond FL, bottle no. 2) before applying the jacket crown (previously etched, cleaned, silanated, and heat-dried) loaded with preheated dentin-shade composite resin (ENA HFO, Micerium, Avegno, Italy) *(c)*.

12c

13a

13b

13c

Fig 13a to 13c Final results.

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