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Core Buildup Repair Using a Clear Matrix: A Case Report and Clinical Technique

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Clinical Relevance

In some cases, cores fractured between the impression and delivery stage may be predictably restored to original contour, allowing for delivery of the crown.

SUMMARY

The fracture of core buildup material is common in dental practice. This article describes a core buildup repair technique utilizing a custom matrix. This technique enables the dentist to reestablish the original contour and alignment of the broken core buildup and assures excellent crown fit in a short amount of time with a predictably successful outcome.

INTRODUCTION

The fracture of core buildup material is common in dental practice. Tooth fracture has been reported to account for 56% of retreatments of crowned teeth (Walton, 1999). To solve this problem, the dentist needs to reestablish the original alignment and contour of the core buildup for ideal fit and esthetics. Different techniques have been reported to replace or fabricate a post and core for an existing crown (Brady, 1982; Heilman, 1998; Portera & Thomson, 1983; Sabbak, 2000; Rosen, 1998; Chan, 2003).

This article presents a clinical case and describes a technique that enables the dentist to solve this clinical situation quickly and successfully by reestablishing the original contour and alignment of the broken core.

Figure 1. *Preoperative facial view of broken core on upper right lateral incisor tooth #7.*

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Figure 2. *Lingual view of broken upper right lateral incisor tooth #7. There was enough interradicular and coronal tooth structure to bond the light cured resin based composite without the need for a post.*

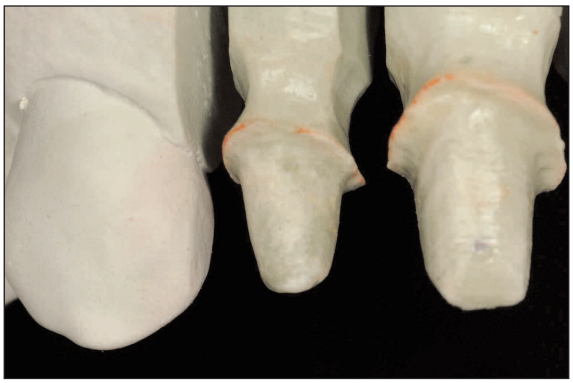

Figure 3. *Facial view of working dies. Note the original contour of the core buildup on the upper right lateral incisor tooth #7.*

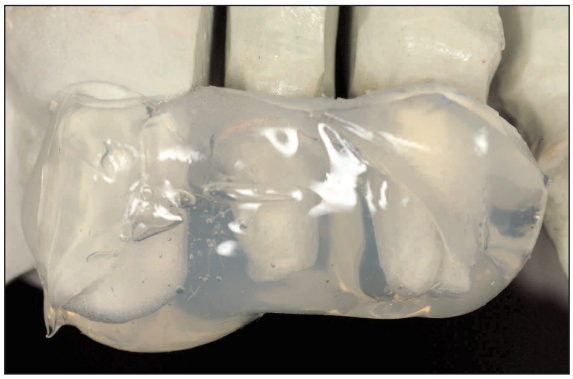

Figure 4. *Clear polyvinyl siloxane (PVS) impression of the preparation model (Clearly Affinity, Clinicians Choice, London, Ontario, Canada). One tooth on each side was included in the impression for stabilization of the matrix in the patient's mouth.*

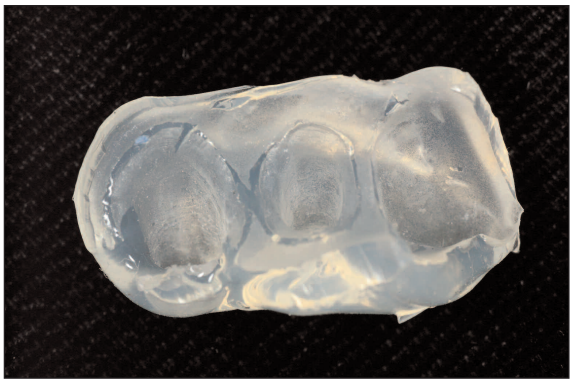

Figure 5. *Internal view of the clear polyvinyl siloxane matrix. Note the detailed reproduction of the die.*

Figure 6. *Core buildup was done by incremental layering of resin-based composite. Incremental placement continued until the canal and chamber were filled to the most coronal portion of the tooth.*

Figure 7. *Lingual view of core buildup after incremental layering of resin-based composite. Increment placement continued until the canal and chamber were filled to the most coronal portion of the tooth.*

CLINICAL REPORT

A 56 year-old patient presented to the Department of Operative Dentistry at The University of Iowa College of Dentistry for replacement of old porcelain-fused-to-metal (PFM) crowns on teeth #7, #8, #9 and #10 because of exposed metal margins. After thorough examination and presentation of treatment options to the patient, all-ceramic Procera crowns were selected to

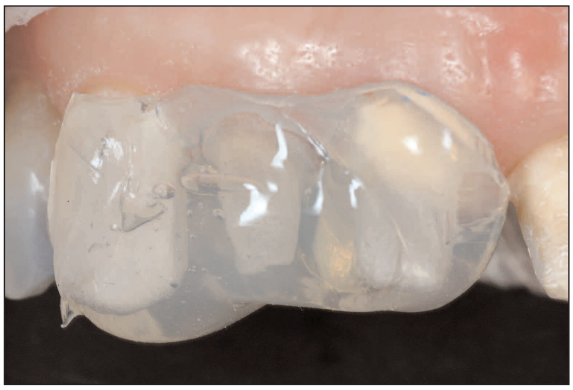

Figure 8. *The polyvinyl siloxane matrix was used to press and shape the final resin-based composite layer. The resin-based composite was then cured through the matrix using a high-intensity halogen light.*

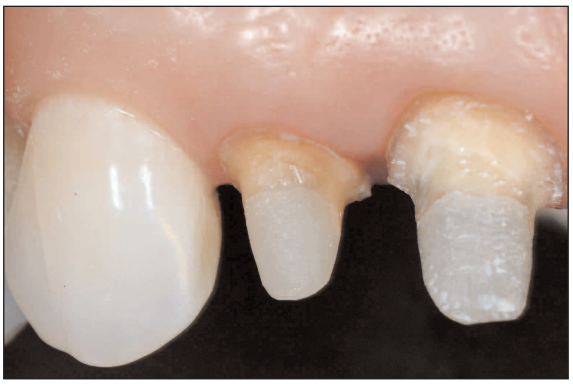

Figure 9. *Facial view of the completed resin core. Note reproduction of the original contours and alignment.*

Figure 10. *Facial view of the Procera crowns on the working die.*

Figure 11. *Facial view of the completed restorations. Note the natural shade matching and esthetics.*

replace the existing crowns. After sectioning and removal of the previous PFM crowns, it was determined that the existing core buildups were in good condition and would not require replacement. The tooth preparations were modified for all-ceramic crowns and conventionally provisionalized.

At the cementation appointment, the patient reported breaking one of the provisional restorations while eating. Examination revealed a broken core buildup on tooth #7 (Figure 1). The patient desired to have the crowns cemented at that visit and did not want to go into a new provisional period required for a new buildup and crown preparation. These crowns were in the esthetic zone, so the recreation of ideal fit and alignment was crucial for successful treatment.

TECHNIQUE

After cleaning the root canal space, there was enough interradicular and coronal tooth structure to bond resin-based composite and provide adequate retention and support for the crown without the need for a post (Figure 2). A decision was made to use light-cured resin composite to replace the fractured core buildup. The advantages of light-cured resin-based composite include controlled setting, better color stability and superior mechanical properties (Combe & others, 1999).

A clear polyvinyl siloxane (PVS) impression was taken from the preparation model (Figure 3) using Clearly Affinity (Clinicians Choice, London, Ontario, Canada). One tooth on each side was included in the impression for stabilization of the matrix in the patient's mouth (Figures 4 and 5).

After removal of the provisional restorations, the teeth were thoroughly cleaned using flour of pumice. The clear PVS matrix was tried in the patient's mouth to assure fit. Tooth #7 was etched for 15 seconds using 35% phosphoric acid gel (Ultra-Etch, Ultradent Products, South Jordan, UT, USA) and thoroughly washed. The adhesive system (Single Bond, 3M ESPE, St Paul, MN, USA) was applied and cured using a high-intensity halogen light (Optilux 501; Demetron/Kerr Corp, Orange, CA, USA) according to manufacturer's instructions. Thin increments of a light shade (A1) resin-based composite (Z-250, 3M ESPE) were placed in the root canal and light cured according to the man-

ufacturers instructions using a high-intensity halogen light (Optilux 501; Demetron/Kerr Corp). Incremental placement continued until the canal and chamber were filled to the most coronal portion of tooth structure (Figures 6 and 7). The resin-based composite (Z-250, 3M ESPE), applied inside the clear polyvinyl siloxane matrix and positioned on the adjacent teeth (Figure 8), was then light cured through the matrix for five seconds. The matrix was removed, excess material was removed using a #12 Bard Parker blade (Becton, Dickinson and Co, Franklin Lakes, NJ, USA) and the core buildup was cured from all directions for 40 seconds (Figure 9). The crowns (Figure 10) were tried in and occlusion was checked. The esthetics were checked visually by both the dentist and patient, then the crowns where adhesively bonded, occlusion checked and centric and eccentric contacts adjusted (Figure 11).

CONCLUSIONS

This article presents a core repair technique utilizing a custom matrix to reestablish the original contour and alignment of the broken core and to assure excellent crown fit. This technique is useful when a core buildup is broken before crown cementation or in cases where post and core refabrication is required for an existing crown. The technique reproduces the original contour and alignment of the broken core, eliminating the need for a new preparation, impression and subsequent crown refabrication.

The clear matrix allows for verification of positive seating when placed over adjacent teeth and adequate light transmission when light-curing resin-based composite. The use of light-cured resin-based composite has many advantages over using chemical or dual cure resins, including controlled working and setting time, better color stability and superior mechanical properties (Combe & others 1999).

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