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Use of Cast Post-and-cores for the Alteration of Crown Position for the Esthetically Compromised Patient

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Clinical Relevance

The use of a cast post-and-core will allow the angle of insertion and the position of the core for a new crown or retainer for a fixed partial denture to be altered. This is done in order to obtain optimal esthetics.

SUMMARY

The authors describe the use of cast post-and-cores, which allow a change in position of the clinical crown to permit the fabrication of two fixed partial dentures. The two fixed partial dentures change the clinical appearance of the patient.

INTRODUCTION

Post-and-cores have traditionally been used to restore teeth when there is not enough tooth structure to retain a crown.[1] Many types of post-and-core systems have been documented in the literature over the years, with an excellent long-term prognosis.[2,3] Hayashi et al[4] reported that when cast-metal post-core systems are subjected to oblique and vertical load, it takes greater loads to fracture teeth. Cast post-and-cores contain one solid material and do not separate under stress or function.[5,6] Cast metal posts are best used for those teeth with canals that are elliptical or irregular in diameter.[7] Excessive tooth reduction does not have to be accomplished in order to accommodate a cast post; it will fill all shapes of canals. A precast post, on the other hand, may require excessive tooth reduction for the canal space, and if the canal is elliptical, the precast post may not fill the post space well.[7] With laboratory support, a cast post can be ready in 30-40 minutes from time of post pattern fabrication.[8-10] Keeping as much tooth structure as possible will aid in the longevity of the endodontically treated tooth.[11-15]

When a tooth is out of position, it cannot be prepared for a veneer or crown without causing possible pulp damage, but a prophylactic root canal and post can be completed. This will allow proper positioning of the new crown for esthetics and retain enough tooth core to support the new crown. Bada[16] stated that there is a limit to how much a precast post can bend and how much buildup material the precast post can retain. Bada also stated that a cast post-and-core is needed in clinical situations where it

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Figure 1. *Preoperative smile.*

is necessary to alter the angle of the core in relation to the tooth.[16]

This article will address the clinical situation where tooth position is not optimal for the placement of fixed prosthodontic work.

CLINICAL TECHNIQUE

A 56-year-old man came into the University of Nebraska College of Dentistry clinic requesting dentures to correct his irregular smile (Figures 1 and 2). A comprehensive dental exam was done, including radiographs and periodontal probing. All teeth were restorable except tooth no. 7, due to caries, and tooth no. 10, which had a vertical root fracture. Caries was also present in tooth no. 9. The patient's chief complaint was that his smile was problematic in the business world, and he wanted a better appearance. He had no missing teeth except

Figure 2. *Close-up of fractured and malpositioned teeth. Teeth nos. 7 and 10 are nonrestorable due to caries and vertical root fracture.*

Figure 3. *Diagnostic wax-up completed on mounted casts. Ideal contours were developed for esthetics and function. This wax-up was duplicated as a solid stone cast, and a vacuum-formed matrix was made.*

nos. 1, 16, 17, and 32. He had no medical contraindications to dental treatment.

A referral was made to orthodontics, but the patient refused treatment due to the length of time to correct the esthetics. Diagnostic casts were made and mounted in a semiadjustable articulator. A diagnostic wax-up was completed to determine the optimum position of the retainers and pontics for maximal esthetics for the fixed partial dentures. It was determined by the wax-up that any attempt to prepare the teeth for the retainers and create an esthetic smile would result in pulpal exposure. A proposal was made to the patient to perform prophylactic endodontic treatment, to place cast post-and-cores, and to restore with zirconia-based fixed partial dentures (Figure 3). The wax-up was

Figure 4. *The vacuum-formed matrix was placed over the endodontically treated teeth to ensure the proper position of the direct post-and-cores.*

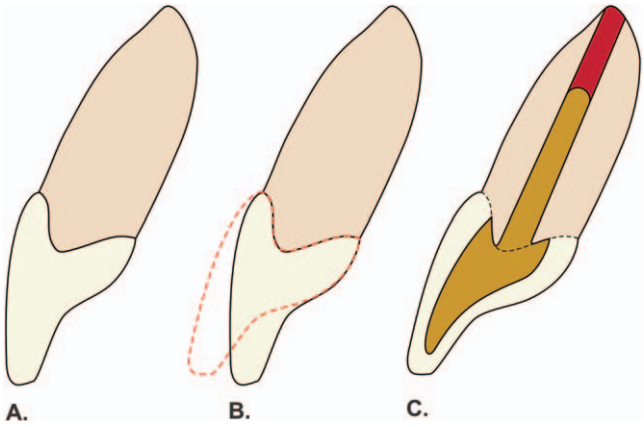

Figure 5. *The use of a cast post and core will allow alteration of the position of the crown of the tooth. A prefabricated post would not be able to accommodate the angle change.*

duplicated and a stone cast made. A vacuum-formed matrix was fabricated to duplicate the desired position of the teeth (Figure 4).

After prophylactic endodontic treatment for teeth nos. 6, 8, 9, and 11, the patient returned to the restorative clinic for tooth preparation and fabrication of the cast post.

Teeth nos. 6, 8, 9, and 11 were prepared for post-and-cores. Ideal crown preps were made using the vacuum-formed matrix to ensure proper position. Every effort was made to conserve tooth structure for the best long-term prognosis for the teeth. Once the tooth preparation was complete and canal space was made, Duralay resin (Reliance Mfg Co, Worth, IL, USA) was used to fabricate direct post-and-cores. The use of the vacuum-formed matrix allowed the preparation of the cores to mimic the ideal position of the prepared tooth for the new fixed partial dentures.

Figure 6. *Immediately placed indirect provisional. A provisional is placed at the time of extractions.*

Figure 7. *Intermediate healing 3 months after extractions and the placement of the post-and-cores.*

The use of the cast post-and-core was done due to the significant change of angle from the root structure. A prefabricated post would not have been able to make the angulation change (Figure 5). After the cementation of the cast post-and-cores, an impression was made of the maxillary arch. A cast was made from the impression, teeth nos. 7 and 10 were cut off the cast, and indirect provisional restorations were fabricated (Jet Resin, Lang Manufacturing Co, Wheeling, IL, USA).[17] Teeth nos. 7 and 10 were then extracted and the new indirect provisionals cemented into place (Figure 6). The tissues were allowed to heal for six months with the provisional restorations in place (Figure 7).

The provisional restorations allowed the clinician to predict the outcome of the final restorations. Lingual contours could be altered to ensure there

Figure 8. *Close-up of the new three-unit fixed partial dentures. The restorations are made of a zirconia substructure, with feldspathic porcelain layered on the substructure. An extra layer of opaque was placed on the substructure to help block any dark tooth structure.*

Figure 9. *The new smile.*

were no functional problems for all mandibular movements and to establish anterior guidance. The position of the incisal edges and the labial contour of the provisional could be altered if necessary. After healing, an impression was made of the provisional restorations to provide the dental laboratory technician a reference for the position of the new restorations. A custom incisal-guide table was made to duplicate the lingual contour of the provisional restorations.

Following healing, the tooth preparations were modified to the free gingival margin of the healed tissue. Tissue margins had moved in an apical direction after healing. Final impressions were made and sent to the dental laboratory. Due to the dark color of the cast post and core, a layer of ceramic opaque was placed on the zirconia framework to mask the color of the teeth. Feldspathic porcelain was layered on the zirconia framework and the new fixed partial dentures completed. The fixed partial dentures were tried in and cemented (Figures 8 and 9). The patient was extremely pleased with the final result.

This paper has demonstrated the use of cast post-and-cores to modify the angle of the prepared tooth to allow for acceptable esthetic restorations.

Conflict of Interest

The authors of this manuscript certify that they have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

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