Case Presentation

Cad-Cam Fabricated One-Piece Ceramic Post and Core for Teeth Supporting Fixed Partial Dentures: Report of Two Cases

Bankoğlu Güngör M*, Karakoca Nemli S, Doğan A, Tamam E and Turhan Bal B
Department of Prosthodontics, Gazi University, Turkey
*Corresponding author: Bankoğlu Güngör M,
Department of Prosthodontics, Gazi University, Ankara, Turkey

Abstract

Endodontically treated teeth with inadequate tooth support can be rehabilitated either prefabricated or custom fabricated post and core materials. Custom post-core restorations are fabricated by casting or computer aided design and computer aided manufacturing (CAD-CAM) systems. It is recommended that teeth treated with post and core restorations should be one-piece and adequate fit of the post into the root canal should be achieved for supporting fixed partial dentures. The purpose of this clinical report is to represent chairside treatment procedures of two patients who received all ceramic fixed partial dentures with one-piece CAD-CAM generated ceramic post core restored abutment teeth. In the first case, it is presented that maxillary central teeth restored with one-piece ceramic post and core for supporting fixed partial denture on the anterior region. In the second case, it is presented that mandibular premolar tooth restored with one-piece zirconia post and core for supporting fixed partial denture on the posterior region. Both cases were treated with CAD-CAM fabricated fixed partial dentures after the cementation of posts and cores. During one-year follow-up period, the patients were satisfied with their prostheses esthetically and functionally. No complication was observed during the follow up period.

Keywords: CAD-CAM; Ceramic; Zirconia FPD; Post-core

The purpose of this clinical report is to represent treatment procedures of two patients who received all ceramic FPDs with one-piece CAD-CAM generated ceramic post core restored abutment teeth.

Case Presentation

This article presents two patients who referred to Gazi University, Faculty of Dentistry, and Department of Prosthodontics to be treated with post core restorations. Descriptions of Case 1 and Case 2 are presented in Table 1. Radiographic examinations were indicated successful endodontic treatment characterized by healthy apical sections, and adequate root canal fillings. Clinical examinations were revealed missing coronal portion for both patients. The treatment details were discussed and patients signed an informed consent. The clinical study was approved by the Ethics Committee of Ankara University, Faculty of Dentistry by grant no. 36290600/21.

Case 1

In the Case 1, one-piece post-core restorations were used to support anterior fixed partial dentures (Figure 1a and 1b). The root canal lengths were measured from the radiograph and the root filling materials were determined to be removed. The post spaces were enlarged with post drills and undercuts at the post space were eliminated (Figure 2a). The edges of the teeth were rounded to facilitate the scanning and milling process. Micro brushes were adapted into the root canals. Impressions of the post spaces and adjacent teeth were taken with condensation silicone elastomer.
Table 1: Description of the cases.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Tooth Number</th>
<th>Region</th>
<th>Number of the supporting teeth</th>
<th>Post-core</th>
<th>Crown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>23</td>
<td>11, 21</td>
<td>Maxillary Anterior</td>
<td>11,13</td>
<td>Lithium disilicate (IPS e.max CAD)</td>
<td>Zirconia (InCoris ZI; framework) Veneer porcelain (VITA)</td>
</tr>
<tr>
<td>Case 2</td>
<td>42</td>
<td>35</td>
<td>Mandibular Posterior</td>
<td>35,37</td>
<td>Monolithic zirconia (InCoris TZI)</td>
<td>Monolithic zirconia (InCoris TZI)</td>
</tr>
</tbody>
</table>

**Figure 1:** a) Initial view of Case 1. b) Initial panoramic radiograph of Case 1.

**Figure 2:** a) Preparing root canals in Case 1. b) Design of the post-core restorations of Case 1. c) Laser modification of gingiva of Case 1 and cementation of post-core restorations.

**Figure 3:** a) Drawing margins of frameworks of Case 1 on the virtual model. b) Design of the frameworks of Case 1. c) Final restoration of Case 1.

**Figure 4:** a) Initial periapical radiograph of Case 2. b) Drawing margin of post-core restoration of Case 2 on the virtual model. c) Design of the post-core restoration of Case 2. d) Milled post-core restoration of Case 2.

One-piece post-cores were fabricated for endodontically treated roots and rapidly produced restoration. In the first case, lithium disilicate thus the patient was treated with a highly esthetic, precisely adapted, monolithic zirconia using CAD-CAM system at one appointment. Esthetics was fabricated [8]. The FPD was also fabricated from greater toughness, maximal adaptability to the canal, and adequate core, and coronal restoration [4,5]. Endodontically treated teeth designed zirconia post and core which provided a restoration with loss was used as abutment of a posterior FPD. One piece custom endodontically treated premolar with extensive coronal hard tissue [7]. In addition, proper alignment among the support teeth can be achieved compared with conventional methods [9]. In the present cases one-piece custom post-core restorations for abutment teeth were treatment of choice. Although there is no consensus on the superiority of custom post and cores when compared with prefabricated posts, it was stated that one-piece posts are more reliable than prefabricated posts with direct cores as the number of interfaces decreases [10].

Discussion

The restoration of endodontically treated teeth is extensively studied but still controversial issue in dentistry [4]. Treatment planning for a post-core restoration should include several considerations such as remaining tooth structure, functional aspects, the use or nonuse of posts, design and material of the post and the core, and coronal restoration [4,5]. Endodontically treated teeth those are used as abutments for fixed partial dentures show different properties from single standing teeth with a crown restoration [4,5]. The higher fracture risk of these teeth has been reported [6]. Thus, custom posts are recommended for abutment teeth of FPDs [7]. In addition, proper alignment among the support teeth can be achieved using these posts [8]. In the second case of present report, an endodontically treated premolar with extensive coronal hard tissue loss was used as abutment of a posterior FPD. One piece custom designed zirconia post and core which provided a restoration with greater toughness, maximal adaptability to the canal, and adequate esthetics was fabricated [8]. The FPD was also fabricated from monolithic zirconia using CAD-CAM system at one appointment. Thus the patient was treated with a highly esthetic, precisely adapted, and rapidly produced restoration. In the first case, lithium disilicate one-piece post-cores were fabricated for endodontically treated roots of the two central incisors. Loss of extensive coronal tooth structure required to establish a strong adhesive bond between post-core and root canal, therefore lithium disilicate which is an etchable ceramic was chosen as the post-core material. After luting post-cores, a zirconia reinforced all ceramic FPD was fabricated.

Fabricating one-piece post-core restoration using CAD-CAM system was described by Liu et al [2]. Which include preparing a wax pattern of post-core, digitizing the pattern using a scanning, and processing data using CAD-CAM software. However, at the impression phase of the root canal, it is generally difficult to remove the resin or wax pattern from the root canal for taking the direct impression of the prepared root cavity furthermore this process is time consuming and needs technical effort. The technique described in this report offers the advantage of fabricating post and core structure by directly scanning the impression of post space and full arch. Thus dimensional changes of the gypsum model and the pattern material such as resin, wax can be eliminated and post-core is digitally designed on a 3-D model instead manual preparation of the pattern. Consequently, more precious and time saving fabrication process can be achieved compared with conventional methods [9].


discussion

One piece post and cores made of zirconia and glass ceramic were fabricated to support all-ceramic fixed partial dentures in the present cases. This article represents fabricating one-piece milled ceramic post and core for endodontically treated teeth supporting fixed partial dentures. Post-core structures fabricated from high strength ceramic materials, zirconia and lithium disilicate, using CAD-CAM technology supported all ceramic fixed partial dentures without compromising esthetic. In addition, the post and core precisely fitted into a prepared post space and anatomically correct core could be fabricated. The survival rate of these restorations should be further investigated.

References


