JOURNAL OF APPLIED DENTAL AND MEDICAL SCIENCES

ISSN NO. - 2454-2288 www.joadms.org Vol. I Issue II July-September 2015

CASE REPORT

Single tooth replacement using a metal-ceramic resin bonded fixed partial denture: Case Reports

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ARTICLE INFO

Article history:
Received 4th June 2015
Accepted 24th July 2015

Keywords:
Minimally invasive technique, resin bonded fixed partial denture, aesthetic, full coverage restorations

ABSTRACT

Conventional procedures for the preparation of abutment teeth often involve major removal of tooth structure. If coverage is necessary for cosmetic purposes because of caries or pre-existing restorations, this removal of structure is acceptable. However, when the abutment teeth are sound, conventional full-coverage procedures seem quite radical. This article describes a technique for fabrication and attachment of metal-ceramic resin-bonded fixed partial denture as a conservative solution for the replacement of an incisor. It is a minimally invasive technique that restores function as well as aesthetics.

Introduction

When replacing an incisor, the dentist has the following options:

(1) an implant-supported single crown,

(2) a conventional fixed partial denture (FPD), or

(3)a resin-bonded fixed partial denture (RBFPD).

The implant-supported crown may not be advisable when available bone volume is minimal, or when the adjacent root is in close proximity. RBFPDs can be used successfully to replace missing teeth.

Clinical guidelines and indications for metal ceramic resin-bonded fixed partial dentures include[1]

(1) vital and non-carious abutment teeth,

(2) a missing maxillary lateral incisor or central or mandibular central or lateral incisor,

(3) minimal or no occlusal contacts on the abutment framework and pontic, and

(4) shallow incisal guidance to avoid a steep vertical overlap.

Metal-ceramic RBFPDs have shown successful outcomes[2] .

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Case Report 1:

A 13-year-old boy was referred with a missing maxillary left central incisor (fig 1). The following prosthetic treatment options were considered: (1) an implant-supported single crown, (2) a conventional FPD, and (3) an RBFPD. The former two treatment alternatives were excluded as an option because of the age of the patient. Before preparation, radiographic evaluations were conducted to ensure that the designated abutments had adequate periodontal health and root support. The tooth reduction was made by using flame-shaped chamfer and shoulder diamond rotary cutting instruments. The lingual surfaces of the abutment teeth were reduced approximately 0.5 mm, with a supragingival shoulder finish line approximately 1 mm from the crest of tissue and 1 mm from occlusal reduction. During preparation of the lingual surface, the labiolingual thicknesses of the incisal edges of abutment teeth were carefully evaluated. This factor provided equal thickness to prevent fracture. The heights of proximal contours were reduced to allow the insertion of the restoration and provide increased tooth surface available for bonding. A proximal chamfer finish line ending approximately 1 mm above the cemento-enamel junction and 1 mm in depth was established. The proximal extension of preparation toward the labial surface was prepared just lingual to the contact areas(fig 2).

Figure 1: Pre-operative front view

Fig 2: Tooth prepared to receive restoration

Impression of the maxillary arch was made with condensation silicone putty and light body impression material (elite P&P, Zermack Italy). The definitive casts were mounted on an articulator. Provisional restorations were made by placing microfilled composite resin directly on prepared unetched tooth surfaces, finished, and polished. At the second visit, the provisional restorations were easily removed with a scaler.

At the trial insertion appointment, complete seating of the prosthesis, marginal adaptation

of each retainer, tissue contact, form of the substructure for the pontic, and occlusion were assessed. Subsequently, the premature contacts were eliminated, if any and the shade of the pontic was determined and recorded. After veneer porcelain was added to the pontic, a second trial evaluation session was conducted. All characteristics described previously were reviewed, and final approval from the patient was obtained.

Fig 3: cemented prosthesis

The prepared tooth surfaces were completely etched with 37% phosphoric acid for 20 seconds. The dentin was conditioned (A+B multilink; Ivoclar Vivadent) for 20 secs. The metal primer was applied and air dried after 180 secs. Metal-ceramic RBFPD was luted with a dual polymerizing adhesive resin cement (multilink; Ivoclar Vivadent) in accordance with manufacturer's instructions. The cement was applied to the intaglio surface of the restoration and prepared tooth surfaces with a disposable brush. The restoration was seated with moderate pressure, and excess luting agent was carefully removed with an explorer. Under slight pressure, the restoration was light-polymerized from 3 different directions (buccal, lingual, and occlusal) for 40 seconds (Bluephase; Ivoclar Vivadent). After polymerization was complete, excess cement was removed from the margins with a periodontal scaler (fig 3). After cementation, the occlusion was evaluated carefully.

Fig 4: Pre-op and post-operative front view

Case report 2 :

A 20 year old-male presented with a missing maxillary central incisor due to partial anodontia (fig 5).

The following prosthetic treatment options were considered:

(1) an implant-supported single crown,

(2) a conventional FPD, and

(3) an RBFPD.

Implant replacement was excluded as an option because the patient declined the several surgical procedures required. The conventional FPD was also excluded because the abutment

teeth were vital and non-carious. Thus, to minimize unnecessary abutment tooth preparation, the use of the RBFPD was suggested and accepted by the patient.

Fig 5: Pre-operative front view

Fig 6: Tooth prepared to receive the restoration

The fabrication procedure was exactly the same as for the case 1 and hence not described to avoid repetition.

Upon completion of the RBFPD, routine maintenance was performed during patient recalls. Probing depths varied between 1 and 1.5 mm, and there was no gingival recession or inflammation in the region of the prosthesis with both the patients. The patients were satisfied and reported no functional or esthetic problems Figs. 6 to 10 are clinical photographs of two patients treated by use of this technique.

Fig 7: Definitive model for fabrication of prosthesis

Fig 8: completed prosthesis

Discussion

The technique has limitations. The resin bonded fixed partial denture as it is frequently used today, considered irreversible, requires the removal of enough tooth structure. There is still some concern about the longevity of this type of prosthesis. A review of about 60 publications on the clinical survival of resin-bonded FPDs put the 4-year survival rate at 74%[3]. By contrast, a similar study done on 552 three unit conventional fixed partial dentures by Kerschbaum and Gaa showed that 96% of

those prosthesis were still in use after 4 years[4]. Difficult temporization and no alignment correction are the other disadvantages.

Fig 9 : cemented prosthesis

Fig 10: Pre and post operative view

The primary advantage of this technique is its conservative approach to tooth replacement[5]. The restoration allows a proper relationship with the supporting tissues, yet the procedure involves minimal tooth reduction. Maximal aesthetics may be achieved with minimal chair time and expense to the patient. The fixed partial denture may also be reattached should the bond fail.

Summary

A technique has been described which permits the fabrication and attachment of a metal ceramic RBFPD. In two patients, the fixed partial denture was attached to the lingual surfaces of the abutment teeth utilizing an adhesive resin cement and acid-etched enamel. Conservation of tooth structure, minimal chair time and patient expense are the primary advantages of this technique.

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How to cite this article: Gadge H, Gandhewar M, Nagaral S, Balareddi G, Waugh A, Moharir A. Single Tooth Replacement Using A Metal-Ceramic Resin Bonded Fixed Partial Denture: Case Reports JOADMS 2015;1(2):37-42.
Source of Support: Nil, Conflict of Interest: None declared