

Rehabilitation with Table-Top Restoration Post Bicuspidisation: An Interdisciplinary Case Report

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ABSTRACT

The first teeth to erupt in the oral cavity are the mandibular molars which are more prone to endodontic and periodontal involvement. This may lead to significant issues like an increase in pocket depth, furcation involvement, loss of clinical attachment and mobility of teeth ultimately resulting in tooth loss. Thus, it necessitates cautious oral hygiene measures. Advances in dentistry have led to treatment modalities for preserving teeth which were earlier indicated for extraction. Hence, periodontally compromised tooth with severe furcation involvement, which may not be amenable for regeneration, may be retained by bicuspidisation. Bicuspidisation is a surgical technique which involves separation of mesial and distal roots of mandibular molars along with its crown portion, where both segments are then retained individually, followed by rehabilitation with fixed prosthesis of the individual segments. This not only eliminates furcation involvement but also facilitates effective oral hygiene maintenance. In the present case report, a 50-year-old male patient reported with the chief complaint of pain, sensitivity and food lodgement in left mandibular first molar. Clinical and radiographic examination revealed grade III furcation involvement, significant pocket depths, delayed electric pulp test response and bone loss in furcation area. Bicuspidisation was opted as the suitable treatment modality. Root canal treatment was done, followed by bicuspidisation and subsequent rehabilitation with novel prosthetic technique. The bicuspids were restored using combination of deep margin elevation, and non splinted Lithium Disilicate table-top restorations. Six month follow-up showed good healing of hard and soft tissues around the bicuspidized sections, which was indicative of a successful treatment outcome, and can be attributed to a careful case selection, choice of restorative materials and techniques as well as good oral hygiene compliance.

Keywords: Endodontically treated tooth, Furcation involvement, Hemisection

CASE REPORT

A 50-year-old male patient, reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of pain and sensitivity in the lower left back region of jaw since five months. The pain was intermittent, spontaneous and intense in nature, which aggravated on consumption of hot food. Patient also complained of food lodgement.

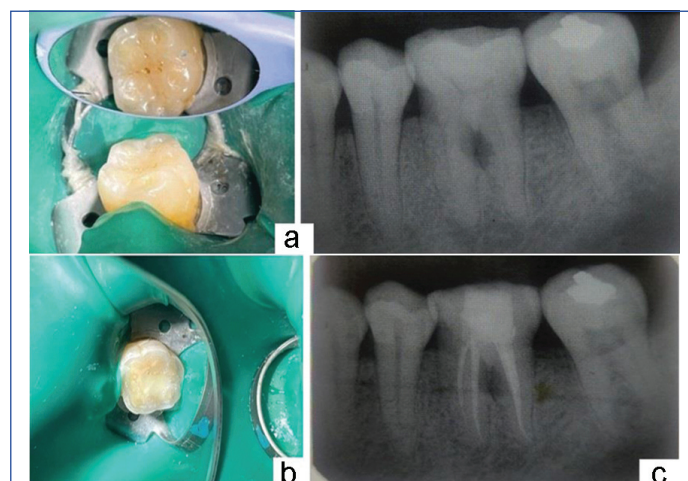
On intraoral examination, the tooth 36 showed no clinical evidence of caries. However, tenderness on percussion was noted. Pulp sensibility test showed delayed response and lingering pain was observed on cold test. Soft tissue examination revealed an inflamed, smooth and oedematous gingiva with lingual recession Type 1 (Cairo F et al., 2011) Probing depth in mesiobuccal and lingual aspect of 36 was found to be 8 mm and 5 mm, respectively, with grade III furcation involvement (Glickman I, 1972) and grade I mobility (Miller's, 1950) [1-3]. However, the overall oral hygiene of the patient was fair.

Radiographic examination revealed that there was no evidence of caries. Vertical crestal bone loss was evident. Radiolucency was observed involving the furcation area. Break in lamina dura and periapical lesion was noted around mesiobuccal root [Table/Fig-1a]. From above mentioned findings, we arrived at a diagnosis of primary periodontal and secondary endodontic lesion. Upon careful treatment planning, endodontic therapy followed by bicuspidisation and indirect adhesive restoration was proposed.

Endodontic procedure: Patient was explained regarding the procedure and a written informed consent was obtained. In the first appointment, local anaesthesia (2% Lignocaine with Adrenaline 1:80,000) was administered and access opening was done under rubber dam. Four canals were located- mesiobuccal, mesiolingual, distobuccal and distolingual. Working length was determined for all canals=19 mm using apex locator (Root ZX mini, J Morita, Japan) and confirmed with radiograph. Cleaning and shaping was done

with NeoEndo Flex rotary files (Orikam Healthcare, India) upto size 20/6%. Intermittent copious irrigation was done using 3% sodium hypochlorite solution with sonic activation followed by final rinse with saline. Calcium hydroxide and 2% chlorhexidine mixture was placed as intracanal medicament for 10 days [4].

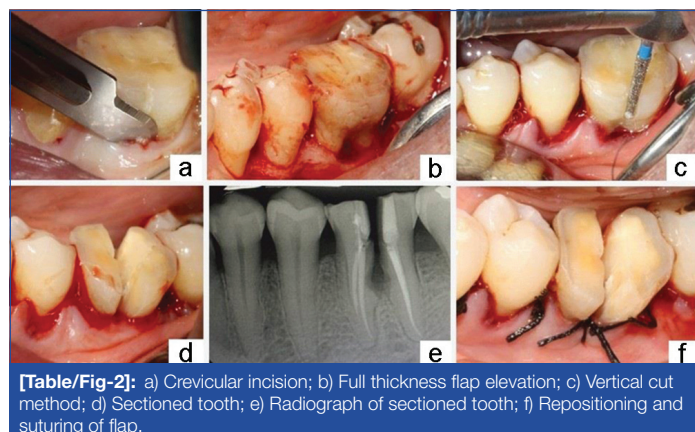
In second appointment, signs and symptoms had subsided. Canals were dried using paper points. Obturation was done with 20/6% gutta-percha and Sealapex (Kerr Corporation, USA) using single cone technique. Postendodontic restoration was done with RMGIC liner (Ionoseal, Voco GmbH, Germany) and dual-cure composite (ParaCore, Coltene, Switzerland) [Table/Fig-1b]. Immediate postoperative radiograph after root canal therapy was taken [Table/Fig-1c].



[Table/Fig-1]: a) Preoperative clinical image and radiograph; b) Postendodontic restoration; c) Postendodontic treatment radiograph.

Periodontic procedure: After anaesthetising the surgical area, a crevicular incision was made [Table/Fig-2a] and full thickness flap was elevated [Table/Fig-2b]. The vertical cut method was used

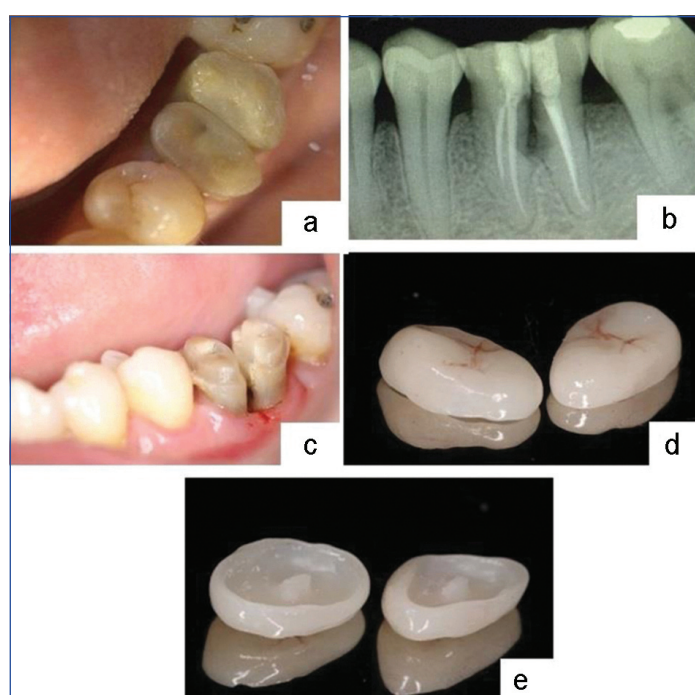
[Table/Fig-2c] to separate the crown into two sections using a long shank tapered fissure bur [Table/Fig-2d,e]. The furcation area was debrided and irrigated followed by repositioning and suturing of flap with simple interrupted sutures [Table/Fig-2f]. Occlusal reduction was done to prevent postoperative pain. Periodontal dressing was placed. After four weeks of procedure, reduction in mobility was seen in both the fragments.



[Table/Fig-2]: a) Crevicular incision; b) Full thickness flap elevation; c) Vertical cut method; d) Sectioned tooth; e) Radiograph of sectioned tooth; f) Repositioning and suturing of flap.

Restorative treatment: On prosthetic evaluation, it was found that there was inadequate tooth structure to establish a finish line. Therefore, deep margin elevation was done using sectional matrices. Supragingival contact was established with composite layering [Table/Fig-3a,b]. Finishing and polishing of the contacts was done using polishing discs (Super-Snap Discs, Shofu, Japan) and strips (Super-Snap Polystrips, Shofu, Japan), followed by root planning procedure which was also done with the help of composite polishing strips (Super-Snap Polystrips, Shofu, Japan). Tooth was kept under observation for two weeks before giving final prosthesis.

Prosthodontic rehabilitation: Eight weeks after surgery, finish line preparation was done to give a table-top all ceramic restoration for both the bicuspids followed by root polishing [Table/Fig-3c]. Lithium disilicate table-tops were CAD-CAM designed, considering the appropriate distribution of forces for which the cuspal inclines were modified to reduce the lateral forces acting on the tooth. The crowns were milled [Table/Fig-3d,e] with radicular extension for secondary retention and bonded to the tooth structure following the bonding protocol for lithium disilicate [Table/Fig-4a]. Patient was



[Table/Fig-3]: a,b) Re-establishing contact with composite layering; c) Finish line preparation for table-top restoration; d) Lithium disilicate table-tops; e) Intaglio surface of prosthesis.

instructed, demonstrated and motivated to maintain proper oral hygiene using floss and interdental brush. Upon six month follow-up after rehabilitation, the tooth was found to be asymptomatic, soft tissue surrounding the tooth was healthy, and mobility was within the normal physiologic limit. On radiographic examination, increased radio-opacity was seen in the furcation region, suggestive of satisfactory healing [Table/Fig-4b].



[Table/Fig-4a]: Final restoration and radiograph.



[Table/Fig-4b]: Six months follow-up clinical picture and radiograph.

DISCUSSION

Long-term retention of mandibular molars with grade III furcation is a challenging clinical dilemma but with an interdisciplinary approach of endodontics, periodontics, and prosthodontics promising results can be achieved. Bicuspidisation is one such procedure by which we can conservatively restore masticatory function of mandibular molars without sacrificing the whole or a part of tooth.

Farshchian F and Kaiser DA have reported the success of a molar bicuspidisation based on three factors [5]:

- Stability of, and adequate bone support for, the individual tooth sections.
- Absence of severe root fluting of the distal aspect of the mesial root or mesial aspect of the distal root.
- Adequate separation of the mesial and distal roots, to enable the creation of an acceptable embrasure for effective oral hygiene.

According to Newell DH, the advantage of bicuspidisation procedure is the retention of some or all the tooth structure [6]. Basten CH et al., have reported that furcation involved tooth can be maintained for a prolonged time (3-7 years) with appropriate treatment and adequate oral hygiene regimes [7].

Regeneration technique could not be considered in the present case, because of the insufficient width of soft tissue and attached gingiva. The option of tunnelling was eliminated because of the closed recession on the lingual aspect. In a similar case done by Abu-Hasein M et al., the bicuspidized tooth was restored using a prefabricated post and core as there was significant loss of tooth structure after sectioning of the tooth [8]. Prosthetic rehabilitation of the dissected parts was done with splinted porcelain restoration. However, splinting of the crowns leads to poor access to the interdental area and hygiene maintenance becomes difficult, which may ultimately lead to failure of the treatment [9]. In another case report by Nidyasari F et al., the bicuspidized teeth was managed by fiber post and rehabilitated using splinted porcelain fused to metal restoration [10]. Porcelain fused to metal was chosen as the restorative material because of its acceptable marginal and internal adaptation and good mechanical properties.

Considering the limitations of the previously treated cases, an innovative restorative technique was used for prosthetic rehabilitation

of the root canal treated bicuspidized tooth in the present case report. Deep margin elevation was done to achieve supragingival margins and better contact for the restoration which will enhance the hygiene maintenance. Also, the root planning procedure was done with the help of composite polishing strips in sequential order to achieve a polished root surface. Table-top restorations were planned for the dissected tooth. The indications of table-top restorations includes restoration of worn out dentition, minimal occlusal decay, correction of occlusion, insufficient tooth structure to give porcelain fused to metal restoration. They are usually contraindicated in cases where supragingival finish lines cannot be achieved and poor oral hygiene maintenance [11]. Finish lines were prepared much supragingival with a minimally invasive approach to preserve the remaining tooth structure. Resin bonded table-top restoration was given to minimise the amount of tooth reduction and also to improve the strength of tooth. The bonded posterior partial restoration makes it possible to restore or even improve the biomechanical resistance of the tooth/restoration assembly [12]. Prosthesis was designed keeping in mind the various aspects of occlusal function which would help in better force distribution and facilitate healing of the tooth. Occlusal contacts were reduced in size and repositioned more favourably. Lateral forces were reduced by making cuspal inclines less steep and eliminating balancing incline contacts. Lithium disilicate was chosen as the restorative material because of its high biocompatibility and high bond strength [13].

The durability of bonded partial restorations depends on a number of factors including properties of the biomaterials, the practice of correct bonding protocol. Overall long-term success of the procedure depends on appropriate case selection, diagnosis and correct treatment planning by a joint interdisciplinary approach.

CONCLUSION(S)

The decision for a specific treatment for a periodontitis affected furcation certainly depends on several factors. Bicuspidisation may be a suitable alternative to extraction and implant therapy and should be discussed with patients during consideration of treatment options. Based on the available literature and clinical outcome of double crowns, the treatment approach was modified in the present case report where the rehabilitation of bicuspidized tooth was done without further destruction of tooth using indirect bonded restoration. This technique improvised the biomechanical resistance

of the tooth/restoration assembly and also individual crowns where given to facilitate the hygiene maintenance of the restored tooth. A good tissue response was seen at six month follow-up. With recent advancements in dentistry, and adoption of minimally invasive approach, bicuspidisation and additive rehabilitation is a dependable treatment alternative and teeth so treated will endure the demands of preservation and function.

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