

## Bicuspidization of Mandibular Molar; A Clinical Review; Case Report

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**Abstract:** Bicuspidization is a surgical procedure performed on the mandibular molars for the separation of the mesial and distal roots with their respective crown portions; this separation eliminates the existence of a furcation and facilitates effective oral hygiene practice. This case report aims at highlighting the conservative management of a grade III furcation-involved molar by bicuspidisation procedure and use of the treated tooth as an abutment for fixed prosthesis.

**Keywords:** Furcation defects, Oral surgical procedures, Preprosthetic, mandibular molar, bicuspidisation

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### I. Introduction

Modern advances in all phases of dentistry have provided the opportunity for patients to maintain a functional dentition for lifetime[1]. Therapeutic measures performed to ensure retention of teeth vary in complexity. The treatment may involve combining restorative dentistry, endodontics, orthodontics, and periodontics so that the teeth are retained in whole or in part.[1,2,3]

Furcation involvement can be defined as the loss of attachment and radiographic evidence of bone loss in the bifurcation and trifurcation areas of multi-rooted teeth. The furcation defects vary from a subtle loss of attachment in the buccal furcation area, forming a shallow pocket, to advanced pathology with deep pockets > 10 mm, advanced bone loss and clinical exposure of the furcation.[1,4,5]

Grade III furcation defects in the mandibular molars are managed with root surface debridement, followed by open flap debridement with radisection, tunnelling procedures and, rarely, a regenerative approach. In the mandibular molars, grade III defects are managed by tunnelling procedures, hemisection and bicuspidisation along with open flap debridement.[1,6,7]

Bicuspidization is a surgical procedure carried out exclusively on the mandibular molars, where the mesial and distal roots are separated with their respective crown portions; this separation eliminates the existence of a furcation and makes it easy for the patient to use an interdental brush for hygiene maintenance[1,5,7,8]. Indications for a bicuspidization procedure include advanced grade III defects in the mandibular molar, areas where tunnelling procedure will not result in effective plaque control, and the presence of adequate remaining alveolar bone around both the roots and the regions indicated for pocket elimination [8,9]. Diagnosis of furcation defects is of paramount importance in executing an effective treatment strategy. Grade III defects in the maxillary molars should be probed with a Nabers probe and care must be taken to explore the mesio-palatal and disto-palatal furcations, as the palatal root obscures the detection of furcation involvement. In the mandibular grade III furcation, the Nabers probe passes through and through the furcation from the buccal to the lingual side, but the furcation is not clinically visible[[1,2,9,10]. Endodontic therapy is performed initially, and during the open flap debridement procedure, the bicuspidization is done and the tooth is restored with a post-endodontic restoration, keeping in mind that the restoration allows for optimal plaque control in the space between the separated roots[1,3,9,10,11].

**Indications for bicuspidization** are following:

1. Root fracture Severe bone loss affecting one or more roots untreatable with regenerative procedures
2. Class II or III furcation invasions or involvements

3. Inability to successfully treat and fill a canal
4. Severe root proximity inadequate for a proper embrasure space
5. Root trunk fracture or decay with invasion of the biological width

**Contraindications include:**

1. Poor oral hygiene
2. Fused roots
3. Unfavourable tissue architecture
4. Retained roots endodontically untreatable

This case report describes a multidisciplinary treatment procedure for mandibular molar with grade III furcation involvement that includes intentional root canal therapy, orthodontics, surgical periodontal therapy with Bicuspidization and prosthetic rehabilitation.

**Case Report**

A 21-year-old male presented with the complaint of pain of right mandibular first molar with a cracked crown. On examination, the tooth was sensitive to percussion.

On probing the area, there was a 7-mm-deep periodontal pocket around the furcation area.

On radiographic examination, severe vertical bone loss was evident at the furcation area. The bony support of both roots was completely intact. But apical lesion was investigated around each root. (Fig.1-4)

After the removal of full amalgam root canal treatments of both second molar were finished. The working canal length was determined and the canals were biomechanically prepared using step back technique. The canals were obturated with lateral condensation method and the chamber was filled with glass-ionomer cement.

Under local anesthesia, the vertical cut method was used to separate the crown. A long shank tapered fissure carbide bur was used to make vertical cut toward the bifurcation area. The distal part of the crown had a severe loss of dentine, then a prefabricated post was inserted and a core was built. (Fig.5-7)

Surgical procedure was planned with bicuspidization technique. A full thickness flap was reflected with the crevicular incision extending from the distal surface of the mandibular 2nd premolar to the midfacial surface of the mandibular 2nd molar (Fig.8-9). After the flap elevation, the tooth was dissected and the gutta-percha cones and other restorative surplus were removed from the furcation. All faces of the mesial and distal roots were instrumented and the spurs were smoothed with aerator. After the irrigation with saline solution, the flap was repositioned and sutured with 3/0 silk sutures. (Fig.10-14)

Six weeks after surgery the dissected portions were prepared for porcelain restorations and each dissected parts of the tooth was crowned as a premolar tooth (Fig.15-16). The patient was followed at 3, 6, 12 and 24 months after surgery, and clinical measurements and radiographies were recorded shows the radiographic image 24 months after surgery.

**II. Discussion**

Management of grade III furcation involvement always presents a challenge to the periodontist. Non-surgical management alone leads to failure due to inaccessibility of the furcation region, leading to incomplete removal of the plaque and plaque retentive factors [1,2,8].

The clinician splits the mandibular molar vertically through the furcation, without removing either half, leaving two separate roots that then are treated as bicuspid (a procedure termed "bicuspidization"). Farshchian and Kaiser [12] have reported the success of a molar bisection with subsequent bicuspidization. They stated that the success of bicuspidization depends on three factors:

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

According to Newell [13] the advantage of bisection is the retention of some or all the tooth structure and the disadvantage is that the tooth has to undergo endodontic therapy. However, in the present case report, the furcation-involved tooth 47 had non-vital pulp due to a proximal carious lesion and hence this technique seemed to be the most viable option. Not many studies have been cited in the literature regarding the use of bicuspidised molar teeth as a viable abutment for a fixed partial bridge.

The role of endodontic care prior to bicuspidization procedure has a long history and it has remained today as a necessity in treating furcally involved mandibular molars.

However, failure to perform endodontic treatment first is not a contraindication for root resectioning, if it can be determined that a successful root canal filling is practical and possible.

Park [14] have suggested that hemisection of molars with questionable prognosis can maintain the teeth without detectable bone loss for a long-term period, provided that the patient has optimal oral hygiene. Saad et al. [15] have also concluded that hemisection of a mandibular molar may be a suitable treatment option when the decay is restricted to one root and the other root is healthy and remaining portion of tooth can very well act as an abutment.

The ideal age for lower FPM extraction has been reported to be approximately 8–9 years of age. If the lower FPM is extracted during or after eruption of the second permanent molar (i.e., well after the ideal stage), spontaneous space closure is usually unsatisfactory [15,16]. Occlusal consequences may include: Mesial tipping and lingual rolling of the lower second permanent molar; over-eruption of the opposing upper FPM, which can in turn prevent mesial drift of the lower second permanent molar; incomplete space closure with associated food entrapment (without orthodontic treatment); distal drifting and/or tilting of the lower second premolar; atrophy of the alveolar bone if space closure is incomplete (which may make orthodontic space closure very difficult or impossible to achieve) [17,18].

However, there are few disadvantages associated with bicuspidization. As with any surgical procedure, it can cause pain and anxiety. An endodontic therapy failure can also cause the failure of this procedure. If the tooth is not relieved from lateral excursive forces or proper marginal adaptation is not there, the restoration may lead to periodontal destruction [19,20].

In the case reported, various aspects of occlusal function such as location and size of contacts and the steepness of cuspal inclines may have played a significant role in causing mobility before treatment. During treatment, occlusal contacts were reduced in size and repositioned more favorably. Lateral forces were reduced by making cuspal inclines less steep and eliminating balancing incline contacts. The prognosis for bicuspidization is the same as for routine endodontic procedures provided that case selection has been performed correctly and the restoration is of an acceptable design relative to the occlusal and periodontal needs of the patient as it was in this case. Subsequent follow-up showed a good bone healing response. This suggested that the procedure, occlusal adjustments made and the angulation of the root was perfect to aid in the recovery of the tooth [18,19,20].

### III. Conclusion

Bicuspidization may be a suitable alternative to extraction and implant therapy especially for FPM in young children and should be discussed with patients during consideration of treatment options. With recent refinements in endodontics, periodontics and restorative dentistry, root separation and resection have received acceptance as a conservative and dependable dental treatment and teeth so treated have endured the demands of function.

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*Legendes;*



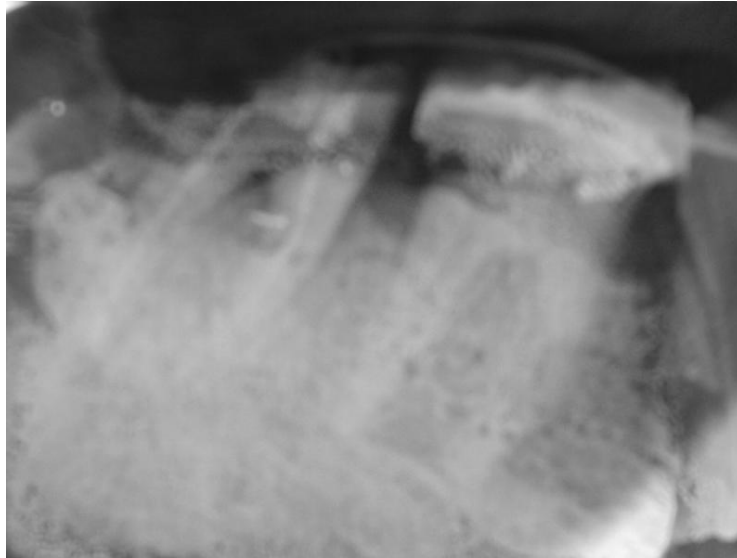
*Fig.1; Intra-Oral Photograph Before bicuspidization of 47*



*Fig.2; Another view 47*



*Fig.3; Panoramics*



*Fig.4; Pre-Operative Radograph*



*Fig.5; Photograph of #47 showing simple appliance for rapid orthodontic extrusion*



*Fig.6;After orthodontic extrusion*



*Fig.7; Intra-Oral Photograph Before bicuspidization of 47*



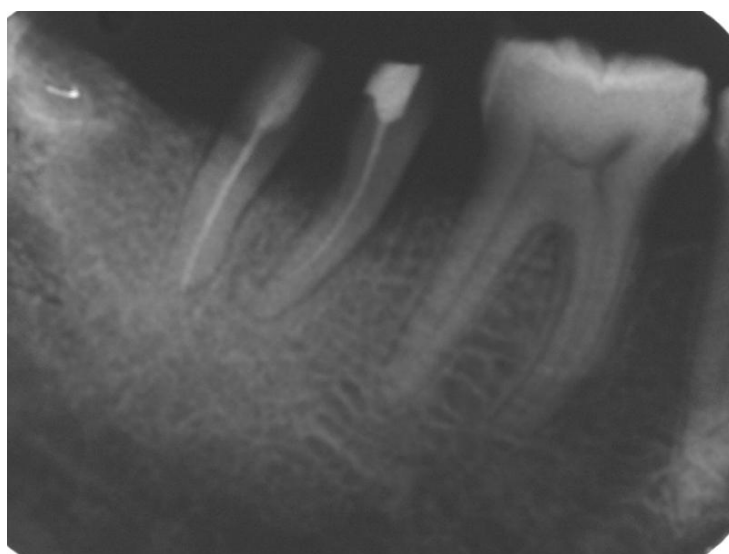
*Fig.8; Photograph showing division of molar into two separated Crowns*



*Fig.9; Post operative view*



*Fig.10;Prob of two separate crown*



*Fig.11. IOPA showing obturation of two root canals*



*Fig.12; metal ceramic crown*



*Fig.1 3; metal ceramic crown*



*Fig.1 4; Photograph showing the two separate crown restored with metal ceramic crown*





*Fig.1 5; Photograph showing the two separate crown restored with metal ceramic crown ,after 12 months*



*Fig.1 6; Post-Operative Radograph ,after 12 months*