Bicuspidization in an 11-year-old child: A conservative approach for periodontally compromised molar

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ABSTRACT

Recent advances in today's dentistry and the increased awareness among the patients to maintain their dentition have led to conservative treatment approaches, which once would have been opted for removal. In order to carry out the present day mandate, periodontally diseased or carious teeth with involvement of furcation area may be well retained by separation of their roots. This clinical report describes a case of bicuspidization of mandibular first permanent molar with subsequent double crowns restoration, which yielded a satisfactory result in an 11-year-old young female patient.

Access this article online Website: www.jpediatrdent.org DOI: 10.4103/2321-6646.151849 Quick Response Code:

Key words: Bicuspidization, First Permanent Molar, Periodontally Compromised Tooth, Young Child

INTRODUCTION

Modern advances in dentistry have provided an opportunity for patients to maintain a functional dentition for lifetime. Bisection/bicuspidization is the separation of mesial and distal roots of mandibular molars along with its crown portion, where both segments are then retained individually.^[1] This procedure represents a form of conservative dentistry, aiming to retain as much of the original tooth structure as possible. The results are predictable, and success rates are high.^[2] The strategic value of retaining such a periodontically involved tooth must be determined by both the patient and dentist before a treatment option is selected.^[3]

Indications for bicuspidization are following:^[2,4-6]

 Root fracture, severe bone loss affecting one or more roots untreatable with regenerative procedures.

- 2. Classes II or III furcation invasions or involvements.
- 3. Inability to successfully treat and fill the canal.
- 4. Severe root proximity is inadequate for a proper embrasure space.
- 5. Root trunk fracture or decay with invasion of the biological width.

Contraindications include:

- I. Poor oral hygiene.
- 2. Fused roots.
- 3. Unfavorable tissue architecture.
- 4. Retained roots endodontically untreatable

CASE REPORT

An II-year-old female patient reported to the department of Pedodontics and preventive dentistry with the chief complaint of pain in the lower right back region of the jaw for the past 5 months. Her medical history was noncontributory. Her Behavioral assessment by Venham

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picture scale in her 1st visit demonstrated higher fear levels. On intra-oral examination, a large carious lesion was observed in 46 with pain on percussion and deep periodontal pocket [Figure 1a]. Radiographic interpretation has shown radiolucency approaching pulp and also involving the furcation area suggestive of irreversible pulpitis with 46 [Figure 1b] and the bony support of both roots was completely intact. The treatment plan included root canal treatment followed by bicuspidization. Access cavity preparation was done, followed by working canal length determination, biomechanical canal preparation using step back technique and obturation was done [Figure 1c]. By the third visit, her dental anxiety was reduced, and a Frankl's positive behavior was achieved by adapting various nonpharmacological behavior management techniques including Tell show do technique and desensitization. Accordingly patient was called for surgical intervention. Tooth was marked properly with dye. Under local anesthesia, flap was raised. A long shank straight fissure diamond point was used to make vertical cut toward the bifurcation area the furcation area was trimmed, scaling and root planning was done to ensure no residual debris was left, which can lead to further periodontal infection. The flap was repositioned and sutured with 3/0 black silk sutures [Figure 1d]. Periodontal dressing was placed, IOPA was taken and instructions were given [Figure 2a and b]. The occlusal table was minimized to redirect the forces along the long axis of each root and two separate stainless steel crowns i.e., semi-permanent crowns were placed on mesial and distal half of the tooth as the patient was only 11-year-old [Figure 2c and 2d]. Tooth was kept under observation and follow-up photograph was taken when patient reported back to the department after 10 months for general follow-up [Figure 3].

DISCUSSION

The first permanent molar (FPM) has been quoted as being the most caries-prone tooth in the permanent dentition, probably as a result of its early exposure to the oral environment. More than 50% of children over 11 years have some experience of caries in such teeth.^[7] With the decline in the caries rate, improvements in restorative techniques and high parental expectations, dentists may consider restoration of FPMs extensive caries and pulpal symptoms during the mixed-dentition stage.^[8] If FPMs are extracted during or after eruption of the second permanent molars, space closure is usually unsatisfactory and consequences may include tilting of adjacent teeth, over-eruption of opposing molar and atrophy of alveolar bone etc. Previously, furcal caries and large perforations were considered untreatable.^[1,9,10] As modern dentistry aims to maintain the dentition in a healthy and functional state, many procedures and treatment options are now available.^[3] Farshchian and Kaiser have reported the success of a molar



Figure 1: (a) Preoperative intraoral photograph (b) radiograph depicting carious lesion with furcation involvement (c) root canal treated tooth 46 (d) vertical cut and suture placement



Figure 2: (a) Placement of periodontal dressing (b) radiograph after bicuspidization (c) redirection of the forces along the long axis of each rootwith crown placement (d) prosthetic rehabilitation given



Figure 3: Follow-up photograph after 10 months

bisection with subsequent bicuspidization.^[11] Bicuspidization is a procedure that represents a form of conservative dentistry that aims to retain as much of the original tooth structure as possible.^[1,9,10] Park 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.^[12] Saad *et al.* 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.^[13]

Many factors determine the clinician's decision to choose one treatment plan over another when confronted with a Class III furcation invasion of a mandibular molar. These may be enumerated in three areas:^[12]

- Local factors-tooth anatomy, tooth mobility, crown root ratio, severity of attachment loss, inter-arch and intra-occlusal relationship, strategic dental value retention or removal
- 2. Patient factors-health of a patient, importance of the tooth to the patient, cost and time factor;
- Clinician factors-a good case selection, diagnostic and treatment planning skills, awareness of therapeutic options and clinical insight or skill in providing service.

Although the use of embryonic stem cells has been shown in recent literature, bicuspidization procedures with double crowns may be considered as a suitable alternative to extraction in multi-rooted teeth with a hopeless prognosis.^[14]

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. 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).^[15]

All the above-mentioned factors were favorable in this case to opt for retention of the FPM by endodontic therapy followed by bicuspidization to avoid extraction in this 11-year-old young child. The treatment included endodontic, periodontal and prosthodontic therapy. The need for endodontic care before root resection or sectioning (bisectioning) has a long history in dentistry. It has remained today as a necessity in treating mandibular molars before the partial removal of their roots or separation of their crowns.^[2,11] The tooth was resected successfully from the furcation area by vertical cut

method so that they can be utilized as an individual tooth.

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.^[1,16,17] If the tooth is not relieved from lateral excursive forces or proper marginal adaptation is not there, the restoration may lead to periodontal destruction.

Patient motivation, faithfulness in adhering to frequent maintenance appointments, various physical handicaps, and poor manual dexterity are limiting factors in keeping these areas in a state of health.^[18]

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.^[19]

In 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.

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How to cite this article: Ratnaditya A, Manoj Kumar MG, Sai Sankar AJ, Nanduri MK. Bicuspidization in an 11-year-old child: A conservative approach for periodontally compromised molar. J Pediatr Dent 2015;3:32-5.

Source of Support: Nil. Conflict of Interest: None declared.