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Case Report

Bicuspidization: Salvaging a mandibular molar with an endo-periodontal lesion – A case report

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Abstract
Teeth are for a lifetime. Losing a tooth will lead to deleterious consequences starting with the loss of function of that tooth and the tooth coming into occlusion with that. With increasing life expectancy, maintaining teeth becomes more important. The expense of replacing teeth is considerable, and certain comorbidities contraindicate some replacement methods. Once the furcation area is affected in a multi-rooted tooth, it is routine to extract the tooth as most of the other treatment protocols do not give promising results. The case described here was successfully treated by sectioning the the mandibular molar tooth and facilitating access to routine care. Ultimately, the tooth is in function as two premolars. This has enabled the tooth to be maintained in the arch at a relatively low cost and least surgical or prosthetic intervention.

Keywords: Bicuspidization, Endo-periodontal lesions, Furcation, Mandibular molar

Introduction

Success following endodontic therapy is defined as the absence of clinical symptoms or signs, the unscathed function of the tooth, normal periodontal ligament space, and intact lamina dura [1]. Endodontic failures can present in the form of endo-periodontal lesions which, in most instances, carry a poor prognosis and are extremely challenging to manage. Endo-periodontal lesions present a pathological communication between the periodontium and pulpal space. The lesion may initially originate from the pulpal side, spreading and causing destruction of the periodontium. The onset can also come from the periodontal side, secondarily affecting the radicular system, or pathologies starting from either side concomitantly can give rise to this. Endo-periodontal lesions are categorized as a unique entity in the new classification of "Periodontal and peri-implant disease and conditions" proposed in 2017, based on the characteristics of their rapid onset and progressive periodontal tissue destruction [2].

Due to the area's susceptibility to endo-periodontal communications, endo-periodontal lesions in the furcation area are not uncommon. Literature reports that 20-60% of mandibular molars are associated with patent furcal canals [3]. The furcal area is also subject to caries or iatrogenic trauma during endodontic therapy, damaging the floor of the pulp chamber. Progressive damage to the periodontium due to periodontitis can give rise to furcation involvement and once developed, it will progress as the furcal area is a very difficult area to access by the patient for plaque control as well as the clinician for non-surgical or surgical periodontal therapy.

Bicuspidization or premolarization is the sectioning of the two roots of a mandibular molar

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with respective crown portions into two units of bicuspids. This is an innovative and conservative way of eliminating the existence of the furcal area from furcally involved molars in order to optimize hygiene maintenance and prolong their survival [4, 5, 6].

Case Report

A 41-year-old lady was presented to the Restorative Dentistry Unit B, Institute of Oral Health, Maharagama complaining of recurrent abscess formation and pain in relation to a root canal treated lower posterior tooth. That tooth has been root canal treated 11 months ago and since then, she has been having recurrent abscess formation in relation to the tooth. Medically, she was in good health.

She had a full complement of teeth, all of which were caries-free and her general periodontal health was satisfactory. 46 had a large composite restoration occlusally. An abscess was noticed on the buccal side of 46 with a wide 7 mm deep pocket. The tooth was tender to percussion, Grade I mobile and had Grade III furcation involvement. A periapical radiograph of 46 revealed satisfactory root canal obturation. The restoration was closely adapted to the cavity walls and reached out to the furcal area. The pulpal floor looked almost non-existent. There were no periapical lesions. However, extensive radiolucency could be seen in the furcation area extending up to the coronal half of the roots. The furcal defect was angular towards the distal root (Figure 1).

With the history and examination findings, 46 was diagnosed to have a "**Grade II endo-periodontal lesion with root damage in a non-periodontitis patient**". The condition of the tooth, prognosis and treatment options were explained in detail to the patient, and it was decided to preserve the tooth by carrying out a bicuspidization procedure.

Two full-thickness envelop flaps were raised on both buccal and lingual sides of the 46, under local anesthesia. An extensive furcal bone defect filled with granulation tissue was noted. A long shank

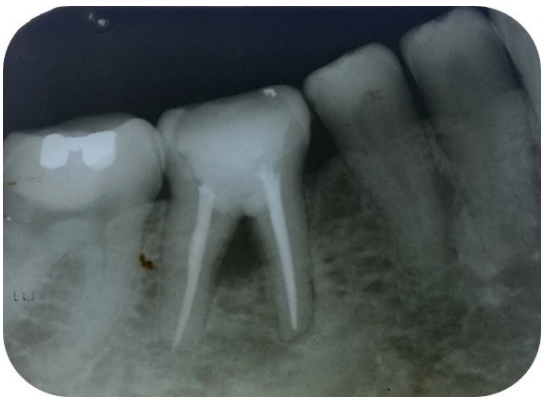

Figure 1: Periapical radiograph of 46 showing an extensive furcal bone loss

slender diamond fissure bur was used to vertically section the crown of the tooth along the furcation area. The same bur was used to remove overhangings and smoothen the contour of the resultant two cuspids (Figure 2).

Figure 2: Following sectioning of 46

The furcal area was curettaged using curettes and irrigated thoroughly with saline. Dried freezed bone allograft with a collagen membrane was placed over the angular bony defect before closing the flap. Six months after the bicuspidization, both portions were surviving well and were asymptomatic (Figure 3).

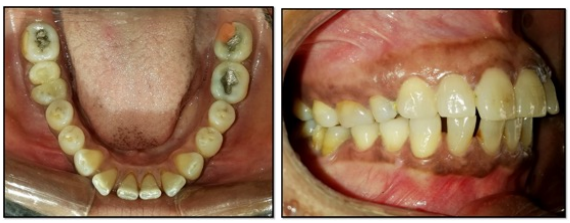

Figure 3: Six months after the bicuspidization procedure

Resulted two bicuspids were prepared to receive metal crowns in order to improve the contact point. Once the metal crowns were cemented, the patient was put on a regular follow-up protocol. On the five-year follow-up visit, both crowned portions were surviving nicely, and the radiograph revealed improved bone levels. (Figure 4, 5 and 6)

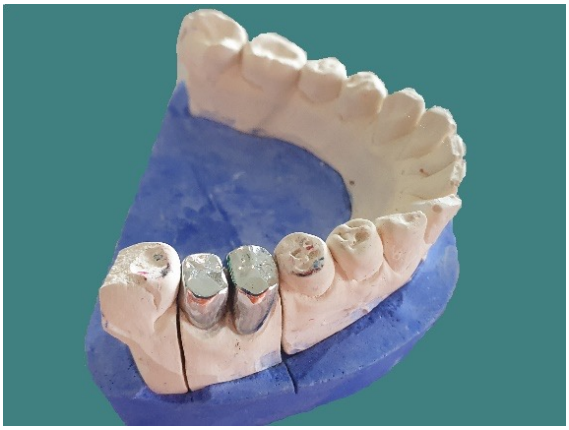

Figure 4: Two metal crowns

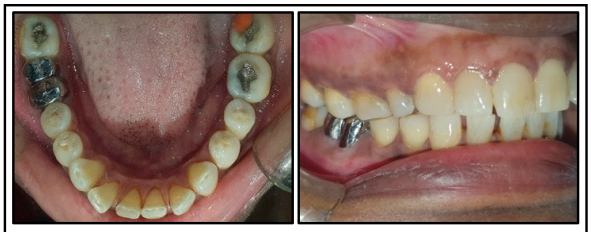

Figure 5: Five years after the bicuspidization procedure

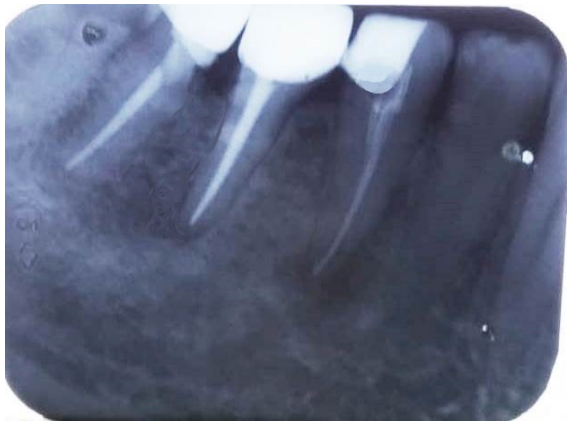

Figure 6: Periapical radiograph obtained for ongoing root canal therapy of 45 showing improved bone levels in between sectioned portions (five years post-op)

Discussion

When a tooth is diagnosed to have an endo-periodontal lesion with root damage, extraction is the commonly practiced treatment, rather than heroically trying to save it as these teeth are generally associated with a poor prognosis. Despite the advances in the field of prosthetic dentistry, the lifetime of any prosthetic tooth is limited. In that sense, preserving the natural dentition is still preferred whenever possible, which is the basis of minimally invasive dentistry. In the middle of a global economic crisis, preserving natural teeth is cost-effective both economically and biologically.

There are periodontal and endodontic indications for the bicuspidization procedure. Class II or Class III furcation lesions, caries affecting the furcation area, fracture of the root trunk, and pulpal floor perforation are some of those. The location of affected teeth in the posterior part of the mouth and narrow furcation entrance makes optimum cleaning of the furcation area impossible. The same factors negatively affect the outcome of non-surgical periodontal therapy [7]. Surgical exposure and complete elimination of the pathologically affected furcation area are more effective in treating furcation-involved molars and allow for regenerative procedures. In this case, tooth 46 had a possible iatrogenic pulpal floor perforation which had led to the endo-periodontal lesion and Class III furcation involvement, thus an indication for bicusidization.

According to Farshchian and Kaiser (1998), the success following bicupidization depends on the following three factors [8].

- Presence of adequate bone support for both roots
- Presence of adequate separation between mesial and distal roots
- Lack of severe root fluting in furcation and septum area

Available tooth substance of two crown portions is also a vital factor as it will directly affect the restorability of bicuspids. Fiber post-retained composite cores were utilized in some published cases before placing crowns [4]. Since the case

presented here had adequate tooth substance to retain cores and existing restoration was well sealed and retentive, the same restoration was utilized to serve as cores before placement of metal crowns. Two metal crowns were selected as extra-coronal restorations in this case as those were more biologically and economically conservative than porcelain fused to metal crowns. Improvement of contact points occlusion and thereby prognosis of two bicuspids are the main goals of providing metal crowns. Some clinicians prefer to place a single crown linking both separated crown portions together. However, the authors' opinion is that it will re-create a "furcation area", reversing the effect of the whole procedure [5]. Bicuspidization is not combined with periodontal regeneration techniques in the majority of published case reports [4,5,7]. By applying a bone graft and collagen membrane to the angular furcal bony defect in this case, periodontal regeneration was attempted during the same surgery and could achieve excellent alveolar bone gain.

Although the necessity of elective root canal treatment is mentioned as a disadvantage of the bicuspidization procedure, the tooth described here was already root canal treated. Thus, no elective root canal treatment was required [9]. Involvement of a surgical procedure, post-operative pain, and swelling are other disadvantages of bicuspidization. However, the biscuspidization surgery is mild in comparison to the extraction of 46 and replacement with an implant-supported crown which would have been the best alternative treatment option in this case. A brief evaluation period of a few months to two years applies to the majority of published case reports, but the evaluation time for this case was five long years [5,7,10].

Conclusion

Bicuspidization is an excellent, conservative treatment option for improvement of the longevity of mandibular molars. Proper case selection is of paramount importance in order to achieve the best outcome following the bicuspidization procedure.

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