Review Article

PROSTHODONTIC INTERVENTION FOR PERIODONTAL FURCATION DEFECTS; A HOPE FOR THE HOPELESS

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ABSTRACT

As we all know that latest innovations in dentistry and higher patient's expectations have led to more conservative treatment approaches in saving the teeth with hopeless periodontal prognosis. As and when the periodontal diseases affect the furcation area of a tooth; the chance of its exfoliation increases significantly. Such clinical problems make it difficult for the patient to maintain hygiene, and impede adequate treatment. The treatment of furcations affected by periodontal disease is one of the most difficult problems for the general dentist and periodontist. Molar bisection is one modality option which is actually the separation of mesial and distal roots of mandibular molars along with its crown portion, where both segments are then retained individually. Here authors have genuinely attempted to congregate a comprehensive review of literature on this obscured field of clinical dentistry.

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INTRODUCTION

Prosthetic dentistry is one of the fundamental pillars of dental sciences wherein the most effective prosthetic prophylaxis could be the prevention of causes leading to tooth extractions. We routinely encounter numerous cases where the modern treatment options improve the overall prognosis of the stomatognathic system and the quality of life of the affected patients significantly. The branch of the dentistry pertaining to the restoration and maintenance of oral function, comfort, appearance and health of the patient by the restoration of the natural teeth and/or the replacement of missing teeth and craniofacial tissues with biocompatible substituents is termed as "Prosthodontics." Therefore, "Preventive Prosthodontics," is a noticeable consideration which is focused on prevention of defects of the oral tissues, as well as the prevention of alveolar bone resorption. The mandibular molars are first teeth to erupt in oral cavity and therefore are having high caries susceptibility index which actually necessitates cautious implementations of oral hygiene measures. Any deprivation in the maintenance may lead to serious problem like furcation involvement. The Glossary of Periodontal Terms defines furcation as "the anatomic area of a multi-rooted tooth where the roots diverge" and furcation invasion refers to the "pathologic resorption of bone within a furcation".[1] Furcation invasion is the most commonly seen phenomenon in relation to mandibular molars. An open furcation is subject to rapid plaque accumulation and calculus formation and is an ideal local environment for the multiplication of microorganisms. The patient, faced with a difficult problem in maintaining an open furcation, often fails in efforts to maintain adequate plaque control. One has to be extra careful while managing such clinical situations with restorative and periodontal therapy.

Various treatment procedures have been discussed in the literature viz; root amputation, hemisection, radisection and bisection. Root amputation denotes the removal of one or more roots of multirooted tooth keeping other roots intaced. Term hemisection indicates the removal of root with its associated crown portion of mandibular molars. Nevertheless, radisection is a novel terminology for removal of roots of maxillary molars. 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.[2] A multidisciplinary treatment procedure for such clinical situations that includes restorative dentistry, endodontics, periodontics and prosthodontics is necessary to preserve the teeth in whole or in part. These teeth can act as independent single units of mastication or as abutments in simple fixed bridges. Hence, tooth resection measures are employed to preserve maximum tooth structure rather than sacrificing the whole tooth. In this literature review, authors have sought to systematically review this particular field with their management.

METHODS OF LITERATURE SEARCH

Performing any genuine and extended literature search without using internet is almost impracticable in the present time. Internet provides a variety of internet-based tools that support the retrieval of biomedical information. Some of the renowned internet based popular search engines (Google, Yahoo), scholarly search bibliographic databases (PubMed, PubMed Central, Medline Plus, Cochrane, Medknow, Ebsco, Science Direct, Hinari, WebMD, IndMed, Embase) and textbooks were searched until Feb 2015 using MeSH (Medical Subject Headings; PubMed) based keywords such as Bicuspid, Furcation Defect, Bisection. The search was limited to reviews, systematic researches and meta-analyses in various dental journals published over the last 35 years in English and Spanish. A total of 45 articles were identified however after examining the titles and abstracts, this number was finally condensed to 18 articles.

REVIEW OF LITERATURE

The principal etiologic factor in periodontal disease is plaque. The outcome of periodontal therapy is in general good and predictable, if the clinician and the patient can adequately access root surfaces to remove the bacterial plaque. Access to the molars furcation areas is especially difficult for the patient and clinician alike due to the posterior location of molars, the dimension and position of furcation entrances, and the internal furcation surfaces that are frequently concave or irregularly contoured. Traditional therapy aimed at alleviating the inflammatory lesion by eliminating soft and hard tissue deposits in the furcation area using scaling and root planing should be the starting point in treating furcation defects. Hirshfeld and Wasserman was the first to report affirmative effect of repeated subgingival scaling, rootplaning and gingival curettage in the long-lasting retention of mandibular molars with Class III cases.[3] Later on Bower postulated that furcal openings of mandibular molars frequently are narrower than the blade of frequently used curettes.[4] However, taking into account the anatomical complexities of the surrounding furcal region in mandibular furcation, curettes used alone may not be sufficient for root preparation still narrow diameter ultrasonic debridement tips may used to have superior results. Saxe and co-workers stated tooth extraction as the last resort for advanced furcation involvments.[5] Root resective procedures can be used to treat furcation involvement permitting the preservation of part of the root for future prosthodontic applications. Although, the immediate results may be gratifying for the patient and clinician and the long-term failure rates may be as high as 38% over a 10-year period. The high failure rates, in particular in the mandibular cases, can be attributed to endodontic and prosthodontic variables further complicating the treatment.[6-8]

In literal meaning, bicuspidization or molar bisection is splitting of the mandibular molar vertically through the furcation without removing both half and leaving two separate roots that are then treated as bicuspids.[9] They further affirmed factors related to the

success of bicuspidization procedures: 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 that could enable the creation of an sufficient embrasure for efficient oral hygiene. Soon after, Newell endorsed the bisection procedures as it retain some or all of the tooth however, the remaining roots has to be endodontically treated with acceptable restorative management and prosthetic crowns.[10]

According to the American Academy of Periodontology in its glossary of periodontal terms, is the "regeneration of periodontal attachment through differential tissue responses." A variety of barrier materials for GTR have been reported to be used for the successful management of Class III FIs of mandibular molars. They are primarily polytetrafluoroethylene, polyglactin, polylactic acid, calcium sulfate, and collagen. Pontoriero *et al*. stated that vertical bone loss of more than 3 mm will limit the success of any attempt at GTR of mandibular molars with Class III FIs that iis why any Class III mandibular furcation with a vertical bone loss of more than 3 mm would not be indicated for a GTR procedure.**[11]** Cohen and co-workers have afterward coined the term “Tunneling” which is a periodontal surgical procedure that creates suitable access point for patient cleaning and maintenance within the furcal area of a molar tooth.**[12-14]** The treatment of furcation defects is a complex and relatively difficult job that may compromise the success of periodontal therapy. Estimation of the prognosis of molars with furcation invasion is often an annoying and disappointing experience to the dental professional and patient. Undoubtedly, the bifurcations constitute one of the zones in the oral cavity where plaque is most difficult to remove. Additionally, patient’s oral hygiene status and attitude, caries susceptibility index and medical and drug history should be taken into account.[15-17]

In dentistry, endodontic care prior to bicuspidization procedure has a long history and it has remained today as a necessity in treating furcally involved mandibular molars.**[18]** In case when the tooth has lost part of its root support, it will require a restoration to allow it to function autonomously or to serve as an abutment for a splint or crown or bridge. Unacceptably, a restoration may lead to periodontal destruction, if the margins are defective or if non-occlusal surfaces do not have anatomic and physiologic form. This confirms the significance of accurate marginal adaptation of the final restoration. At the metal trial stage, the occlusal contacts were reduced in size and repositioned more favorably. Additionally, lateral excursive forces were reduced by making cuspal inclines less steep and eliminating balancing cuspal inclinations.

CONCLUSION

The management of furcation involvement presents one of the greatest challenges in periodontal therapy. Furcation-involved molar teeth respond less favorably to conventional periodontal therapy, and molars are lost more often than any other tooth type. Clinical application of various preventive measures in relation to the function of the masticatory system as well as prosthetic treatment is reviewed in the above discussion. Potential problems can be avoided and resolved by properly instituting a preventive prosthodontic procedure or practice according to the degree or level of prevention needed to correct it.

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