European Journal of Molecular & Clinical Medicine
ISSN 2515-8260 Volume 07, Issue 2, 2020

Furcation Involvement And Its Treatment Modalities

Authors:

1)Drjennifer Suhasini.S

Post Graduate,

Department Of Periodontology,

Sree Balaji Dental College And Hospitals

jenni.suhasini@gmail.com

2) Dr Mohan Valiathan., M.D.S.

Professor,

Department Of Periodontology,

Sree Balaji Dental College And Hospitals

Chennai

ABSTRACT:

The furcation is an area of complex anatomic morphology that is difficult or almost impossible to debride by routine periodontal instrumentation. Homecare methods that are performed routinely may not keep the furcation free of plaque. The presence of furcation involvement id one clinical finding that can lead to a diagnosis of advanced periodontitis and potentially to a less favorable prognosis for the affected tooth or teeth. Furcation involvement of teeth further poses a great dilemma in both therapeutic and diagnostic aspects. Though a common clinical problem which results due to a progressive periodontal pathology which mainly involves the molars , it still presents as a challenge for the dental surgeon. This review mainly aims in evaluating the various aspects of furcation like its classification and the treatment modalities that are available.

Keywords: Furcation involvement, Periodontitis, treatment of furcation.

INTRODUCTION:

Furcation maybe defined as the anatomic area of a multi-rooted tooth where the roots diverge[1]. Due to its complex nature and anatomic morphology it is difficult to maintain proper personal oral care and for non surgical periodontal instrumentation. Personal plaque control methods have not been very efficient in keeping the furcation area free of plaque accumulation[2]. Periodontal disease is characterised by the loss of connective tissue attachment induced by the presence of periodontal pathogens within the gingival sulcus[3]. Progression of periodontal disease occurs in the apical direction affecting cementum, periodontal tissues and the alveolar bone. The degree of progression of a periodontal lesion or disease is dependent upon various factors like inflammatory response of the individual, the composition of the bacteria present at the site, anatomic and local factors. Etiology and progression of periodontal disease is complex and furcation involvement further complicates the prognosis or outcome of the treatment. Furcation involvement is more common among the molar teeth when compared to the others. Long-term studies on treated periodontal patients have reported that molar teeth with prior furcation involvement were the most frequently lost teeth, probably because of their complex anatomy[4]. As the main aim of periodontics is the conservation of natural teeth, it is

important to understand the involvement of the furcation in periodontal disease. A thorough clinical examination is the key to diagnosis and treatment planning. Nabers probe may be helpful to enter and measure difficult to access furcal areas. Many factors contribute to the development of the furcation defect. These factors include: 1) The morphology of the affected tooth, 2) the position of the tooth relative to the adjacent teeth, 3) the local anatomy of the alveolar bone, 4) configuration of the bony defects and the presence of other dental diseases like dental caries and pulpal necrosis. 81% of the furcation have an orifice of 1 mm or less, 58% are 0.75 mm or less. It is important that the clinician should consider these dimensions while selecting instruments for probing.

Local anatomic factors are important as they affect the result of the therapy or prognosis. Root trunk length is the distance from the cemento enamel junction to the entrance of the furcation. The shorter the root trunk, the less the attachment needs to be lost before the furcation is involved. Teeth with short root trunks may facilitate surgical procedures. Teeth with long root trunks and short roots may have lost a majority of their support. Teeth with long roots and short to morderate root trunk length are readily treated. Closely approximated or fused roots can preclude adequate instrumentation during procedures. The anatomy of the furcation is complex and the presence of bifurcational ridges, accessory canals and concavity in the dome. Cervical enamel projections are reported to occur in 8.6-28.6% of the molars. These projections affect plaque removal and can complicate surgical.

CLASSIFICATION OF FURCATION INVOLVEMENT:

Glickman's Classification[5] in 1953:

1) Grade I:
   Incipient or early stage lesion. The pocket is supra bony, involving the soft tissue; there is slight bone loss in the furcation area. Radiographic change is not usually found, as bone is minimal.
2) Grade II:
   Can affect one or more furcations of the same tooth.
   Essentially a cul-de-sac with a definite horizontal component. If multiple defects are present then they do not communicated with each other. Vertical bone loss may be present. Radiographs may or may not depict furcation involvement.

3) Grade III:
   The interradicular bone is completely absent, but the facial and/or lingual orifices of the furcation and occluded by gingival tissue. Hence furcation opening cannot be seen clinically, but is essentially a through hand-through tunnel. Craterlike lesion in the interradicular area, creating an apical or vertical component along with the horizontal loss of bone may be seen. If the radiograph of the mandibular molars is taken as a proper angle and the roots are divergent, these lesions will appear on the radiograph as a radiolucent area between the roots.
4) Grade IV:
   The interradicular bone is completely destroyed. Gingival recession apically is seen so that the furcation opening is clinically visible. A tunnel therefore exists between the roots of the affected tooth.

Goldman's Classification[6] in 1958:

- Grade I: Incipient
- Grade II: Cul-de-sac
- Grade III: Through and through

Ramjford and Ash Classification in 1979:

- Class I: Beginning Involvement: The tissue destruction should not extend more than 2mm [or not more than 1/3 of the tooth width into the furcation.

- Class II: Cul-de-sac Involvement: The tissue destruction extends deeper than 2mm [or more than 1/3rd of the tooth width] into the furcation opening.
- Class III: Through and through involvement: Tissue destruction extends throughout the entire length of furcation.

Staffileno, H J et al [7] :

Class I: Furcations with a soft tissue lesion extending to furcal level but with minor degree of osseous destruction.
Class II: Furcations with a soft tissue lesion and variable degree of osseous destruction but not a through-and-through communication through the furca.
Class II F: Furcations with osseous destruction from facial aspect only.
Class II L: Furcations with osseous destruction from lingual aspect only.
Class II M: Furcations with osseous destruction from mesial aspect only.
Class II D: Furcations with osseous destruction from distal aspect only.
Class III: Furcations with osseous destruction with through-and-through communication.

Prognosis of the treatment provided and the involved tooth depends upon factors like the age, gender, systemic conditions of the patient, form of the periodontal disease, tooth involved and the degree of furcation, tooth ad root morphology, morphology of the bony lesion, mobility and the operators skills.

Diagnosis:

The extent of furcation invasion is often difficult to diagnose, and therefore a combination of radiographs, clinical probing using a curved Naber'sprobe[11] is advisable. The buccal furcaof maxillary molars and Buccal & lingual furcas of mandibular molars -- normally accessible for examination by clinical probing.Distal furcation - located midway bucco-lingually - probing from both sides. Mesial furcation - located 2/3rd towards palate - probed from palatal aspect.

The presence of furcation-involved teeth in a periodontal patient will influence the treatment plan.[8,9] The selection of procedures to be used in the treatment of periodontal disease at multi-rooted teeth can first be made when the presence and depth of furcation lesions have been assessed. A thorough clinical examination is the key to diagnosis and treatment planning.[10]

Slight radiographic change - furcation area should be investigated clinically, esp. if there is bone loss on adjacent roots. The radiographic examination includes intraoral periapical radiographs and vertical "bitewing" radiographs for detection of furcation invasion. In the radiographs, the location of the interdental bone, as well as the bone level within the root complex, should be examined[8].

Diminished radiodensity in furcation area in which outlines of bony trabeculae are visible suggests furcation involvement

Whenever there is marked bone loss in relation to a single molar root, it may be assumed -- furcation is also involved

Perioscope

Introduced subgingivally to visualize furcation

Consist of re-usable fiber optic endoscope which fits onto the periodontal probes & ultrasonic instruments that have been designed to accept it

Transgingival Probing[10]

Determine the contour of underlying bone

- Reduces the underestimation following normal probing

- Greenberg et al (1976) à sounding yielded accurate measurements when compared to surgical reentry measurements

TREATMENT:

The main objectives of treatment planning is to completely eliminate plaque from the area and to facilitate proper self plaque control.

Non-surgical therapy:

The preliminary phase mainly involves good patient plaque control before proceeding with surgical correction of periodontal abnormalities. Non-surgical therapy is a combination of oral-hygiene instructions, scaling and root planning.Bower in 1979 suggested that 58% of furcations can be entered typically using curettes. Other instruments include DeMarco curettes, diamond files, Quetin furcation curettes and Mini Five Gracey curettes. Chemotherapy has proven to be disappointing.

Aim of non surgical therapy:

- Reshaping of the tooth coronal to the furcation to improve access to plaque control
- Eliminate any facial grooves

  enamel pearls

  cervical enamel projections
- Potential complication is

  hypersensitivity

  increased risk of root caries

[Goldman 1958, Fleischer et al 1989]

Surgical therapy:

- Furcationoplasty: Most effective in grade II furcation

1) Remove the lip of defect to reduce horizontal depth
2) Bone ramps into the furcation to enhance plaque control
3) Reduce probing depths

- **Tunneling**

  - Osseous Resection:
  - Osseous surgical therapy can be divided into resective and regenerative therapy. For many years, osteoplasty and ostectomy have been used to make the furcation accessible and cleansable.

    Regenerative:

    i) Contain bone forming cells - **Osteogenesis**

2) Serve as a scaffold for bone formation - **Osteoconduction**
3) Matrix of the grafting material contains bone inductive substances - **Osteoinduction** stimulating both the regrowth of alveolar bone and the formation of new attachment

- **Hemisection:**
  Hemisection refers to removal of half the tooth: tooth sectioning followed by removal of a root at the furcation or apical to it, without removal of the crown, usually on maxillary

molars.Hemisection has been called bicuspidizationor separation as it changes the molar into two separate tooth structure, where the furca area is changed to an interproximal space, where the tissue is more manageable by the patient.[9]

- **Root resection**:
  Removal of a root without reference to how the crown is treated. Usually done in Grade II or Grade III furcation involvements. Maybe performed in vital or endodontically treated teeth. Crowns are then used for resected tooth.
  Criteria for root resection:

1. Remove the root(s) that will eliminate the furcation and allow the production of a maintainable architecture on the remaining roots [9]
2. Remove the root with the greatest amount of bone and attachment loss. Teeth with uniform advanced horizontal bone loss are not candidates for root resection [8]
3. Remove the root that best contributes to the elimination of periodontal problems on adjacent teeth [8]
4. Remove the root with the greatest number of anatomic problems [9]
   Remove the root that least complicates future periodontal maintenance.[8]

   Severe vertical bone loss ivolving only one of the multi rooted teeth, through and through furcation destruction, proximity of adjacent roots, severe root exposure due to dehiscence, prosthetic failure of abutments with a splint, endodontic failure, vertical root fracture or root trunk fracture or decay are indications for root resection[12]. Systemic factors, poor oral hygiene, fused roots, unfavorable tissue architecture, internal root decay, deepening of pulp chamber floor are contradictions of root resection [13].

   i) Resectivebicuspidization

- Bone regeneration procedures:
  In furcal lesions, bone regeneration is often thought to be relatively futile. Furcation defects with deep two walled or three walled components may be suitable for reconstruction procedures.
- Tooth extraction:
  Indicated when the extent of destruction is beyond restoration. Indicated in teeth with through and through furcation involvement.
- Dental implants.

Longitudinal[14,15] and retrospective [16,17,18,19,20] studies have shown that periodontal treatment shows better results in single-rooted teeth or non-furcated molars with respect to molars with furcation lesions. These studies have also indicated that just because a furcation lesion was present it is not enough to assign a questionable or hopeless prognosis. previous studies comparing scaling and root planing in furcation area with and without surgical access [21,22], have found better results when compared with surgical treatment.

CONCLUSION:

Treatment, management, and long-term retention of multi-rooted teeth with periodontal destruction of varying degrees into their furcations have long been a challenge to the dental surgeon. It is important to diagnose and treat furcation defects with caution as they always pose a dilemma. Hence, complete knowledge and understanding is necessary. Treatment plans should be properly formulated for the success of the treatment.

REFERENCES:

[1]. The American Academy of Periodontology. Glossary of Periodontal Terms. 4th ed. Chicago, IL, USA: 2001. p. 20.

[2]. Hamp SE, Nyman S,Lindhe J. Periodontal treatment of multirooted teeth. Results after 5 years. J ClinPeriodontol 1975; 2:126-130.

[3]. Massimo Desanctis and Kevin Murphy: The role of periodontal surgery in the treatment of furcation defect. Perio 2000: 22:2000:154-168.

[4]. Leonare HJ: Dental Cosmos: 1931:73:392-393.

[5]. Newman, Takei, Carranza: Clinical Periodontology 9th edition 2003.

[6]. Goldman HM, Cohen WD: Infrabony pocket: classification and treatment. J Periodontol: 1958:29:272-280.

[7] Staffileno H.J. Surgical management of furcainvasión. Dent. Clin. N. Am. 1969;13:103–119.

[8] Carnevale G, Pontoriero R, Lindhe J, editors. Treatment of furcation-involved teeth. In: Clinical Periodontology and Implant Dentistry. 4th ed. Iowa: Blackwell Munksgaard Co.; 1997. p. 683-710.

[9] Ammons WF Jr., Harrington GW. Furcation: The problem and its management. In: Newman MG, Takei HH, Klokkevold PR, Carranza FA, editors. Carranza's Clinical Periodontology. 10th ed. Missouri: WB Saunders Co.; 2009. p. 911-1004.

[10] Müller HP, Eger T. Furcation diagnosis. J Clin Periodontol1999;26:485-98.

[11] Kalkwarf KL, Reinhardt RA. The furcation problem. Current controversies and future directions. Dent Clin North Am 1988;32:243-66.

[12] Weine FS. Endodontic Therapy. 6th ed. Missouri, USA: Mosby Inc.; 2004. p. 423-51.

[13] Basaraba N. Root amputation and tooth hemisection. Dent Clin North Am 1969;13:121-32.

[14] Nordland P., Garrett S., Kiger R., Vanooteghem R., Hutchens L.H., Egelberg J. The effect of plaque control and root debridement in molar teeth. J. Clin. Periodontol. 1987;14:231–236. doi: 10.1111/j.1600-051X.1987.tb00972.x.

[15] Loos B., Nylund K., Claffey N., Egelberg J. Clinical effect of root debridement in molar and non-molar teeth. J. Clin. Periodontol. 1989;16:498–504. doi: 10.1111/j.1600-051X.1989.tb02326.x.

[16] Hirschfeld L., Wasserman B. A long-term survey of tooth loss in 600 treated periodontal patients. J. Periodontol. 1978;49:225–237. doi: 10.1902/jop.1978.49.5.225.

[17] Ross I.F., Thompson R. A long term study of root retention in the treatment of maxillary molars with furcation involvement. J. Periodontol. 1978;49:238–244. doi: 10.1902/jop.1978.49.5.238.

[18] McFall W.T. Tooth loss in 100 treated patients with periodontal disease. A long-term study. J. Periodontol. 1982;53:539–549. doi: 10.1902/jop.1982.53.9.539.

[19] Wood W.R., Greco G.W., Mc Fall W.T. Tooth loss in patients with moderate periodontitis after treatment and long term maintenance care. J. Periodontol. 1989;60:516–520. doi: 10.1902/jop.1989.60.9.516.

[20] Wang H.L., Burgett F.G., Shyr Y., Ramfjord S. The influence of molar furcation involvement and mobility on future clinical periodontal attachment loss. J. Periodontol. 1994;65:25–29. doi: 10.1902/jop.1994.65.1.25.

[21] Bower R.C. Furcation morphology relative to periodontal treatment. Furcation entrance arquitecture. J. Periodontol. 1979;50:23–27. doi: 10.1902/jop.1979.50.1.23.

[22] Matia J.I., Bissada N.F., Maybury J.E., Ricchetti P. Efficiency of scaling of the molar furcation area with and without surgical access. Int. J. Periodontics Restor. Dent. 1986;6:25–35.