

Furcation Involvement and its Management

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Abstract:

One of the most important and at present unsolved problems in clinical periodontology is the predictable successful treatment of periodontitis-affected furcations of multirooted teeth. Since several therapeutic approaches are proposed, i.e., conservative, resective or regenerative, a proper diagnosis of these lesions is demanding.

Keywords: Furcation and Management

INTRODUCTION

The furcation is an area of complex anatomic morphology that may be difficult or impossible to debride by routine periodontal instrumentation. The etiology of periodontal disease is complex and so is its management. One of the most compelling challenges faced in management of periodontal diseases in multirooted teeth is furcation involvement. Involvement of furcae in multirooted teeth by chronic periodontitis is a common event resulting from loss of bone adjacent to and within the furcae.¹

Furcation involvement is reported to considerably increase the risk for tooth loss. Therefore, furcation defects represent a formidable problem in the treatment of periodontal disease, principally related to the complex and irregular anatomy of furcations.¹

One of the most important and at present unsolved problems in clinical periodontology is the predictable successful treatment of periodontitis-affected furcations of multirooted teeth. Since several therapeutic approaches are proposed, i.e.,

conservative, resective or regenerative, a proper diagnosis of these lesions is demanding.²

ETIOLOGICAL FACTORS³

1. Plaque Associated Inflammation
2. Trauma From Occlusion
3. Contributing Anatomical Factors

These factors include:

- Furcation entrance width
- Root trunk length
- Presence of root concavities
- Cervical enamel projections
- Bifurcation ridges
- Enamel pearls

CLASSIFICATION

There are various classifications proposed for furcation involvements. Broadly they can be divided according to the component involved into⁴

A. Horizontal component

Glickman in 1953 gave 4 grades based on horizontal attachment loss.

Grade 1: Incipient lesion, suprabony pocket and slight bone loss in the furcation area.

Grade 2: Loss of interradicular bone and pocket formation but a portion of the alveolar bone and periodontal ligament remain intact.

Grade 3: Through and through lesion.

Grade 4: Through-and-through lesion with gingival recession, leading to a clearly visible furcation area.

B. Vertical component

Tarnow and Fletcher in 1984 measured the distance between fornix to the alveolar bone of the adjacent two roots and gave three Subclasses.

Subclass A: 1-3mm

Subclass B: 4-6mm

Subclass C: >6mm.

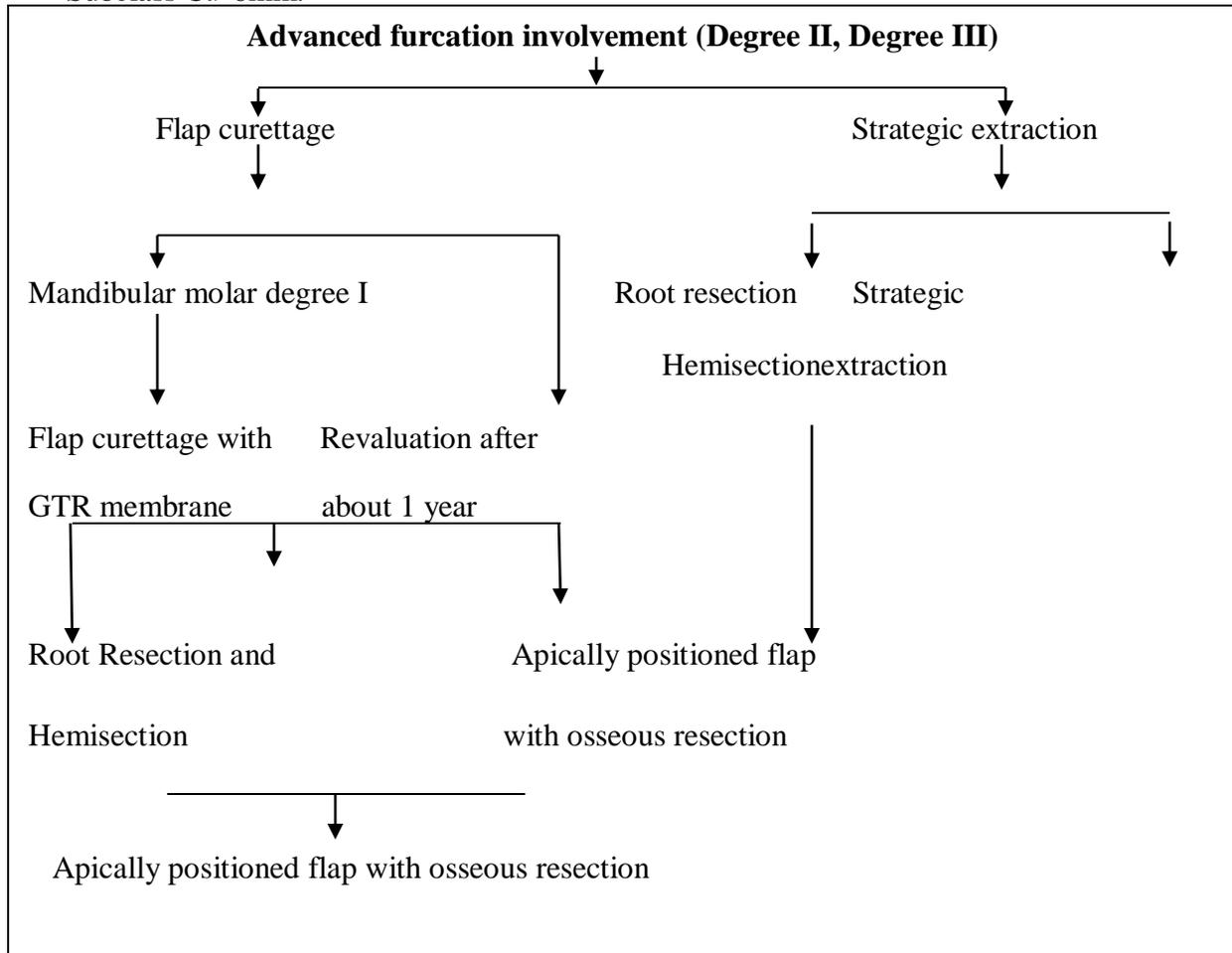
MANAGEMENT OF FURCATION LESIONS

Furcation management can be broadly classified as put forth by Kalkwarf and Reinhardt (1988)⁵ as follows:

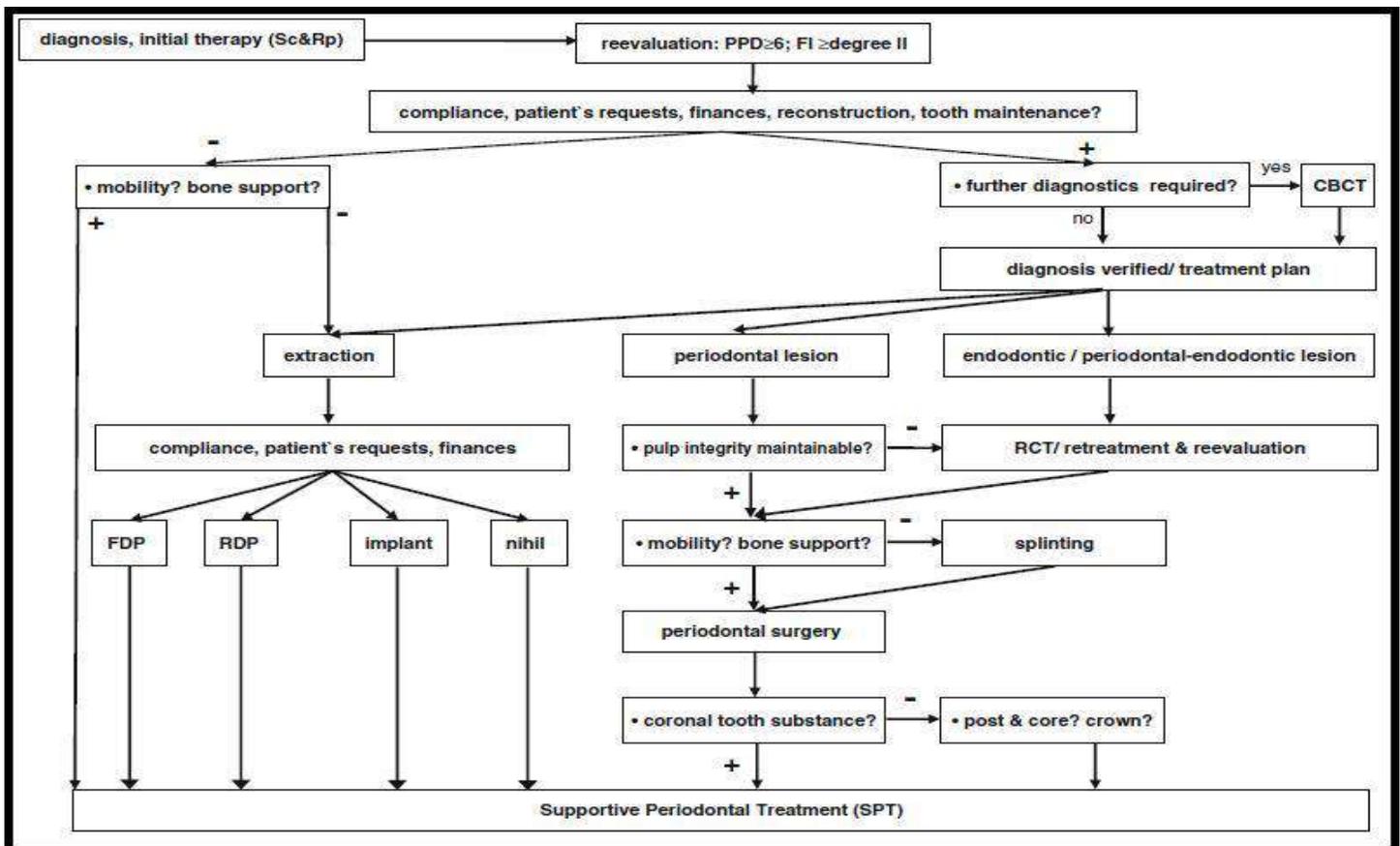
Maintain the furcation

1. Increase the access to furcation
2. Removal of furcation
3. Closure of furcation with new attachment

Degree I	Degree II	Degree III
Scaling and Root planing Flap curettage Apically positioned flap Odontoplasty Osteoplasty, Ostectomy	Flap curettage Root resection Hemisection Flap curettage with barrier membrane (GTR)	Flap curettage Root resection Hemisection Flap curettage with barrier membrane (GTR) Strategic extraction



DECISION MAKING IN MOLARS WITH FURCATION INVOLVEMENT²²



Treatment of advanced forms of periodontal disease frequently includes surgical procedures. The objectives of periodontal therapy are to²²:

1. To obtain visibility and access to the root surfaces for proper professional debridement.
2. To eliminate the pathologically deepened pockets.
3. To establish morphology in the dento-gingival region which facilitated proper self performed tooth cleaning.

NON-SURGICAL THERAPY

1. Scaling & Root Planing & Chemotherapy: Many clinicians believe the prognosis of teeth with furcation involvement is poor. They think that the treatment of choice for all furcation lesions was surgical exposure,

root amputation, root resection or extraction. These clinicians recommended scaling and root planing to remove hard and soft bacterial deposits from the tooth and root surfaces as the primary form of therapy for furcations with slight periodontal involvement.⁶

SURGICAL THERAPY

1. Furcationplasty,

Odontoplasty & Osteoplasty: Hamp & Colleagues (1975)⁷ described furcationplasty as raising a mucoperiosteal flap to provide access to furcation area and combining scaling and root planing, osteoplasty and odontoplasty to remove local irritants and open the furcation to allow the patient access to clean and maintain the area. The result should be a firm, well-contoured papilla to cover the inter-

radicular space. This procedure is recommended for Grade I and early Grade II furcations. This is a surgical method used to eliminate inter-radical defects. If the alveolar bone tissue at the furcation entry is lifted it is called osteoplasty and if a treatment is carried out on the tissue in the tooth structure this is called odontoplasty. Furcationplasty can be applied to the buccal and lingual furcation areas. In interproximal surfaces the entry is usually limited^{1,6}. During the healing period the furcation entry section is closed off with tissue “similar to papilla”. As the severe loss of tooth tissue during odontoplasty could lead to hypersensitivity the treatment should be carried out with special care.¹

2. Tunnel Operation

This is a resective method used in treating mandibular deep class 2 and 3 defects. This type of respective treatment is proposed if the root body is short, if it has a wide divergence angle and if there is long divergence between the mesial and distal roots. In order for the patient to enable plaque control following this treatment, a sufficient furcation entry is provided. It is proposed that chlorhexidine-digluconate varnish application should be carried out on the root surface that is out in the open during the maintenance process. As the surgical process could lead to surface slickness that could in turn lead to root hypersensitivity and root surface cavities, it should be carried out carefully.^{15,9}

3. Root Resection: Resection of one or more roots was first reported by Black 1915.¹⁷ A radectomy may be performed in 2 ways:

- Amputation of a tooth at the cemento-enamel junction with preservation of the crown.
- Division of the crown to the bifurcation or trifurcation and subsequent removal of the root and the pertinent part of the crown.

This is a treatment method used in class 2-4 furcation defects in multi-rooted teeth. This can be applied to vital or endodontic treated teeth. It is suggested that endodontic treatment is completed prior to resection however vital root resection is a difficult procedure both for the patient and the dentist.

An unexpected perforation during an operation could create root fractures and the preparation problem in the tooth root.¹⁰ Root resection can be applied if the disease is localized in one or two teeth, if there is advanced bone loss that cannot be treated with regenerative methods, if there is advanced gingival recession or dehiscence, if there are class 2 and 3 furcation defects, if there are root fractures, root cavities and root resorption.¹¹

4. Osseous Surgery following Tooth Resection:

Another consideration in root resection procedure is the possibility that a second surgical procedure may be necessary several months after the respective therapy. This may occur in cases of close root proximity in which there are extensive osseous lesions around the resected roots. The socket left by the removal of the root requires several months to fill and may leave a residual osseous defect close to the remaining roots, this may result in a vertical bone loss next to the adjacent roots. Attempts to recontour the bone at the time of the initial surgery may result in

excessive removal of bone. By allowing the bone to fill the socket, one can later reopen the area for a final definitive osseous correction of the resected area. If the tooth presents widely divergent roots with good interradicular bone, the socket left by the removal of the root may not affect the remaining roots. In this case a second surgical procedure may not be necessary.¹⁸

5. Hemisection: According to Carranza (2007)¹⁸, hemisection is the splitting of a two-rooted tooth into two separate portions. This process has been called bicuspidization or separation. Hemisection is most likely to be performed on mandibular molars with buccal and lingual Class II or Class III furcation involvements.

This is the splitting of the two roots of double rooted teeth. One of the roots that are separated is taken out together with the crown. By taking out the chosen root, the patient is enabled to carry out his/her hygiene applications and plaque control is provided. Bone structuralization is formed with increased plaque control and the pocket depth is decreased. The alveolar bone of the tooth affected with hemisection is protected and other expensive treatment is avoided.¹² It is frequently applied in mandibular teeth with class 2-3 defect.¹¹

6. Bicuspidization: The treatment of advanced Grade II or Grade III furcation involvement of mandibular molar can also be accomplished by bisection (bicuspidization) procedure if the molar exhibits the proper anatomic features and stability. Long, divergent roots with the bone loss restricted to the furcal area are ideal candidates for this procedure.¹⁸

7. Extraction of the tooth: In teeth that advanced degree of furcation defects and advanced degree of attachment loss is present pulling out said teeth could be a more suitable treatment method. The application of osseointegrated implants following the extraction of teeth for the treatment plan can be evaluated as an alternative treatment.¹

8. Oriented Tissue Regeneration: The aim of the technique based on the covering of bone defects with barrier membranes, is to ensure that the defect is filled with mineralised tissue and to give time for slowly growing bone cells by preventing the soft tissue cells that grow quickly. Even though successful results have been obtained with this method it is nearly impossible to estimate the results beforehand periodontal treatment.¹³ As it is not possible to seal the tissue that has been healed inside the mouth, a barrier membrane is placed and the infection that develops affects the results.¹⁴ Histologic examination shows that frequently epithelium is present between the membrane and tooth surface.¹⁵

9. Regenerative Therapy: The goal of regenerative therapy for furcation involvement is to obtain complete osseous fill of the area with reformation of the periodontal ligament. Attainment of this goal results in the reduction of pocket depth and gain in attachment level, as demonstrated by probing with standardized technique and gain in bone level demonstrated by probing or by visual inspection after re-entry procedure. Histological procedures can certify regeneration of the periodontal ligament in combination with clinical parameters.

NON- BONE GRAFT ASSOCIATED NEW ATTACHMENT TECHNIQUE:

Periodontal reconstruction can be attained without the use of bone grafts in meticulously treated three-walled defects (intrabony defects) and in periodontal and endodontal abscesses.¹⁹

New attachment is more likely to occur when the destructive process has occurred rapidly, such as after treatment of pockets complicated by acute periodontal abscesses and after treatment of acute necrotizing ulcerative lesions.²⁰

REMOVAL OF JUNCTIONAL EPITHELIUM:

Several methods have been recommended to remove the junctional and pocket epithelium. These include:

1. Curettage
2. Chemical agents
3. Ultrasonic methods
4. Lasers
5. Surgical techniques

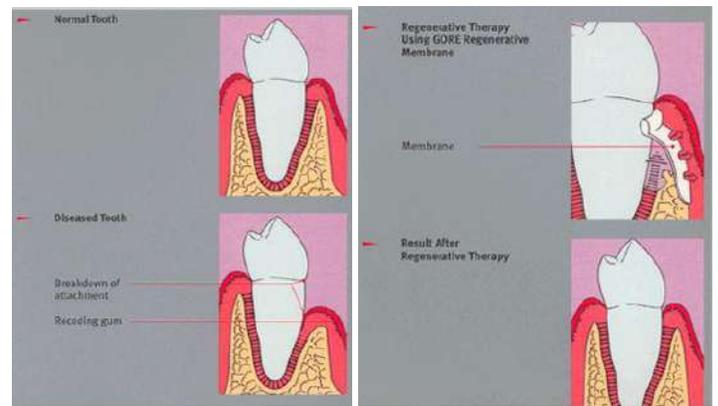
Prevention or impeding of epithelial migration:

Elimination of junctional and pocket epithelium may not be sufficient because the epithelium from the excised margin may rapidly proliferate to become interposed between the healing connective tissue and the cementum.

GUIDED TISSUE REGENERATION (GTR):

The method for prevention of epithelial migration along the cemental wall of the pocket that has gained wide attention is guided tissue regeneration (GTR). GTR consists of placing barriers of different types to cover the bone and periodontal ligament, thus

temporarily separating them from the gingival epithelium. Excluding the epithelium and the connective tissue from the root surface during the post-surgical healing phase not only prevents epithelial margin into the wound, but also favour repopulation of the area by cells from the periodontal ligament and the bone.



BIODEGRADABLE MEMBRANES:

The periosteum was obtained from the patient's palate by means of a window flap. Studies reported that autogenous periosteal grafts can be used in guided tissue regeneration and result in significant gains in clinical attachment and osseous defect fill.²¹

CONCLUSION

Earlier, the common solution to furcation problems had been extraction. With the above knowledge about its etiology, incidence and distribution of furcation involvement, accurate diagnosis and appropriate treatment, it should be possible to prevent its development and treat the established cases. Furcation involvement no longer carries a mandatory hopeless prognosis provided that adequate plaque control is possible after treatment. But, effective management of furcation regions affected by periodontal

destruction includes accurate assessment of etiologic factors, careful diagnosis and appropriate plan of therapy. The guidelines for management of a periodontally involved furcation region must be stressed on the application of the simplest therapy that is likely to provide clinical stability.

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