



## FURCATION INVOLVEMENT

Furcation is an area of complex anatomic morphology, that once involved is difficult to debride by routine periodontal instrumentation.

### **Definitions:**

Furcation – anatomic area of a multirooted tooth where the roots diverge. AAP 1992

Furcation invasion – pathologic resorption of bone within the furcation. AAP 1992

Furcation involvement – invasion of the bifurcations/ trifurcations of multirooted tooth by periodontal disease.

**It is detected using Naber's probe !!**

### **Classifications**

#### **1. Glickman [1953]**

**Grade I :** Pocket formation into the flute, but intact interradicular bone (incipient).

**Grade II:** Loss of interradicular bone and pocket formation, but not extending through to the opposite side.

**Grade III:** Through-and-through lesion.

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

#### **2. Goldman [1958]**

Grade I: Incipient.

Grade II: Cul-de-sac.

Grade III: Through-and-through.

#### **3. Hamp et al [1975]**

Degree I: Horizontal loss of periodontal tissue support less than 3 mm.

Degree II: Horizontal loss of support 3 mm, but not encompassing the total width of the



furcation.

Degree III: Horizontal through-and-through destruction of the periodontal tissue in the furcation.

#### **4. Ramfjord & Ash (1979)**

Class I: Beginning involvement. Tissue destruction, 2 mm (1/3 of tooth width) into the furcation.

Class II: Cul-de-sac. .2mm (.1/3 of tooth width), but not through-and-through.

Class III: Through-and-through involvement.

#### **5. Tarnow & Fletcher (1984)**

Sub-classification based on the degree of vertical involvement

Subclass A. 0–3 mm

Subclass B. 4–6 mm

Subclass C. >7 mm

#### **6. Goldman and Cohen (1980)**

- Degree I: Involves furcation entrance.
- Degree II: Involvement extends under the roof of furcation but not throughand-through.
- Degree III: Through-and-through involvement.

#### **Clinical Features of Furcation Defects**

- The mandibular first molars are the most common sites
- Maxillary premolars are the least common
- The denuded furcation may be visible clinically or covered by the wall of the pocket
- Associated with suprabony & infrabony pockets
- Periodontal abscess
- Root caries & tooth mobility are common.



### **Cervical enamel projection:**

The cervical enamel projection (CEP) is an enamel projection, which extends from the CEJ to furcation. **Masters and Hoskins** (1964) <sup>7</sup> reported the incidence of CEPs in extracted human teeth and suggested their possible implication in isolated furcation involvement. They can be classified on the basis of their proximity to furcation entrance as,

**Grade I** – The enamel projection extends from the CEJ of the tooth toward the furcation entrance.

**Grade II** – The enamel projection approaches the entrance to the furcation. It does not enter the furcation, and therefore, no horizontal component is present.

**Grade III** – The enamel projection extends horizontally into the furcation.

### **There are various factors which help in the diagnosis of furcation involvement !!**

- Root trunk length.
- Size of the furcation.
- Root separation and divergence.
- Root fusion.
- Root concavity.
- Crown root ratio of the tooth.
- Occlusal interferences and trauma from occlusion.
- Tooth mobility.
- The ease with which hygiene of the affected furcation can be maintained.
- The capacity of the patient to maintain optimum hygiene.
- The extent of furcation disease can be determined by evaluating
- Vertical bone loss.
- Horizontal bone loss.
- Both vertical and horizontal bone loss.
- Out of horizontal and vertical bone loss parameters, the horizontal bone loss is more commonly used.

### **Management of furcation involvement :**

1. **Root Resection / Amputation:** It is the surgical removal of all or a portion of the root before or after endodontic treatment.
2. **Hemisection / Root Separation:** It is the surgical removal of the root with the associated part of the crown. It is frequently used with reference to lower molars.



3. **Bicuspidization:** Root separation/ bicuspidization is the sectioning of the root complex & the maintenance of all roots.
4. **Tunnel Preparation :** It is by transforming the grade II lesions to grades III & IV for better access but it is not recommended because of increased incidence of root caries.

#### **Furcationplasty:**

The reshaping of alveolar bone in the furcation area is known as furcationplasty. Furcationplasty can be applied to the buccal and lingual furcation areas. If the same procedure is carried out on the tooth structure, it is called as odontoplasty.

#### **Root amputation:**

Root amputation is characterized as removal of a root without removal of the overhanging portion of the crown <sup>42</sup>.

#### **Root resection:**

Root resection generally indicates the removal of a root without any information on the crown of the tooth <sup>42</sup>.

#### **Root separation:**

Root separation is indicated as the sectioning of the root complex and the maintenance of all roots <sup>42</sup>.

#### **Bicuspidization:**

This is the procedure done for mandibular molars where a single molar tooth can be converted into two bicuspid by retaining both mesial and the distal root.

#### **Hemisection:**

Hemisection is defined as the removal of half of a tooth performed by sectioning the tooth and removing one root. It is frequently used with reference to lower molars <sup>42</sup>.

### **Phases of treatment of root resection :**

1. Endodontic Phase
2. Restorative Phase
3. Surgical Phase

#### **Root complex:**

- Portion of tooth that is located apical to the CEJ
- Parts: Root Trunk & Root Cone

#### **Furcation Fornix:**



It is the roof of furcation

**Treatment modalities for grade I furcation:**

- Initial preparation followed by scaling & root planing.
- Curettage or gingivectomy
- Odontoplasty

**Treatment modalities for grade II furcation:**

- Osteoplasty & Odontoplasty in case of shallow invasions
  - Root resection / amputation
  - Hemisection
  - Bicuspidization
  - Tunnel Preparation
- } Severe grade II or IV lesions

**Regenerative treatments for furcation defects:**

1. Autogenous bone grafting (Osseous coagulum, Bone Blend)
2. Allografts (Freeze dried bone allografts-FDBA ,DFDBA)
3. Alloplasts (Hydroxyapatite, Tricalcium phosphate)
4. Citric acid root conditioning
5. GTR & combination techniques



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