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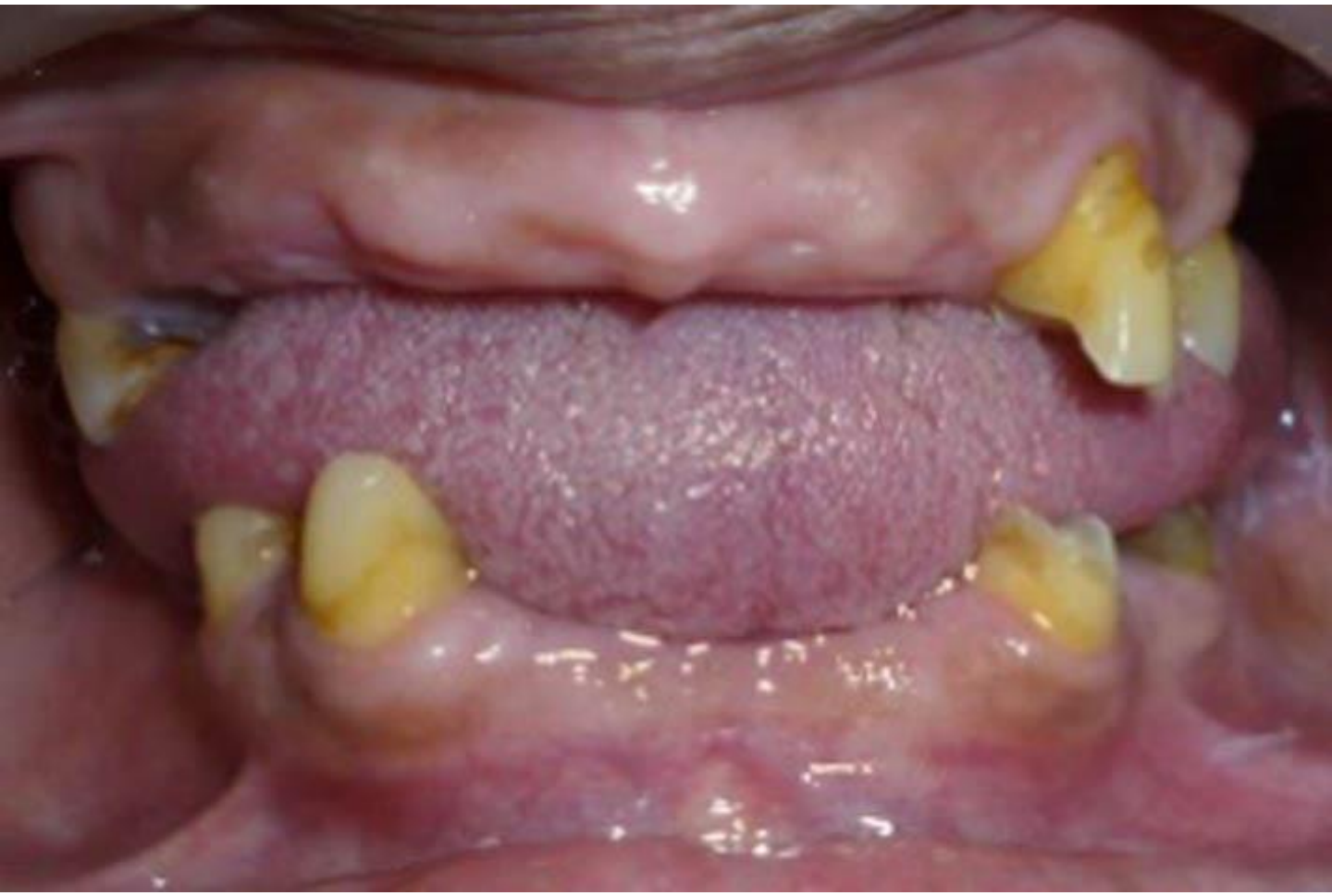

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FURCATION – AN UNSOLVED MYSTERY

Tanya Nandkeoliar, * Ajeya Kumara E G, ** Meenu Dangi, ***
Sinam Subhas Chandra Singh, † Ujjwala Rastogi, †† Chengappa M U †††

* Assistant Professor, Department of Periodontics, Dental College, Regional Institute of Medical Sciences, Imphal, Manipur, India
** Senior Lecturer, Department of Periodontology & Implantology, Kannur Dental College, Anjarakandy, Kerala, India
*** Post Graduate Student, Department of Periodontics, Institute of Dental Studies and Technologies, Modinagar, Uttar Pradesh, India
† Assistant Professor, Department of Periodontics, Dental College, Regional Institute of Medical Sciences, Imphal, Manipur, India
†† Intern, Institute of Dental Studies and Technologies, Modinagar, Uttar Pradesh, India
††† Reader, Department of Prosthodontics, Kannur Dental College, Anjarakandy, Kerala, India

ABSTRACT

Furcation is the region of division of the tooth root. It is a bifurcation if there are two roots or a trifurcation if there are three roots. Since times immemorial a wealth of information has been gathered that has allowed clinicians to dramatically modify the evaluation and treatment of a tooth with periodontal destruction in the furcation region. The complexity of the anatomy of the furca proves it to be a mystery when it comes to treating a furcation involvement. This review evaluates the different aspects of furcation in terms of etiology, classification, diagnosis and various treatment possibilities.

KEYWORDS: Furcation; furcation etiology; furcation classification; furcation diagnosis; furcation treatment

INTRODUCTION

Periodontal disease may be defined as "an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession or both" [1] which is affected by age, gender, ethnicity, income, social class and educational status. Furca is the region of division of the tooth root. It is a bifurcation if there are two roots or a trifurcation if there are three roots. "Furcation involvement may be defined as the invasion of the bifurcation and trifurcation of multirooted teeth by periodontal disease".[2] This involvement of the furcae of multirooted teeth by chronic periodontitis is a common event resulting from loss of bone adjacent to and within the furcae.

Etiology Of Furcation Involvement

The etiology of furcation involvement can be classified into three major groups, among which the most common etiologic factor is bacterial plaque.[3]

1. **Primary factor**
2. **Predisposing factors**
3. **Contributing factors**

The primary factor includes bacterial plaque. The various predisposing factors include Location relative to CEJ, Root trunk length, Root length, Root form, Interradicular dimension, Furcation shape, Location of entrance, Furcation entrance diameter, Facial and lingual radicular bone, Enamel projections, Enamel pearls, Bifurcation ridges, Root concavities and Carious lesions. The contributing factors include plaque-associated inflammation, trauma from occlusion, pulpal pathology, vertical root fractures and iatrogenic factors.[3-9]

Classification Of Furcation Involvement

Several systems have been devised to classify the severity of furcation involvement based either on the extent of horizontal probing depth into the furcation defect or on the vertical extent of the loss of alveolar bone within the defect (Table 1).

Diagnosis Of Furcation Involvement

The buccal furcation entrance of the maxillary molars and the buccal and lingual furcation entrances of the mandibular molars are normally accessible for examination using a curved graduated periodontal probe (Naber's probe), an explorer or a small curette. The examination of approximal furcations is more difficult, in particular when neighboring teeth are present.[10] Bone sounding i.e. transgingival probing to the bone crest under local anaesthesia, has been reported to permit a relatively accurate assessment of the osseous topography.[7] A

Table I: Classification Of Furcation Involvement

HORIZONTAL COMPONENT OF FURCATION INVOLVEMENT	*VERTICAL COMPONENT OF FURCATION INVOLVEMENT*
GLICKMAN 1953[4]	**TARNOW AND FLETCHER 1984**[5]
Grade I	Sub Class A
Grade II	Sub Class B
Grade III	Sub Class C
Grade IV	
GOLDMAN 1958 [5]	**ESKOW AND KAPLIN 1984**[5]
Grade I	Sub Class A
Grade II	Sub Class B
Grade III	Sub Class C
HAMP, LINDHE, NYMAN 1975 [6]	**HOU AND TSAI 1997**[8]
Degree I	Type A
Degree II	Type B
Degree III	Type C
RAMJFORD AND ASH 1979 [5]	**HOU ET AL 1998**[9]
Class I	AI, AII, AIII
Class II	BI, BII, BIII
Class III	CI, CII, CIII
RICHETTI 1982 [5]	
Class I	
Class II	
Class III	
FEDI 1985 [5]	
Grade I	
Grade II	
Degree I	
Degree II	
Grade III	
Grade IV	
BASARABA 1990 [7]	
Class I	
Class II	
Class III	

careful radiographic diagnosis often provides early evidence for interradicular periodontitis, although **Carranza & Takei**[11] point to the fact that, since bone loss is minimal, the incipient lesion may not be seen radiographically in most instances. An advanced furcation invasion in the maxillary first or second molars may be provided by a small, triangular radiographic translucency across the mesial or distal roots of these teeth called ‘‘**furcation arrow**’’.[7]

THERAPY

Treatment of a bony defect in the furcation region is intended to meet two objectives:

1. Elimination of the microbial plaque from the exposed surfaces of the root complex
2. Establishment of an anatomy of the affected surfaces that facilitates proper self-performed plaque control.[10]

Factors to be considered for successful treatment of furcation involvement:[5]

1. Degree of Involvement
2. Crown: Root ratio
3. Length of roots
4. Root anatomy/morphology
5. Degree of root separation
6. Strategic value of the tooth
7. Residual tooth mobility
8. Need for endodontic treatment
9. Prosthetic requirements
10. Periodontal condition of adjacent teeth
11. Ability to maintain oral hygiene
12. Quality of bone/ ability to place implants
13. Financial considerations
14. Long term prognosis

The treatment of furcation involvement according to different classification is shown on Table 2.

Table 2: Treatment Of Furcation

Glickman	I	II		III OR 1V
Lindhe	---	I	II	III
Tarnow	---	A, B OR C	A, B OR C	A, B OR C
Treatment	Scaling, root planing and curettage, Gingivectomy, Odontoplasty	Odontoplasty, Osteoplasty, Furcationplasty, Regenerative procedures	Root resection, Tunnel preparation, Regenerative procedures, Extraction/ implant placement	Root resection, Tunnel preparation, Regenerative procedures, Extraction/ implant placement

Wound Healing In Furcation Defects[12]

It was suggested by **Melcher** that the type of cell that repopulates the periodontitis affected root surface after periodontal surgery determines the nature of the attachment that will form. After the surgical intervention in the periodontal region, the detached and cleaned root surface may be repopulated by four different types of cell:

1. Epithelial cells
2. Gingival connective tissue cells
3. Bone cells
4. Periodontal ligament cells

PROGNOSIS

For many years the presence of significant furcation involvement meant a hopeless long term prognosis for the tooth. Clinical research has indicated that furcation problems are not as severe a complication as originally suspected, if one can prevent the development of caries in the furcation. Relatively simple periodontal therapy is sufficient to maintain these teeth in function for long periods. The key to long term success appear to be: ***Thorough diagnosis, selection of patient with good oral hygiene and careful surgical and restorative management.***[4]

CONCLUSION

Successful treatment, management and long term retention of multirooted teeth with periodontal destruction of varying degrees into their furcations has long been a challenge to the discerning general dentist or dental specialist. Some earlier authors have reported that periodontal pockets that involve the domes of furcations of multirooted teeth present a hopeless or at best an unfavorable prognosis and should be extracted. However, long term studies of treated teeth with furcations have shown impressive statistics on retention period up to 50 years. The decision for a specific treatment mode for furcation involved tooth depends on several factors, with a both general and local perspective. The age of the patient, his or her general condition and the form or expression of periodontal disease has to be taken into account, along with the overall strategic importance of the respective tooth and its possible role in a comprehensive treatment plan. Tooth type and degree of furcation involvement may be regarded as the most important factors. Aspects like tooth or root morphology, the anatomical and topographical relation between the roots, morphology of the bony lesion, remainder of the periodontal attachment around single roots and their expected mobility have also to be considered. Finally, the operator's skill and experience to detect and treat the furcation involved tooth must be taken into account. A careful diagnosis is a pre-requisite for appropriate therpy. Novel treatment modalities compel the therapist to acquire the necessary data and to correctly interpret the respective observations. The current concept for treatment of interradicular periodontitis is complex. Not only technical skill of the therapist is required but also understanding, confidence and compliance of the patient are necessary for successful treatment of furcation involvement. Furcation involvement is a commonly encountered problem in day-to-day periodontal practice. Preserving a functional natural dentition should be the goal of our practice. The management of furcation involvement should include selection of appropriate treatment modality from the array of treatment options available taking into account various merits and demerits or success and failure associated with each treatment modality.

CONFLICT OF INTEREST & SOURCE OF FUNDING

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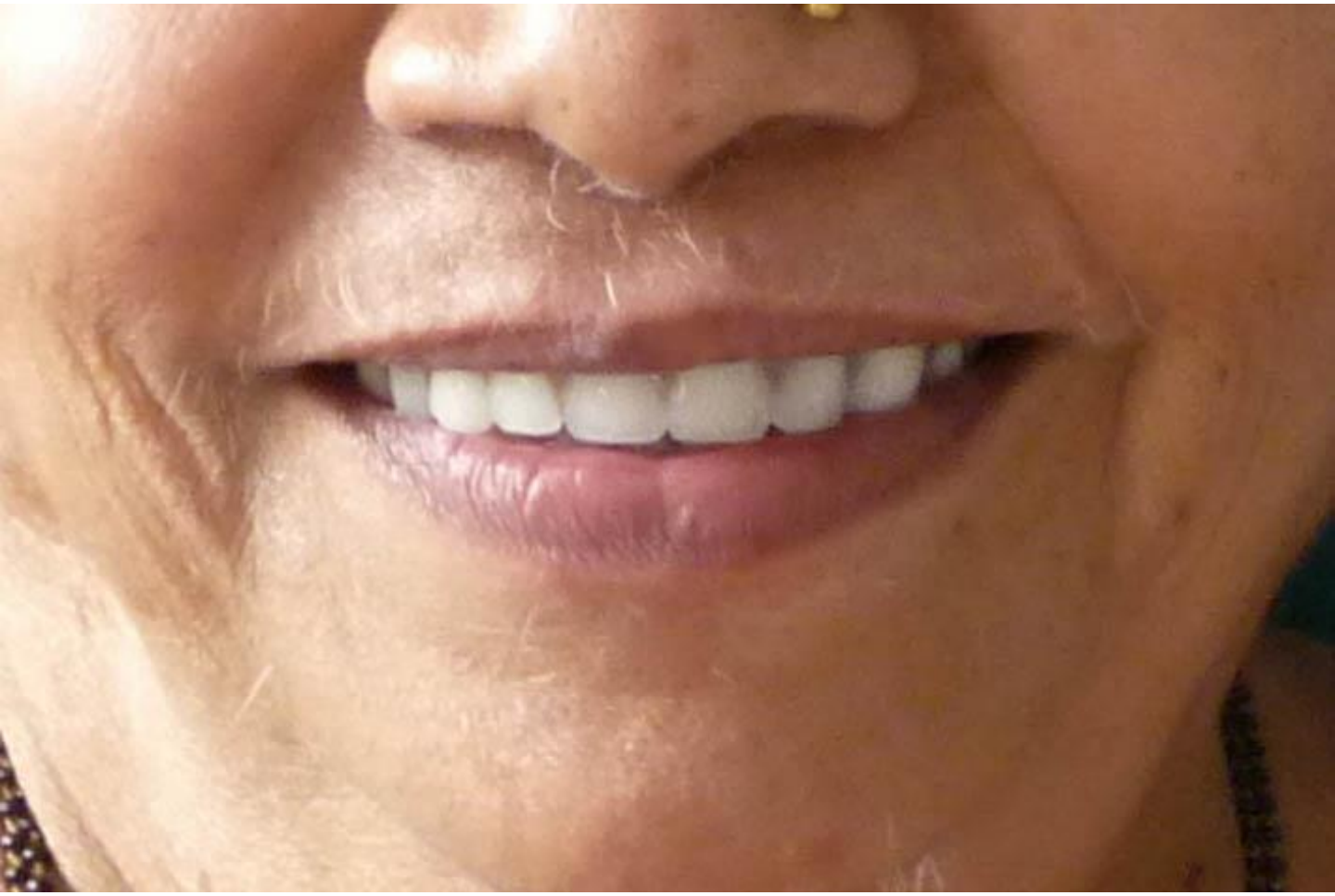
Editorial Office
426/427, S. V. Road
B/30, 4th Floor
Roop Kamal Society
Kandivali (West)
Mumbai, Maharashtra
India (400067)



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