

The Frenum and the Diastema: A Clinical Observational Study

Nandini Manjunath

Professor and HOD, AJ Dental College, Mangalore

Anjana Mary George

Assistant Professor, AJ Dental College, Mangalore

Neethi. M, Lia Mathew

Post graduates, AJ dental college, Mangalore

Abstract

➤ Background

The upper labial frenum is a normal anatomic structure with inherent morphological difference. Frenum has variations depending upon the attachment of fibers along with the presence of structural variations. Diastema is a space between teeth. The most often is maxillary midline diastema between upper central incisors. One of the main causes of diastema is enlarged upper lip frenulum attachment.

➤ Aim

To evaluate the prevalence of frenal attachment among males and females and to assess the relation of frenum attachment with diastema

➤ Materials and Methods

This cross sectional study was conducted on 100 subjects of both males and females within the age group of 18-60 years, attending a tertiary care hospital in Mangalore city. Intra oral examination was done to evaluate the variations in frenum and photographs were taken. Descriptive statistics, including frequencies and percentages was applied using SPSS Version 17.0.

➤ Results

The most prevalent frenii were the simple frenum (64%) and frenum with appendix (19%). It was found that mucosal type of frenum was the most prevalent type among males while females exhibited more of papillary penetrating and frenum with appendix. The percentage of diastema exhibited by papillary penetrating type of frenal attachment (100%) was more compared to other simple frenum. Though frenum with appendix and frenum with nodule were more common among the aberrant types, the prevalence of diastema was found to be less in both compared to other aberrant types. Aberrant frenal attachments were more common among females than males in our study.

➤ Conclusion

It is apparent that that proper identification of various frenal variations is important and need to be addressed. The dentist thus needs to give due importance for frenum assessment during oral examination.

Keywords:- Abberant frenum, Frenal attachment, Diastema

I. INTRODUCTION

Aesthetic concerns have led to an increasing importance in seeking dental treatment, with the purpose of achieving perfect smile. The continuing presence of a diastema between the maxillary central incisors in adults has often been considered as an aesthetic problem. The presence of an aberrant frenum being one of the etiological factors for the persistence of a midline diastema.¹ Frenum is a fold of mucous membrane, usually with enclosed muscle fibers, that attaches the lips and cheeks to the alveolar mucosa and /or gingiva and underlying periosteum.² The frenii of the oral cavity are categorized into different types: Frenulum linguae, (under the tongue); the frenulum labii superioris (inside the upper lip); the frenulum labii inferioris, (inside the lower lip); and the buccal frena which connect the cheeks to the gingiva.³

Labial frenum is a dynamic and often changeable structure and it goes through variation in shape, size, and position during the different stages of growth and development.⁴ The upper labial frenum is a small, sickle-shaped mucosal fold extending from the vestibular mucosa of the upper lip to the alveolar or gingival mucosa in the anterior midline of the maxillary arch. Histologically, it is made up of loose fibrous connective tissue, abundance of elastic fibers along with a few striated muscle fibers that arise from the muscle bundles of the lip on either side of the midline.⁵

A frenum can become a significant problem if tension from lip movement pulls the gingival margin away from the tooth, or if the tissue inhibits the closure of a diastema during orthodontic treatment. Frenal attachment that encroach on the marginal gingiva distend the gingival sulcus, fostering plaque accumulation, increasing the rate of progression of periodontal recession and thereby leading to recurrence after treatment.⁶

➤ Classifications

- Depending upon the extension of attachment of fibers, frena have been classified by Placek et al in 19746 (Table 1)
- Other variations of frenum given by Kakodkar et al in 20097 (Table 2)

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| <ol style="list-style-type: none"> 1. Mucosal – when the frenal fibers are attached up to mucogingival junction. 2. Gingival – when fibers are inserted within attached gingiva. 3. Papillary – when fibers are extending into interdental papilla. 4. Papilla penetrating – when the frenal fibers cross the alveolar process and extend up to palatine papilla. |
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Table 1. Simple Frenum

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| <ol style="list-style-type: none"> 1. Simple frenum with a nodule. 2. Simple frenum with appendix. 3. Simple frenum with nichum. 4. Bifid labial frenum. 5. Persistant tectolabial frenum. 6. Double frenum. 7. Wider frenum. |
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Table 2. Aberrant Frenum

II. MATERIALS AND METHODS

The present cross sectional study was conducted on 100 subjects comprising both males and females who reported to department of periodontology at AJ Dental College with age group of 18-50 years. All the subjects were explained about the study and an informed consent were taken. Patients were examined lying in a supine position using direct visual method on the dental unit. The upper lip was gently lifted with the index finger and thumb of both hands. Tension was applied over the frenum to see the movement of the papillary tip or the blanch which is produced due to ischemia in the region. Photographs were taken of the variations of frenum present.

Descriptive statistics, including frequencies and percentages was applied using SPSS Version 17.0.



Fig 1:- Gingival attachment



Fig 2:- Papillary attachment



Fig 3:- Papillary penetrating



Fig 4:- Mucosal attachment



Fig 5:- Frenum with appendix



Fig 6:- Frenum with nodule



Fig 10:- Frenum with nichum



Fig 7:- Double frenum



Fig 8:- Bifid frenum



Fig 9:- Wider frenum

III. RESULTS

| Types of Frenum | N | Gender in % | |
|-------------------------------|----|-------------|--------|
| | | Male | Female |
| Gingival | 15 | 60% | 40% |
| Mucosal | 16 | 68.75% | 31.25% |
| Papillary | 24 | 66.67% | 33.33% |
| Papillary penetrating | 9 | 44.44% | 55.55% |
| Frenum with appendix | 19 | 42.11% | 57.89% |
| Frenum with nodule | 8 | 50% | 50% |
| Frenum with nichum | 2 | 0 | 100% |
| Bifid labial frenum | 4 | 25% | 75% |
| Wider frenum | 1 | 0 | 100% |
| Double frenum | 2 | 0 | 100% |
| Persistent tectolabial frenum | 0 | 0 | 0 |

Table 3

| Types of Frenum | N | Midline distance in % |
|-------------------------------|----|-----------------------|
| Gingival | 15 | 66.67% |
| Mucosal | 16 | 56.25% |
| Papillary | 24 | 62.5% |
| Papillary penetrating | 9 | 100% |
| Frenum with appendix | 19 | 10.53% |
| Frenum with nodule | 8 | 12.5% |
| Frenum with nichum | 2 | 100% |
| Bifid labial frenum | 4 | 50% |
| Wider frenum | 1 | 100% |
| Double frenum | 2 | 0 |
| Persistent tectolabial frenum | 0 | 0 |

Table 4

A total of 100 out patients in the age group of 18-60 were selected and examined for their frenal attachment. Table 3 illustrates the mean percentage of males and females with various types of frenum. Simple frenal attachment (64%) was found more among the study subjects. It was found that mucosal type of frenum was the most prevalent type among males while females exhibited more of papillary penetrating and frenum with appendix. The percentage of diastema exhibited by papillary penetrating type of frenal attachment (100%) was more compared to other simple frenum.

36% of the subjects showed one or the other aberrant frenum. Though frenum with appendix and frenum with nodule were more common among the aberrant types, the prevalence of diastema was found to be less in both compared to other aberrant types. (Table 4) Aberrant frenal attachments were more common among females than males in our study. (Table 3)

IV. DISCUSSION

Median maxillary labial frenum appears as a fold of mucous membrane extending from the mucous lining of the mucous membrane of the lips towards the crest of the residual ridge on the labial surface.³ Abnormal frenum and muscle pull has been considered detrimental to periodontal health by pulling away the gingival margin from the tooth and thus contributing to accumulation of plaque and calculus, leading to inflammation and pocket formation. Presence of muscle fibers in frenum could play a co-destructive role by exerting forces along with elastic and collagenous components of the gingiva.² Frena which are aberrant often cause problems such as loss of papilla, recession, diastemas, difficulty in brushing, alignment of teeth, speech abnormality and psychological disturbances.^{8,9} Frenum with papillary attachment was more prevalent in our study, followed by frenum with appendix and frenum with mucosal attachment. Persistent tectolabial frenum, wider frenum and frenum with nichum were less commonly observed in this study.

In a study conducted by Niazi et al, the prevalence of gingival type frenum was more among males than females, which is in concordance with our findings. ⁸, Though Linda et al ⁹, in her study showed no significant association of frenal type with gender, the present study revealed a remarkable gender difference between the various frenal types. It was also noted that males presented more frenum with mucosal attachment, while females conferred more of frenum with appendix type.

Sewoska et al ¹⁰ in their study stated that papillary and papilla penetrating type of frenulum coexisted with large diastema while small diastema was a characteristic of mucosal and gingival type. A consistent increase in midline diastema was observed in frenum with papillary penetrating followed by gingival and papillary attachment type in the present study. The study was in agreement with observations made by Thosar et al ¹¹ regarding the existence of various frenal types with age. Tectolabial frenum is a characteristic of primary dentition and it disappears as age advances due to the apical migration of the frenum.⁴

Frenum should be correctly assessed during oral examination to avoid misdiagnosis of normal variations as abnormal frenum and to correctly diagnose the etiological factors behind a malformed labial frenum in order to proceed with best possible treatment. Its relevance in smile esthetics and being one of the leading causes of diastema further makes it important to properly identify the frenum before orthodontic

treatment to achieve successful treatment outcome. ⁸, The limitation of the study is its smaller sample size. A similar study should be conducted in a large scale involving large number of samples for more reliable results. The association of frenal attachment with oral hygiene maintenance and dental caries were also not recorded, which can be considered in future research.

V. CONCLUSION

Mucosal type of frenum was the most prevalent type among males while females exhibited more of papillary penetrating and frenum with appendix. It is apparent that proper identification of various frenal variations is important and need to be addressed. The dentist thus needs to give due importance for frenum assessment during oral examination. However, the presence of any abnormal frenal attachments can be corrected with a wide variety of surgical techniques available.

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