

ORTHODONTIC PROBLEMS OF PATHOLOGICAL FRENULUM: IMPORTANCE OF INTERCEPTED DIAGNOSIS AND OF TIMING TREATMENT.

 **PROBLEMATICHE ORTODONTICHE DEI FRENULI PATOLOGICI: IMPORTANZA
DELLA DIAGNOSI INTERCETTIVA E DEL TIMING DEL TRATTAMENTO.**

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Key words: upper labial frenulum, frenum pathology, orthodontic problems.

 **Parole chiave:** frenulo labiale superiore, frenulo patologico, problematiche ortodontiche.

Abstract

Background: The frenula of the oral cavity are anatomical structures, histologically constituted by a fibromucosa, which join the inner surface of the upper and lower lip with the buccal mucosa of the alveolar process (frenula labial median and lateral) and the ventral surface of the tongue with the floor of the mouth (lingual frenulum). The oral frenula normally undergo changes in shape, size and position during the different stages of growth and development of the people. When they arise changes in morphological and structural characteristics, leading to pathological conditions of various kinds and severity, such frenula defining pathological.

Objectives: In this work, analysis is performed of the etiopathogenesis, diagnostic elements and timing of therapeutic treatments toward these clinical cases, further into detail orthodontics problems.

Methods: The intervention of the odontologist with a thorough clinical examination radiographic investigations and assisted by an early framing of the patient, are the best diagnostic and therapeutic approach.

Results: The problems arising from late or non-intervention in the case of pathological frenula, may lead to significant morphological and structural of the patient.

Discussion and Conclusions: The complex clinical and issues related to abnormalities of frenula of the oral cavity, require an adequate knowledge of the development processes of the organism and diagnostic procedures, in order to preserve structural and functional integrity of stomatognathic system, structures and organs connected to it.

Abstract

Introduzione: I frenuli del cavo orale sono strutture anatomiche costituite da una plica fibromucosa, che congiungono la superficie interna del labbro superiore e inferiore con la mucosa vestibolare del processo alveolare (frenuli labiali mediani e laterali) e la superficie ventrale della lingua con il pavimento della bocca (frenulo linguale).

I frenuli orali normalmente vanno incontro a modificazioni della forma, delle dimensioni e della posizione, durante i differenti stadi di crescita e di sviluppo dell'individuo. Quando presentano variazioni delle loro caratteristiche morfo-strutturali, determinando condizioni patologiche di diversa natura e gravità, tali frenuli si definiscono patologici.

Obiettivi: Nel presente lavoro verrà eseguita un'analisi dell'etiopatogenesi, degli elementi diagnostici e del timing dei trattamenti terapeutici nei confronti di tali quadri clinici, approfondendo le problematiche di carattere ortodontico.

Metodi: L'intervento dell'odontostomatologo mediante un accurato esame clinico coadiuvato da indagini radiografiche ed un inquadramento precoce del paziente, rappresentano il migliore approccio diagnostico-terapeutico.

Risultati: Le problematiche derivanti da un ritardato o mancato intervento nel caso dei frenuli patologici, possono determinare importanti alterazioni morfologiche e della funzionalità del paziente.

Discussione e Conclusioni: I complessi quadri clinici e le problematiche connesse ad anomalie dei frenuli del cavo orale, impongono una adeguata conoscenza dei processi di sviluppo dell'organismo e degli iter diagnostici, al fine di conservare l'integrità morfo-funzionale dell'apparato stomatognatico e delle strutture ed organi ad esso connessi.

Background

The frenulum of the oral cavity is an anatomical structure, histologically constituted by a fibro-mucosa, which joins the inner surface of the upper and lower lip with the buccal mucosa of the alveolar process (labial frenulum median and lateral) and the ventral surface of the tongue with the floor of the mouth (lingual frenulum) (1) (Figure 1). The labial frenulum, moreover, has been classified according to the anatomical type of its insertion, to obtain an optimal prognosis and therapeutic approach; the classification of Placek et al. (1974) is still among the most followed and provides four different types of frenula insertion: mucosal, gingival, papillary and papillary penetrating (Table 1).

Table 1. Frequency of different type of labial frenula (Placek & coll.)

Tipo di attacco	Frenulo superiore	Frenulo inferiore
Type of attack	Upper frenulum	Lower frenulum
Mucoso/ Mucosal	46,5%	92,1%
Gengivale/ Gingival	34,3%	6,5%
Papillare/ Papillary	3,1%	0,2%
Papillare penetrante/ P. penetrating	16,1%	1,2%

The oral frenulum normally undergoes changes in shape, size and position during the different stages of growth and development (2). When these changes arise in morphological and structural characteristics, they lead to pathological conditions of various genres and severity, such as frenulum defining pathologies (Figure 2).

The prevalence of simple frenulum and the level of gingival insertion increases with age, while the percentage of tectolabial frenulum decreases proportionally. Therefore, in the first months of life, it is important to consider the physiological presence of tecto-labial frenulum and abnormalities as opposed to their persistence. The highest percentage of pathological labial frenulum known mainly depends on the upper median frenulum that can give rise to a series of problems. These problems can be of orthodontic, periodontal and prosthetic.

Figure 1. Physiologic insertion of oral frenula



Figure 2. Abnormal insertion of upper midline frenum



Objectives

The orthodontic problems, in pathologic labial frenulum, frequently occur more in the maxilla than the mandible, in association with hypertrophic labial frenulum or a very low insertion into the gingival fibro-mucosa.

The scientific opinions on orthodontic complications are varied. Many authors state that the presence of a pathological median frenulum is not always responsible for the appearance of a maxillary midline diastema, due to many causes which produce a diastema.

The maxillary interincisal diastema is a space or gap between the upper central incisors, and is relatively common during the deciduous and mixed dentition, generally after the eruption of the permanent canines, this gap closes (3). The transitory presence of a upper midline diastema can be considered physiologic during a specified period of dental eruption, called "ugly-duckling stage" (stage of the ugly duckling), although we can note the presence of an abnormal median frenulum.

Around the 7-8 years of age, it undergoes pressure on the roots of permanent central incisors, and with the lateral incisor which have not yet erupted, the permanent central incisors widen. The eruption of the lateral incisors and canines determine a displacement in mesial direction of central incisor and consequentially, the diastema undergoes self-correcting.

Taylor found that an upper midline diastema is present with different percentages which commonly correspond at different years : 97% at 6 years, 88% at 7 years, 48% between 10 and 11 years and 7% between 12 and 18 years (4, 5, 6).

The transseptal fibers may have a different structure. When of a robust structure, they are arranged in an orthogonal position, within the patency formed by incomplete ossification of median bone suture, and alter the equilibrium between mesial and distal forces that, acting on the arch, are in favor of the traction distally responsible for the persistence of midline diastema (7, 8).

It is a dysontogenetic phenomenon that independent etiological correlations between frenulum and diastema require diagnosis and early intervention to restore the correct dento-periodontal relationships, and thus, to promote a harmonious development of the jaws (7). The lower labial frenulum is unlikely to be due to a diastema (9); the inferior diastema is not a physiological characteristic of anatomical growth structures of the lower arch. It is well known, that the primary etiological factor of the mandibular diastema is the thrust exerted by the tongue in the rest position (10).

Materials and methods

The diagnosis of pathological labial frenulum is based on a careful examination of clinical and radiographic examinations. For the diagnosis of pathological frenulum, a series of clinical assessments are necessary that include:

- presence of a short frenulum, hypertrophic and/or fibrous texture, with abnormal insertion and associated or not with interincisal diastema;
- presence of a moderate dental crowding: the observation of an interincisal diastema associated with crowding is an indication of abnormal frenulum (11);
- blanching positive test: if stretching the lip has ischemic papilla interincisal or retroincisor (frenulum tectolabial trans-papillary), it is a probable pathological frenulum (12) (Figure 3);
- involvement of the frenulum in the phenomena of marginal tissue dystrophy, an instability of the gingival margin to coincide with the stretching of the frenulum. These constitute a criterion of pathology and a sufficient indication for surgical treatment.

When the clinical examination is completed, a radiographic examination procedure with a digital orthopantomography and intraoral juxta-gingival radiograph is used, in order to obtain the following additional information:

- the presence of an underlying frenulum disease which could justify an interincisal diastema (tooth included, possibly supernumerary, odontogenic neoformation);
- radio-transparent image at V or U form, in correspondence to interincisal bony septum, this can be interpreted as a gap due to the presence of transseptal fibres which take a parallel course within the interincisal suture (permanent diastema due to tectolabial frenulum) (12) (Figure 4);
- radio-transparent image at W form in correspondence of the interincisal septum: it can be assumed that the insertion of the frenulum is lower than normal (13).

These radiographic studies, as well as ruling out other causes of interincisal diastema and to contribute, therefore, to making a differential diagnosis, can provide information on the progress of transseptal fibers. In the case of a upper interincisal diastema, clinical evidence of a pathological frenulum, should be evaluated using various clinical possibilities:

- dental age;
- physiological growth and abnormal dental arches and jaws;
- the presence of supernumerary teeth, odontomas, cysts, neoplastic lesions;
- disharmony dento-alveolar;
- flawed habits.

Figure 3. Blanching Test



Figure 4. Bone resorption of interincisal/sept



Results and Conclusion

A frenulum is defined as pathological if it has anatomical abnormalities which may relate to the length, volume, solidity and topographic insertion, contributing to the onset of pathological conditions that can be orthodontic, periodontal, prosthetic or functional.

For a correct therapeutic resolution, an analysis of general and particular characteristics of the patient is fundamental, fit to confirm the indication for treatment, the time of surgery and therefore to be able to decide the type of approach. This may be provided using the conventional cold knife method, or the alternative use of the laser. The complex clinical profile related to abnormalities of frenula of the oral cavity, requires an adequate knowledge of the development processes of the organism and diagnostic procedures, in order to preserve structural and functional integrity of the stomatognathic system and the structures and organs connected to it.

References

1. Tenore G, Zicari S, Palaia G, et al. Il trattamento dei frenuli orali patologici mediante laser KTP 532 nm. Atti del Congresso Nazionale dei Docenti in discipline Odontostomatologiche e Chirurgia Maxillo Facciale. Roma, Aprile 2009.
2. Diaz- Pizan ME, Lagravere MO, Villena R. Midline diastema and frenum morphology in the primary dentition. J Dental Child (Chic) 2006; 73 (1): 11-14.
3. Popovich F, Thompson GW, Main PA. The maxillary interincisal diastema and its relationship to the superior labial frenum and intermaxillary suture. Angle Orthod 1977; 47 (4): 265-271.
4. De Felice C, Toti P, Di Maggio G. Absence of the inferior labial and lingual frenula in Ehlers-Danlos syndrome. Lancet 2001; 357 (12): 1500-1502.
5. Dollberg S, Botzer E, Grunis E, et al. Immediate nipple pain relief after frenotomy in breast-fed infants with ankyloglossia: a randomized, prospective study. J Pediatr Surg 2001; 41: 1598-1600.

6. Fischer TJ, Psaltis GL. The diastema and the abnormal frenum. J Dent Child 1971; 48 (4): 264-268.
7. Annibali S, Sfasciotti GL, La Monaca C. Frenulectomia tecto-labiale: tecnica chirurgica in due tempi. Riv Ital Chir Oral 1995; 1 (2): 31-37.
8. Quaranta M. Alcune osservazioni sulla eziologia e sul trattamento dei frenuli mediani patologici. Rivista italiana di stomatologia 1984; 53 (1): 33-47.
9. Wigdor HA, Walsh JT, Featherstone JD, et al. Lasers in dentistry. Lasers Surg Med 1995; 16 (2): 103-133.
10. Huang W, Creath CW. The midline diastema: a review of its etiology and treatment. Pediatr Dent 1995; 17 (3): 171-179.
11. Mazzocchi A, Clini F. Le indicazioni alla terapia dei frenuli labiali. Ped Med Chir 1992; 14: 637-640.
12. Durante D, Gazzina M, Pippi R. Trattamento chirurgico dei frenuli patologici. "4° congresso nazionale dei docenti di odontoiatria: 297-301, 1997.
13. Romeo U, Palaia G, Del Vecchio A, et al. Effects of KTP laser on oral soft tissues. An in vitro study. Lasers Med Sci 2010; 25 (4): 539-543.

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