Original Hypothesis

Does Absence or Malformations of Oral Frenulae Indicate Orofacial Developmental Fields with Dermatome Abnormalities

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Abstract

Introduction: The frenulum labii superioros do not receive specific attention in the odontological clinic and in odontological research. Actual papers on oral frenulae focus on the morphology of the frenulae and the frenulae in syndromic conditions. The etiology behind the development of frenulae has seemingly never been revealed. **The Hypothesis:** The hypothesis is that the frenulum labii reveal normal and abnormal location of the dermatomes within the orofacial developmental fields. **Evaluation of the Hypothesis:** This hypothesis is difficult to prove as long as the dermatomes in the oral cavity have never been localized. In the present new hypothesis, it could be suggested that the oral frenulae labii are structures bordering the oral dermatomes. This is illustrated by two examples, however, more examples are needed for the complete understanding of the etiology behind frenulae labii, which at present need to receive attention in the dental clinic.

Key words: Frenulum labii, fronto-nasal field, SMMCI, macrodontic incisors

Introduction

Frenulae in the oral cavity include the frenulum linguae, frenulae labii, and buccal frenulae.

The frenulum labii occur as well in the maxilla where they are named frenulum labii superiores as in the mandible where they are called frenulum labii inferiores. These frenulae are small folds of tissue connecting the oral surface of the lips with the gums.

The frenulum labii superioros do not receive specific attention in the odontological clinic and in odontological research. Actual papers on oral frenulae focus on the morphology of the frenulae[1] and the frenulae in syndromic conditions.[1,2] The etiology behind the development of frenulae has seemingly never been revealed. This present original hypothesis focuses on the scientific background for the development of frenulum labii superioros.

The Hypothesis

The hypothesis is that the frenulum labii reveal normal and abnormal location of the dermatomes within the orofacial developmental fields.[3,4]

A dermatome is defined as an area in the skin and underlying tissue innervated and bordered by a specific peripheral nerve. The dermatomes originate early in the embryogenesis.[5] They have a mesodermal origin and migrate from the body axis peripherally. In the orofacial area, they form the epidermis, which is important for tooth and bone formation.[6,7] Dermatomes exist not only on the face but on the whole body where they extend from the body axis and form the trunk and appendicular skeleton.[5]

For the dermatomes or fields in the orofacial area it is characteristic that they are innervated from different trigeminal nerves.[8,9]

It is well known that the dermatomes in the body can overlap during development.[5] Furthermore, it is well-known that viral infections such as herpes zoster can spread along the perifinal nerves and cause skin and underlying tissue

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abnormalities.[10] In the cranium, regional spreading by virus (mums and meningitis) can spread along the peripheral nerves and cause destruction in localized fields.[11] Therefore, field borders or dermatome borders are important to register clinically, however, this has not been possible to do in diagnostics.

In the maxilla, there is a midaxial frenulum labii in the central incisor region and two bilateral frenulae in the canine regions. Each of these bilateral frenulae have a major lateral part and a minor medial part [Figure 1]. These are the frenulae which are the focus of this original hypothesis.

Two examples:

(1) In SMMCI where the frontonasal field is pathologic the mid-axial frenulum labii is absent.[12]
This is illustrated in Figures 2 and 3. Moreover, the bilateral frenulae bordering the frontonasal field has a more medial position. These positions are marked with arrows in Figure 3. It is obvious that the bilateral frenulae indicate the narrowness of the frontonasal field. It is well-known that SMMCI not only has a deviation in the dentition (single central incisor[12]) but also a deviation in the underlying bone[13] and the central nervous system reference.[14] In this original hypothesis, not only absence but also malformation and abnormal location of the frenulum labii superior are documented. It could be believed that narrowness between the bilateral lateral frenulae labii could indicate the severity of the SMMCI condition. If so, then a short distance between these lateral frenulae

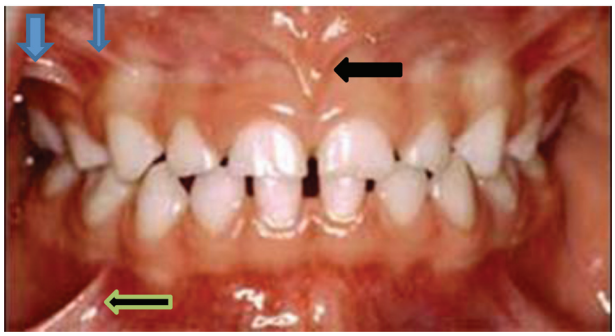

Figure 1: Intraoral photograph of a 6-year-old child with primary dentition. Note the frenulae labii in the maxilla and mandible. The maxillary mid-axial frenulum is marked by a black arrow. In the patients right side lateral frenulae are marked in the maxilla by two blue arrows (medial part and lateral part) and in the mandible by one green arrow

Figure 2: Intraoral photograph of a girl with SMMCI aged 11 years. The central maxillary incisor appear symmetric. There is absence of the midaxial frenulum labii superior in the region marked with a black arrow

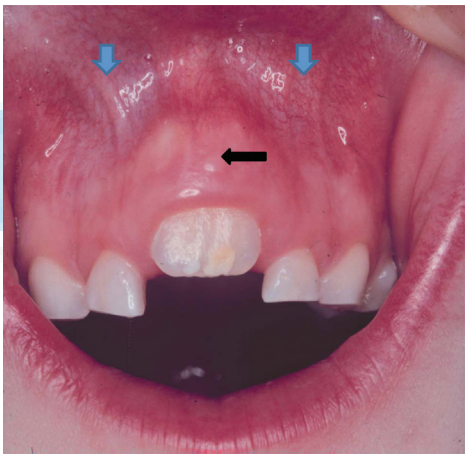

Figure 3: Intraoral photograph of a girl with SMMCI aged 7 years. The central maxillary incisor appears symmetric. There is absence of the mid-axial frenulum labii superior in the region marked with a black arrow. The bilateral maxillary frenulae are malformed and malpositioned (between the laterals and the central incisors). The lateral frenulae are marked with blue arrows. These arrows indicate the lateral border of the frontonasal field

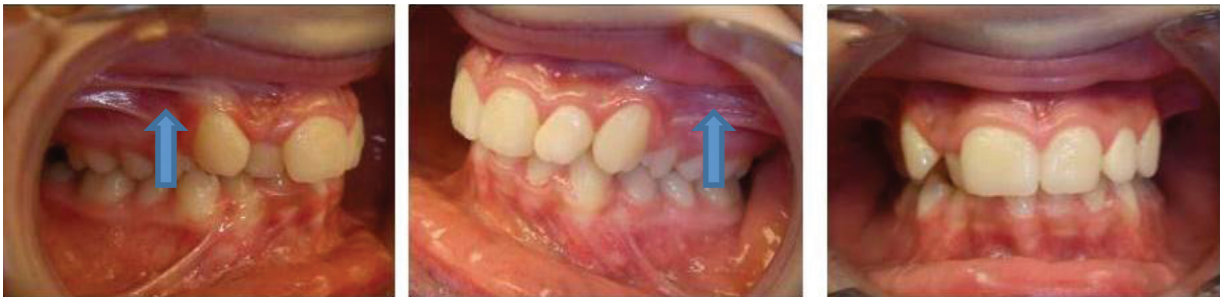

Figure 4: Three intraoral photographs of a boy aged 13 years. The right central incisor in the maxilla is macrodontic (right). Note the bilateral maxillary lateral frenulae labii (left figures). A concavity (marked blue) is seen between the medial and the lateral part of these frenulae

would express a severe condition, possibly associated with brain malformation.[14]

(2) In patients with macrodontic central incisors, dental and skeletal deviations have been described.[15] Recently, focus has also been given to neuropsychiatric deviations in patients with maxillary macrodontic central incisors.[16]

In this present report, a case isdemonstrated in which the lateral frenulum labii superior in both canine regions are malformed with a concavity between the medial and the lateral part of the frenulum [Figure 4]. Why these bilateral frenulae are malformed is presently not known.

Evaluation of the Hypothesis

The hypothesis is difficult to prove as long because the dermatomes in the oral cavity have never been localized. As mentioned in the text, several deceases in the oral cavity and dental arches prove the existence of neural crest developmental fields. It is believed that the extensions of these fields and the extensions of the dermatomes are identical due to the innervation pattern. The study demonstrates that dentists should diagnose the oral frenulae carefully. These frenulae might explain the etiology behind deviations in the oral cavity and improve diagnostics.

Conclusion

In the present new hypothesis it could be suggested that the oral frenulae labii are structures bordering the oral dermatomes. This is illustrated by two examples, however, more examples are needed for complete understanding of the etiology behind frenulae labii, which at present does not receive much attention in the dental clinic.

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Conflicts of interest

The author has editorial involvement with *Dent Hypotheses*.

References

1. Priyanka M, Sruthi R, Ramakrishnan T, Emmadi P, Ambalavanan N. An overview of frenal attachments. J Indian Soc Periodontol 2013;17:12-5.
2. Mintz SM, Siegel MA, Seider PJ. An overview of oral frena and their association with multiple syndromes and nonsyndromic conditions. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2005;99:321-4.
3. Kjær I. Neuro-osteology. Crit Rev Oral Biol Med 1998;9:224-44.
4. Kjær I. Etiology-Based Dental and Craniofacial Diagnostics. Wiley Blackwell; 2017.
5. Schoenwolf GC, Bleyl SB, Brauer PR, Francis-West PH. Larsens? s Human Embryology. Fourth Edition. Churchill Livingstone Elsevier; 2009.
6. Kjær I, Kocsis G, Nodal M, Christensen LR. Aetiological aspects of mandibular tooth agenesis – focusing on the role of nerve, oral mucosa, and supporting tissues. Eur J Orthod 1994;16:371-5.
7. Kjær I. New diagnostics of the dentition on panoramic radiographs – focusing on the peripheral nervous system as an important aetiological factor behind dental anomalies. Orthodont Waves 2012;71:1-16.
8. Kjær I. Orthodontics and foetal pathology: A personal view on craniofacial patterning. Eur J Orthod 2010;32:140-7.
9. Kjær I. Review: Dental approach to craniofacial syndromes: How can developmental fields show us a new way to understand pathogenesis? Int J Dent 2012;10:145749.
10. Becktor KB, Reibel J, Vedel B, Kjær I. Segmental odontomaxillary dysplasia: Clinical radiological and histological aspects of four cases. Oral Dis 2002;8:106-10.
11. Kjær I, Strøm C, Worsaae N. Regional aggressive root resorption caused by neuronal virus infection. Case Rep Dent 2012;2012:693240.
12. Kjær I, Becktor KB, Lisson J, Gormsen C, Russell BG. Face, palate and craniofacial morphology in patients with a solitary median maxillary central incisor. Eur J Orthod 2001;23:63-73.
13. Tabatabaie F, Sonnesen L, Kjær I. The neurocranial and craniofacial mprphology in children with solitary median maxillary central incisor (SMMCI). Orthod Craniofac Res 2008;11:96-104.
14. Kjær I, Wagner Aa, Thomsen LL, Holm K. Brain malformation in Single Median Maxillary Central Incisor. Neuropediatrics 2010;40:280-3.
15. Kenrad A, Christensen IJ, Kjær I. Craniofacial morphology of the frontonasal segment in patients with one or two macrodontic maxillary central incisors. Eur J Orthod 2013;35:329-34.
16. Kenrad AB, Kjær I. The interrelationship between permanent maxillary incisors and neuropsychiatric conditions. J Neuropsychiatr 2016;2:1-3.