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The Anatomy of the Frenum Labii in New Born Infants*

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This is a report of the first part of a study of the frenum labii and is limited to the normal macro and microscopic anatomy of that structure in new born infants, delivered in the In and Out Patient Service of the Presbyterian Hospital and Rush Medical College, and by postmortem dissection of the structure removed from 14 infants who died at birth or immediately thereafter, from various causes but exhibiting no gross oral defects.

The microscopic findings were obtained from serial sections of tissue taken from 12 new born infants who died in the first few days of life or at birth, with no apparent oral defects. The group included premature as well as full term infants. The tissues were fixed in 10% formalin, imbedded in celloidin, and stained, a few with Mallory connective tissue stain and the balance with the usual hematoxylin and eosin. Sections were cut in the following manner: Four in the sagittal or labio-lingual, four in the horizontal plane and four in a frontal direction. Casts were made of all the palates before they were cut for section, one of which is shown in Fig. 1.

Gross Anatomy

The tissue of the frenum labii springs from a relatively wide origin on the inner surface of the upper lip; presents a smooth, epithelized septum

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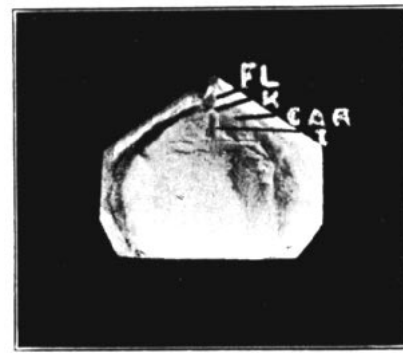
which narrows in width as it progresses posteriorly and is inserted at the mid-line in the outer layer of the periosteum and the connective tissue of the medial suture and the crest of the alveolar process. The ridges of the latter structure are less prominent at this point forming a groove in which the dorsal extremity of the frenum lies. A smaller and somewhat similar structure arises from the incisal papilla of the palate and passes anteriorly to be inserted in this groove. A notch is usually observed at the junction of these



1.

Cast of Full Term New Born Infant Palate, ¾ the actual size.
F.L.—Labial Frenum
K.—Notch
I.—Incisal Papilla
C.A.R.—Crest of Alveolar Ridge

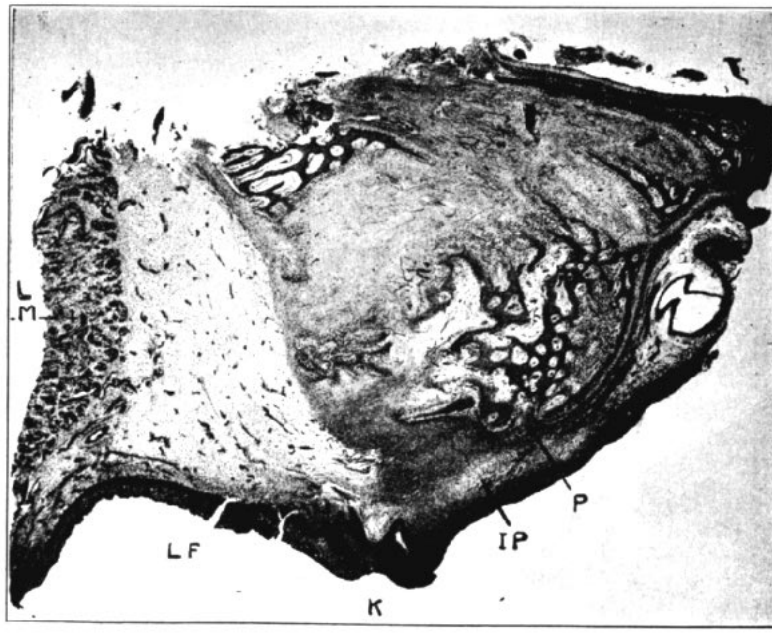
structures. (Fig. 1.) This depression was arbitrarily chosen as a basis for classification of the types of frena.

Of the 619 infants there were 447 or 77.06% in which the notch between the labial frenum and the incisal papilla was at the mid-point of the alveolar crest; 41 or 6.62% in which the notch was on the labial slope of the alveolar process and 73 or 11.79% in which it was upon the lingual or palatal side approaching the lingual papilla. In 28 or 4.52% there was no clearly defined notch, the tissue forming a smooth unbroken tuft along the groove between the crest of the alveolar process to the incisal papilla.

Considerable variation in the size of the frenum was noted and a rough attempt to record this difference was made by classifying them with regard to thickness or lateral width. The infants examined for this dimension fell into groups as revealed by the accompanying table.

Classification	Approximate Width	No. of Infants
—2	less than ½ mm.	1
—1	½ to 1 mm.	5
0	1 to 1½ mm.	4
1	1½ to 2 mm.	*327
2	2 to 2½ mm.	*245
3	more than 2½ mm.	32

* 93% fall within the range of 1½ to 2½ mm.



2.

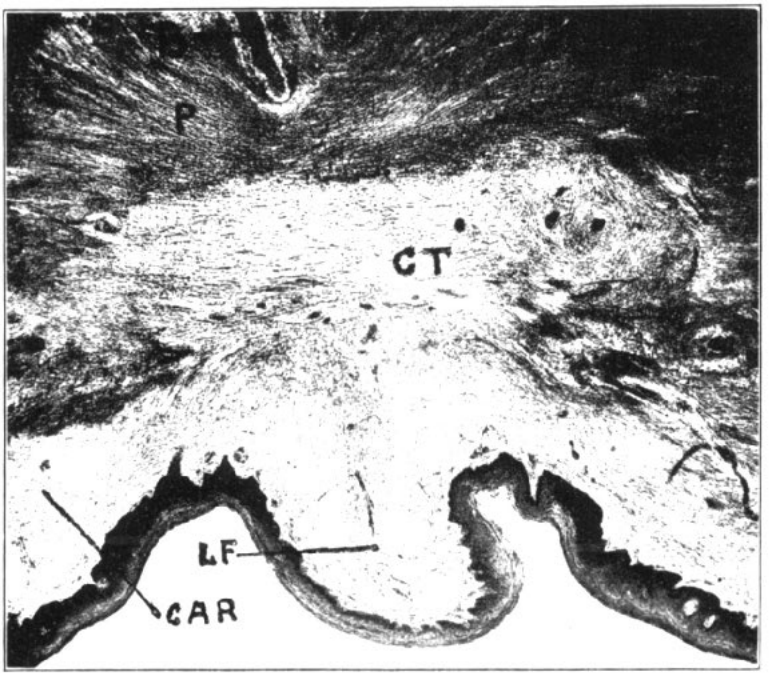
Sagittal Section at the Mid-Line
(H. and E. Stain)
L.M.—Lip Musculature
P.—Periosteum
L.F.—Labial Frenum
K.—Notch
I.P.—Incisal Papilla

It appears from this material that the normal frenum in the new born is approximately 1½ to 2 mm. in thickness at its attachment and that the *notch* between the labial and lingual portion occurs commonly at the mid-point of the alveolar crest but may vary to the labial or lingual in a small percentage of cases and is occasionally absent.

In gross dissection the normal tissue is not easily separated from either

the overlying epithelium or the deeper layers of connective tissue of the alveolar ridge and lip. The blood supply is abundant.

Microscopic Anatomy. Histologically the frenum is composed, almost entirely, of alveolar and fibrous connective tissue. There are a few striated muscle fibers which arise from the muscle bundles of the lip on either side

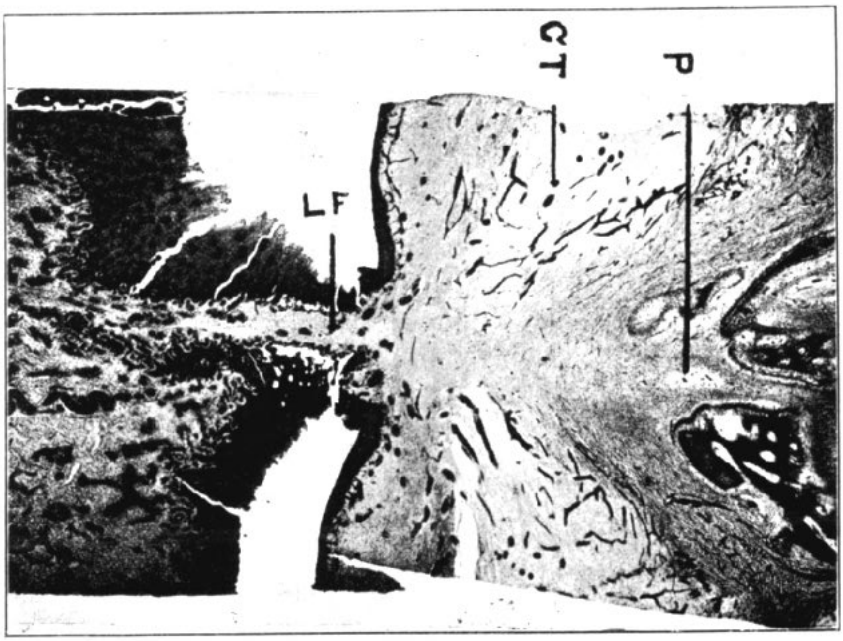


3.
Frontal Section through the Alveolar Ridge at the Mid-Line (H. and E. Stain)
L.F.—Labial Frenum
C.A.R.—Crest of Alveolar Ridge
C.T.—Connective Tissue above the Alveolar Process
P.—Periosteum
B.—Bone of the Alveolar Process

of the mid-line and pass in a diagonal direction medially and posteriorly but do not reach the alveolar process. The loose character of the fibrous connective tissue becomes more regular in arrangement with strands lying in an anterior-posterior direction as it nears the posterior attachment. In the labial portion there are mucous glands in the subcutaneous tissue on either side of a central artery and vein that lie near the muscle bundles of the lip

with branches which are given to the frenum. These travel in a anterior-posterior direction, providing the blood supply of the structure. Nerve filaments accompanying the vessels. (Fig. 2-4.)

The posterior fibers ramify with the connective tissue of the alveolar crest and its anterior surface. The most lateral and inferior fibers branch



4.
Horizontal Section in the Region of the Mid-Line
(H. and E. Stain)
L.F.—Labial Frenum
C.T.—Connective Tissue above the Alveolar Process
P.—Periosteum below the Incisal Papilla

to the right and left respectively while the medial and superficial strands are lost in the network of similar tissue of the ridge. No fibers were found extending posteriorly to the incisal papilla. (Fig. 4.)

The connective tissue of the incisal papilla arises about the central vessels and passes anteriorly exhibiting an anterior-posterior direction in the short cord visible grossly. These fibers mingle with those of the crest of the alveolar process at the region of the notch. There is a ramification of fibers at the central portion of the alveolar process, (the area observed grossly as the notch) and a decussation of the fibers which pass anteriorly from the

incisal papilla. The deepest fibers are in contact and distinguished with difficulty from the periosteum of the developing lingual plates of bone. (Fig. 3.) The blood supply of this palatal structure is provided by branches of the vessels of the incisal papilla which travel anteriorly where their terminal arborization anastomoses with those of the labial frenum. Both structures are covered superficially with stratified squamous epithelium. The character of the cells and papillae are of the type found, respectively, in the palate and on the labial mucous membrane.

While, in the normal tissue chosen for section, no continuity could be observed in the anterior-posterior fibers of either the labial or lingual structures, they are more intimately related superficially. This supports the hypothesis that the abnormality of a continuous frenum might reveal a continuity of the fibers of these tissues. If we are correct in assuming that the adult position of the normal frenum attachment is the result of growth of the alveolar process leaving this insertion in a relatively superior position with respect to the total alveolar height, it might be further hypothesized that the interference to occlusal growth of a band of connective tissue at this point might cause the diastema between the central incisors and the deformity of the mid-line suture commonly observed in patients who present this abnormality. Theoretically, this condition might be caused in three ways—

1. By extreme lingual attachment of the labial frenum.
2. By extreme labial attachment of the connective tissues of the incisal papilla.
3. By the condition designated as a continuous frenum. The latter offering the basis for the most glaring deformities.

The validity for such a hypothesis rests with data to be collected in the second portion of this study which deals with the developmental and hereditary aspects of the problem and awaits the obtaining of suitable tissues for study and the development, through childhood, of previously observed infants with continued opportunity for examination and record.

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