



Ankyloglossia with Deviation of the Epiglottis and Larynx (ADEL)

Susumu Mukai*

Department of Otolaryngology, Mukai Clinic, Kanagawa, Japan

Abstract

History and definition of tongue-tie were previous to those of ankyloglossia. There after ankyloglossia accompanied by deviation of the epiglottis and larynx (ADEL), which hindered the growth of both maxillary and mandibular bones was site. It is next consideration that the cause of ADEL is an anatomical weakness of human beings was considered next. Diverse symptoms and signs of ADEL were reported. It was concluded that ADEL is an important problem in modern medicine.

General Remarks on Ankyloglossia

Today, ankyloglossia and tongue-tie are considered as the same concept. Tongue-tie is a condition in which the tip of the tongue and the lower gingiva are combined with the lingual frenum. The history of the word “tongue-tie” is very old. It goes back to the Chou Era (1066?–256 BC) in Japan and in Europe goes back to Celsus (BC 25-AD 50) [1,2]. The majority of human babies could not suckle sufficiently at their mothers’ breasts. They suffocated frequently, vomited milk during suckling and suddenly withdrew from the breasts. They slept during suckling. They cried hard. These symptoms disappeared dramatically after the tip of the tongue was separated from the oral cavity [3,4]. The concept of the ankyloglossia was created by A Paré (1517-1590) in the Renaissance [5]. He modified the frenotomy devised by Paul d’Égine (625-690) to detach the tip of the tongue to the genioglossus (GG) muscle. After his modification the tip of the tongue has been separated from the base of the oral cavity by midwives to avoid ankyloglossia for all babies. The nail of little fingers of midwives was elongated for this procedure (Hieronymus (1537-1619), Theobald J (1764) [2-6]. All babies were considered to have been born with ankyloglossia. At that time those procedures were necessary for childcare.

Tongue-tie was included in the definition of ankyloglossia. It was written in a book for midwives that this intervention was necessary for all babies whether the frenum of the tongue exists or not [7]. We examined the lingual frenum at 4-month-old babies’ health checkups in Yokohama (1992, n=205) and at 5- and 6-year-old dental and oral health checkups in kindergartens in Kobe (2000, n=95) and in Odawara (2002, n=65). No frenum under the tongue was observed in 51%, 49% and 58% of children at these checkups, respectively, and the lingual frenum from the sublingual caruncle to the tongue was observed in 46%, 42% and 39% of the children at these checkups, respectively. Tongue-tie was only observed in 3%, 6% and 3%, respectively. Actually the rate of tongue-tie is very low in humans. Almost all babies are born with no or mild lingual frenulum as Baudelocque indicated in his book [8-10]. Since the Renaissance until the 20th century these procedures were done in Europe. The prosperity in Europe after the Renaissance might have greatly depended on this petit intervention.

From the early 20th century famous medical doctors began to oppose these surgeries [11]. In the textbook of Pediatrics (1996) [12], it is mentioned that a short lingual frenulum (tongue-tie) may be worrisome to parents but only rarely interferes with eating or speech, generally requiring no treatment. Ankyloglossia is confused with tongue-tie in modern medicine, and surgery for it is considered only for tongue-tie as “frenotomy”.

When I started in the field of otorhinolaryngology in 1970, frenotomy was popular in the pediatric setting in Japan. The technique used was that developed by Paré. That is to cut the center of the frenum a little by an ophthalmologic scissors, then detach the tip of the tongue with a finger from the base of the oral cavity as far as the GG muscle. There was minimal bleeding by gentle detachment with a finger. This intervention resulted in an open wound, and could be skillfully done in several seconds. Just after the detachment of the tip of the tongue the babies’ faces turned pink and their colicky cries changed to clear and smooth sounds. Babies with previous suckling

OPEN ACCESS

*Correspondence:

Susumu Mukai, Department of
Otolaryngology, Mukai Clinic,
Kanagawa, Japan,
E-mail: s-mukai@da2.so-net.ne.jp

Received Date: 07 Aug 2017

Accepted Date: 17 Oct 2017

Published Date: 30 Oct 2017

Citation:

Mukai S. Ankyloglossia with Deviation
of the Epiglottis and Larynx (ADEL).
Ann Clin Otolaryngol. 2017; 2(4): 1021.

Copyright © 2017 Susumu Mukai. This
is an open access article distributed
under the Creative Commons Attribution
License, which permits unrestricted
use, distribution, and reproduction in
any medium, provided the original work
is properly cited.

difficulties could suckle well after the procedure, as cited in many reports about ankyloglossia [3,8,13-16]. The mothers said that their babies became easier to cuddle, which strengthened their love for the babies. Based on these observations, I realized that the tongue had a strong relationship with respiration.

I found that in babies with ankyloglossia the epiglottis and larynx were deviated upward and forward. I named this condition as ankyloglossia with deviation of the epiglottis and larynx (ADEL) [17]. After separation of the tip of the tongue from the base of the oral cavity those deviations were greatly ameliorated. Voice changes were reported to be clear after the division of the tip of the tongue at the same time unexpectedly corrected the deviation of the larynx. Observations by laryngoscopy showed that the deviation of the epiglottis and larynx did not straighten completely by simply separating the tip of the tongue using Paré's technique alone. I added the cutting of several bundles of GG muscles to move the epiglottis and larynx downward after a multitude of simulations. The epiglottis and larynx stood straight towards the nasal choanae. The symptoms of ankyloglossia then disappeared amazingly. SaO₂ of the operated cases rose to 100%. This surgery was named "correction of glosso-larynx (CGL)". Ameliorations by CGL were more satisfactory than those changes by frenotomy alone.

Respiratory Rate (RR), Vital Capacity (VC) and forced vital capacity in one second percent (FVC1.0%) increased after CGL. The hyoid bones moved ventrally and downward. Expansions of the hypopharynx were observed by X-ray studies of the neck cross-sectional CT scans. The changes made by CGL obviously revealed that the symptoms and signs of ankyloglossia mainly resulted from respiratory insufficiencies [18-23]. These observations mean that the GG muscle inhibited respiration. Human beings have this weakness. This defect might be caused by the posture of *Homo sapiens* in that the foramen magnum is at the center of the base of skull because with the upright stance. And the larynx moves downward from the 4th to the 5th vertebrae of the neck [24-26].

Observed symptoms of ADEL in babies in addition to those cited above are as follows: "dark forehead", "dark color around the lips", "scanty eyebrows and eyelashes", "retraction of orbitotemporal region", "frowning expression", "swelling around the palpebrae", "hypertrophy of the cheeks" and "difficulty in making eye contact". Their skin has been described as "cyanotic", "cutis marmorata" and "pale lips and face". They present with "persistent jaundice" "eczema" and "rough skin". The head is "not round", "is distorted" and "is flat at the back". Their hair can be described as "easily falls out", "alopecia", "piloerection" and/or "scanty". "Retracted chest," "swollen abdomen and umbilicus", "hanging scrotum (boy)", "flatulence" and "constipation", have been noted as have "weak muscle tone", "bent extremities", "stiff joints and body", "weakness upon standing up", "weak grasp", "digit sucking" and "cold extremities".

These babies cry day and night. Apnea occurs during crying. Crying sounds can be described as painful, feeble and fierce. They only sleep while being held or driving in vehicles. But they awaken and cry with a little soft sound when put in beds. They tilt the head in one direction (mainly right) when sleeping. Some babies have a "near miss of SIDS" and they have the possibility of SIDS [27].

Symptoms and signs of ADEL change as the child ages. In childhood, spaces between the primary teeth are very narrow or there is no space, they have malocclusions and misaligned teeth, the shape of the head is irregular, they have poor posture, narrow nostrils and

mouth, and poor masticating abilities. They are bashful, and their voices are weak and low. They are dependent and inactive. They easily fall down and want to be carried by someone when walking. Their sleep is shallow and they snore. Their features are pale and they are irritable and over-reliant. They lack in cooperation and are egotistical. They have no patience. They have a tendency toward mental retardation and ADHD.

In adulthood, they have malocclusions, misaligned teeth, high hard palates and deviations of the nasal septa. They cannot fully open the mouth and have underdeveloped jaws. They have feelings of nasal obstruction and deep wrinkles between their eyebrows. Lumbago is observed at a high rate when the epiglottis and larynx are deviated. Their legs tremble habitually when seated placidly. These habits might be caused from the habit of digit sucking during infancy. Most prominent complaints of adults with ADEL are sleep disorders such as insomnia, feeling of being sleepless, daytime somnolence, fatigability, headache, sleep apnea, snoring, bruxism and nightmares. The following symptoms are prominent in women: rough dry skin, tendency to feel cold, menoxenia, constipation and stiffness of shoulders. In addition, they are short tempered, selfish and dependent. They have a past history of conflicts against their parents. The greatest influence of ADEL is communication disorders. These symptoms and signs are successions of those from babyhood and childhood. Above all, they are the result of being incapable of healthy breastfeeding in their babyhood. Furthermore as seen with malocclusion, misaligned teeth, deviation of the nasal septa and nasal obstructions, ADEL inhibits development of both the maxillary and mandibular bones. I developed an operation that expanded nasal cavities by cutting vestibular septi nasi muscles from the maxillary bone between both canine teeth. It was named as 'expansion of the vestibular oris (EVO)'. Nasal cavities expanded after EVO. EVO ameliorates sleep problems more than CGL. These observations show that the increase in the nasal cavities contributes to cooling of the brain. It changes the quality of sleep [28]. The greatest problem of ADEL is that it causes humans to be stress and it hinders communications. I emphasize that the resolution of ADEL is an important problem in modern medicine.

References

1. Tamba Y. The twelfth, How to cut the tongue-tie of the infants Ishinhoh: In Fujikawa Library of Keio University Medical Library, 984.
2. Butlin HT, Spencer WG. Congenital ankyloglossia, adherent tongue, or tongue-tie. In: butlin A, ed. Disease of the tongue. London: Cassel Co. Ltd, 1900:30-37.
3. Pechey J. CHAP. XVIII. Of loosening the String of the Tongue, and of the Ranula under the Tongue. In: Ann Arbor MOU, ed. A general treatise of the diseases in infants and children collected from the best practical authors by John Pechey. 1697:92-93.
4. Cullin IM. An old wives tale. Br Med J. 1959;2(5150):497-8.
5. A Paré. De l'empeschement et retraction de la langue In: Malgaigne JF, ed. Amboise Paré; Oeuvres complètes; Réimpression de l'édition de Paris (1840-1841). Genève: Slatkine Reprinte, 1970:455-456.
6. Loux F. Le jeune enfant et son corps dans la médecine traditionnelle. Paris: Flammarion, 1978:126-129.
7. Baudelocque JL. A system of midwifery I, II, III: translated from the French, by J Heath. London: ECCO, 1781.
8. Baudelocque JL. Principes sur l'art des accouchements, par demandes et réponses, en faveur des élèves sages-femmes de la campagne (1775), septième édition. Paris: Germer-Baillière, 1839.

9. Mukai S, Mukai C, Asaoka K, Nagasugi S, Yoshimi Y. Distribution on conditions of tongue, hair and skin in babies with four month old (Japanese with English abstract). *Annals ADEL*. 1993;3:1-12.
10. Hirano J, Mukai S, Nitta M. Relationship between dental arch, lingual and labial frenulum and tonsils. (From ENT and Dental checkup of 5,6 year old at a Kobe Kindergarten in 2000). *Nihon Zetuyuchakushou Gakkai, Annals ADEL*. 2002;11:58-69.
11. Spencer WG, Cade SH. *Tongue-tie: Ankyloglossia Disease of the tongue*. London: K. Lewis & Co. Ltd., 1931:18-20.
12. Ulshen M. Normal digestive tract phenomena. In: RE Behrman RK, AM Arvin, ed. *Nelson textbook of pediatrics*. 15th ed. Tokyo: W.B. Saunders Co., 1996:1031.
13. Moss W. *Nursing and diseases of children*. London, 1794.
14. Tuerk M, Lubit EC. Ankyloglossia. *Plast Reconstr Surg Transplant Bull*. 1959;24:271-6.
15. Horton CE, Crawford HH, Adamson JE, Ashbell TS. Tongue-tie. *Cleft Palate J*. 1969;6:8-23.
16. Catlin F. Tongue-tie. *Arch Otolaryngol*. 1971;94(6):548-57.
17. Mukai S, Mukai C, Asaoka K. Ankyloglossia with deviation of the epiglottis and larynx. *The Annals of otology, rhinology & laryngology Supplement*. 1991;153:3-20.
18. Mukai S, Mukai C, Asaoka K. Congenital ankyloglossia with deviation of the epiglottis and larynx. *Annals of Otolaryngol*. 1991;153:1-20.
19. Mukai S, Mukai C, Asaoka K. Congenital ankyloglossia with deviation of the epiglottis and larynx: symptoms and respiratory function in adults. *Ann Otol Rhinol Laryngol*. 1993;102(8 Pt 1):620-4.
20. Mukai S, Mukai C, Nagasugi S. Changes in respiratory rate following correction of ADEL (Japanese with English abstract). *Zetuyuchakushou Kenkyukai Kaiho (Annals ADEL)*. 1995;5:1-9.
21. Nitta M, Mukai S, Mukai C. The expansion of the hypopharynx by correction of glosso-larynx. *Psychiatry Clin Neurosci*. 2000;54(3):344-5.
22. Mukai S, Nitta M. Correction of the glosso-larynx and resultant positional changes of the hyoid bone and cranium. *Acta Otolaryngol*. 2002;122(6):644-50.
23. Yamamoto I, Mukai S, Nakagawa K, HO, Yamada Y. Analysis of hypopharyngeal airway space after correction of glosso-Larynx (CGL) by both cephalometry and compute tomography. *Nihon Zetuyuchakusho Gakkai Kaishi (Annals ADEL)*. 2011;17:13-18.
24. Lieberman DE. *The evolution of human head*. Cambridge, Massachusetts: The Belknap Press of Harvard Press, 2011.
25. Negus V. *The mechanism of the larynx*. Paris: WH Heinemann Ltd, 1929.
26. Negus S. *The biology of respiration*. Baltimore: The Williams and Wilkins Company, 1965.
27. Mukai S, Mukai C, Asaoka K, Nagasugi S, Ogiyama M. Near miss for SIDS seen in infants who have ankyloglossia with deviation of the epiglottis and larynx (In Japanese Iwith English abstract). *Annals of the Ankyloglossia with Deviation of the Epiglottis and Larynx*. 1993;3:33-45.
28. Mukai S. Amelioration of sleep by expansion of the nasal cavity: A role of the nose. *Annals of Clinical Otolaryngology*. 2017;1-6.