

Complete ventral ankyloglossia in three related dogs

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- ▶ Congenital anomalies of the tongue are rare in dogs, with the most common being microglossia, bird tongue, lateral protrusion, ankyloglossia, and macroglossia.
- ▶ Ankyloglossia is a general term that describes a group of congenital anomalies characterized by limitations of tongue movement; complete ventral ankyloglossia refers to total fusion between the tongue and floor of the oral cavity.
- ▶ In dogs with complete ventral ankyloglossia, frenuloplasty can be used to free the tongue.

Two 8-month-old and one 7.5-month-old Anatolian Shepherd dogs were examined at the surgery clinic of the Faculty of Veterinary Medicine, University of Akdeniz. The owner complained that the dogs would drool saliva and had not gained weight as quickly as their siblings had. The 2 older dogs were full brothers, and the younger dog was their half sister. All 3 had the same sire.

At the time of initial examination, the owner reported that drooling had been evident for approximately 5 months and that he had first noticed that the dogs were underweight and undersized 3 weeks earlier. The owner was unaware of any other oral or systemic abnormalities. Physical examination revealed that the dogs were unable to protrude their tongues properly. Throughout the examination, they drooled so much that the ground was wet where they had been standing (Fig 1). In all 3 dogs, the tip of the tongue was abnormally shaped and deviated ventrally when the dog attempted to protrude the tongue. A notch in the middle of the tongue tip was evident during oral examination. In addition, a thin tissue band between the sublingual surface of the tongue and floor of the oral cavity was seen in all 3 dogs. This tissue band extended from the lingual frenulum to the gingiva of the mandibular incisors (Fig 2). Mobility of the tongue was limited in all 3 dogs, and it was not possible to manually protrude the tongue in any of them. The dogs were offered food so that function of the tongue could be observed. They were unable to use their tongues as a ladle while eating, and some food dropped from their mouths as they began to eat. No other lesions of the oral cavity were seen, and the remainder of the physical examination was unremarkable. A diagnosis of complete ventral ankyloglossia was made.

The dogs weighed 23.1, 25.7, and 21.6 kg (50.8,



Figure 1—Photographs of a dog with complete ventral ankyloglossia. Notice the caudal deviation of (a) and the notch in (b) the tip of the tongue. Also notice the excessive drooling.



Figure 2—Photograph of a dog with complete ventral ankyloglossia. Notice the thin tissue band between the sublingual surface and floor of the oral cavity extending toward the gingiva of the mandibular incisors. The dotted lines represent proposed incisions for frenuloplasty.

56.5, and 47.5 lb). The dams, sire, and other 9 puppies produced by the sire were brought to the clinic and examined. None of these dogs had any physical abnormalities. Mean body weight of the healthy siblings was 36.3 kg (79.9 lb).

Frenuloplasty was performed to correct the complete ventral ankyloglossia. Dogs were premedicated with atropine sulfate (0.04 mg/kg [0.018 mg/lb], SC) and xylazine hydrochloride (2.2 mg/kg [1 mg/lb], IM) and anesthetized with ketamine hydrochloride (10 mg/kg [4.5 mg/lb], IM). They were then positioned in lateral recumbency. The mouth was held open with cloth bands to expose the tongue, and the oral cavity was flushed with diluted chlorhexidine solution. The tissue band connecting the tongue to the floor of the oral cavity was sectioned with a pair of fine scissors. The first incision began at the tip of the tongue near where it was fused to the gingiva and con-

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tinued caudally along the ventral surface of the tongue. A second incision was then made along the floor of the oral cavity. The 2 incisions joined at the level where the lingual frenulum would normally have begun (Fig 2). Care was taken to avoid injury to the lingual frenulum and the salivary gland ducts. For this purpose, the tongue was pulled gently to identify the junction between the tissue band and normal lingual frenulum. Minor bleeding that was observed was controlled with electrocauterization. The incisions in the sublingual and oral cavity mucosa were closed with simple interrupted sutures of 3-0 polyester. Although resection of the tissue band allowed the tongue to move freely, the notch in the tip of the tongue was still evident.

The dogs were treated with cefazolin (25 mg/kg [11.4 mg/lb], IM, q 12 h for 5 days) after surgery. No restrictions were placed on eating. The day after surgery, greater mobility of the tongue was evident, and the dogs appeared to be able to eat and drink properly. Sutures were removed 8 days after surgery, at which time the incisions appeared to have healed without any complications (Fig 3). The dogs were reexamined 4 months after surgery, at which time they appeared to be able to use their tongues normally and could protrude their tongues when panting. They had gained weight and now weighed almost as much as their healthy siblings. In all 3 dogs, the tip of the tongue had a “W” shape.

Congenital anomalies of the tongue are rare in dogs, with the most common being microglossia, bird tongue, lateral protrusion, ankyloglossia, and macroglossia.¹⁻³ Ankyloglossia is a general term that describes a group of congenital anomalies characterized by limitations of tongue movement.^{4,5} In humans, attachment of the tongue tip to the hard palate is referred to as superior ankyloglossia,⁶ whereas attachment of the tongue tip to the lingual frenulum is referred to as inferior ankyloglossia.⁷ Inferior ankyloglossia is defined as partial when it results from shortening or fibrosis of the lingual frenulum or genioglossus muscles and as complete when there is total fusion between the tongue and floor of the oral cavity.^{6,8-10}

The lingual frenulum is a ventral median fold of mucosa that extends from the floor of the oral cavity to the body of the tongue. Caudally, it contains the right and left genioglossus muscles. Rostrally, its 2 layers of mucosa are united by delicate areolar tissue. The tip of



Figure 3—Photographs of a dog with complete ventral ankyloglossia 8 days (a) and 4 months (b) after frenuloplasty. Notice the “W” shape of the tip of the tongue.

the tongue is free, and the lingual frenulum does not extend to the tip of the tongue in clinically normal dogs.¹¹ During embryogenesis, the tongue is fused to the floor of the oral cavity, but cell death and resorption free the tongue, with the frenulum left as the only remnant of the initial attachment.¹²

It has been reported that the incidence of complete inferior ankyloglossia in humans is 0.02% and lower than the incidence of partial inferior ankyloglossia.^{9,13} Although partial ventral ankyloglossia has been reported in a calf,¹⁴ goat,¹⁵ and dog,¹⁶ to our knowledge, complete ventral ankyloglossia in a dog has been reported only once previously.¹⁷

Ankyloglossia may rarely be combined with other anomalies in humans, such as cleft palate, camptodactyly of the fingers, blepharophimosis, elongation of the philtrum, or microstomia.^{6,18} The dog previously reported to have complete ventral ankyloglossia¹⁷ also had a 3-cm cleft at the tip of the tongue (bifid tongue), and a thyroglossal cyst under the base of the tongue was observed in a goat with partial ankyloglossia.¹⁵ No abnormalities other than the complete ventral ankyloglossia were observed in the dogs described in this report.

In individuals with ankyloglossia, most of the clinical signs are related to limitations of tongue movement, including problems during eating and swallowing and difficulties maintaining good oral hygiene.¹⁴⁻¹⁷ Various secondary disorders have been recognized in humans with ankyloglossia, with the most commonly reported being speech defects, breastfeeding difficulties, and dental and periodontal problems.^{5,10,12,19} The principal abnormalities in the dogs in the present report were drooling of saliva and reduced weight gain. Drooling of saliva may have been related to abnormalities of the swallowing mechanism and has been reported in association with partial inferior ankyloglossia.^{14,15} Drooling of saliva was not mentioned in the previous report¹⁷ of a dog with complete ventral ankyloglossia, but obvious difficulties in eating and drinking were mentioned. Dogs described in the present report also had difficulties eating, as they dropped food while eating. The poor weight gain in these dogs, compared with their healthy siblings, was likely related to poor nutrient intake since birth.

In the dogs described in the present report, the notch in and ventral deviation of the tip of the tongue were a result of the complete ventral ankyloglossia. Although similar abnormalities have commonly been identified in humans with ankyloglossia,^{4-6,10,20} they have not been mentioned in previous reports¹⁴⁻¹⁷ of animals with partial or complete ventral ankyloglossia. In the previous dog with complete ventral ankyloglossia,¹⁷ the lack of these signs was a result of the dog's bifid tongue, because the length of bifurcation (3 cm) was sufficient to free the tip of the tongue.

The most striking feature in the dogs described in the present report was the “W” shape of the tip of the tongue following frenuloplasty. This unusual shape may have been a result of an anomaly that accompanied the ankyloglossia or an acquired disorder that developed gradually as a result of pulling on the tongue tip during sucking and swallowing attempts.

The necessity of frenuloplasty in humans with partial ankyloglossia is controversial.^{7,13,19,21,22} In children, the tip of the tongue normally grows until 4 years of age, and initial restrictions in mobility may improve as the child gets older. Therefore, it is advised not to perform frenuloplasty before 4 years of age.^{13,20} However, frenuloplasty is required with complete ankyloglossia^{6,17,20} and was performed in these 3 dogs to allow proper eating and drinking.

Some difficulties have been encountered during endotracheal intubation of children with partial ankyloglossia,²³ and partial ankyloglossia was identified in a dog because of an inability to protrude the tongue sufficiently to allow passage of an endotracheal tube.¹⁶ For this reason, injectable drugs were used to maintain anesthesia in the 3 dogs described in the present report.

It has been suggested that ankyloglossia could be a result of exposure to teratogenic chemicals during pregnancy²⁴ or a mutation in T-box genes.²⁵ Although the 3 dogs described in the present report were all closely related, a lack of information about the dams and sire and about previous generations makes it difficult to speculate about a genetic basis. Even though the previous report¹⁷ of a dog with complete ventral ankyloglossia also involved an Anatolian Shepherd, no conclusions can be drawn about a breed predisposition without genetic analyses.

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