

ANKYLOGLOSSIA IN DOGS: SURGERY AND OUTCOME STUDY

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ABSTRACT

The objective of this study was to assess the clinical manifestations and outcomes in canines presenting with ankyloglossia pre- and post-surgical intervention. The study sample comprised 6 canines of varied ages, breeds, and genders admitted to the veterinary hospital. Following standard clinical and oral evaluations, congenital complete ventral ankyloglossia was confirmed. Surgical intervention entailed the utilization of the lingual frenuloplasty technique. During the postoperative phase, it was noted that sutures positioned on the tongue's ventral aspect self-dissolved within an average span of 4.6 days (ranging between 3 to 7 days), accompanied by minor wound line separation. Full recovery was evident within an approximate duration of 18 days. Post-recovery assessments revealed unhindered tongue mobility in the subjects, facilitating effortless consumption of solids and liquids. The findings from this study underscore the efficacy of the frenuloplasty technique in addressing pronounced adhesions. No post-surgical complications emerged that could detrimentally impact the canines' recuperation trajectory. The immediate alleviation of consumption challenges post-surgery, coupled with the rapid acclimatization to tongue mobility and enhanced bodily health, underscores the clinical significance and appropriateness of surgical intervention in afflicted canines.

Keywords: Ankyloglossia, Frenuloplasty, Congenital disorders

INTRODUCTION

The tongue, a highly dynamic organ in both feline and canine oral cavities, plays a pivotal role in various physiological functions. It is pivotal in numerous functions including the separating, chewing, swallowing of both solid foods and liquids. Additionally, it facilitates grooming behaviors through licking and plays a role in thermoregulation. (Hernandez and Negro, 1999; Lobprise and Wiggs, 1993).

Similar to other bodily organs, the tongue can exhibit a range of congenital or acquired anomalies. Within this spectrum, congenital aberrations are infrequently observed. Notably, congenital presentations often manifest as microglossia, macroglossia, anomalies of the frenulum, or other tongue deformities. The majority of these anomalies typically do not necessitate surgical intervention (Slatter, 2003).

Ankyloglossia, colloquially termed tongue-tie, is a congenital malformation of the tongue typified by a truncated and dense frenulum linguae (Karahan and Cinar Kul, 2009). The embryological underpinnings of

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ankyloglossia remain a topic of active research. Investigations involving both humans and experimental animal models posit that the condition may arise from mutations in T-box genes or prenatal exposure to teratogens (Karahan and Cinar Kul, 2009).

In animals manifesting ankyloglossia, a partial or total adhesion is observed between the ventral aspect of the tongue and the oral cavity's floor. This adhesion arises due to an insufficiency or developmental aberration of the connective tissue termed the frenulum lingua. Under typical conditions, this tissue manifests as a slender longitudinal tract beneath the midline of the tongue's ventral surface. A healthy lingual frenulum serves to maintain relative stability at the tongue's base while enabling unencumbered movement of its apex within the oral cavity (Alkan *et al.*, 2013).

In the majority of afflicted animals, the clinical manifestations encompass challenges in eating and swallowing, suboptimal oral hygiene, and restricted tongue mobility. (Temizsoylu and Avki, 2003). Tongue mobility in affected animals can differ based on the extent of the adhesion. In instances of complete adhesion between the tongue's ventral surface and the oral cavity floor, the animal's tongue movement is significantly inhibited. When attempting to protrude the tongue, its extension is limited, not surpassing the gingival boundary of the mandibular incisors. This adhesion often molds the tongue's tip into a configuration reminiscent of the letter "W." Consequently, the tongue is unable to protrude beyond the oral cavity or make contact with the hard palate, even when the mouth is agape (Alkan *et al.*, 2013).

For animals where an anomaly is identified shortly after birth, surgical intervention may be deferred for a specified duration, provided there's no adverse clinical impact on feeding. Nevertheless, should the

anomaly pose a threat to the animal's well-being or survival, prompt surgical action is imperative, typically employing either the lingual frenuloplasty or lingual frenulotomy procedures (Alkan *et al.*, 2013).

The objective of this study was to assess the clinical manifestations and outcomes in dogs with ankyloglossia pre- and post-surgical intervention.

MATERIALS AND METHODS

This study's group comprised 6 dogs of various ages, breeds, and genders presented at the animal hospital (Table 1). Through anamnesis, standard clinical evaluations, and oral examinations, all the subjects were diagnosed with congenital complete ventral ankyloglossia (Figure 1). Given the absence of any other pathology contraindicating surgical intervention, the decision was made to perform lingual frenuloplasty under general anesthesia.

Pre-operatively, animals were fasted from food and fluids for 8 hours. Cefazolin sodium (22 mg/kg, IV, Sefazol®, Mustafa Nevzat İlaç San. A.Ş., Turkey) was administered as a preoperative antibiotic, and meloxicam (0.2 mg/kg, SC, Bavet, Turkey) was given for analgesia. Subsequently, xylazine hydrochloride (2 mg/kg, IM, Xylazinbio 2%, Intermed, Turkey) was employed for sedation, followed by ketamine hydrochloride (10 mg/kg, IM, Ketazol 10%, Interhas, Turkey) for anesthesia induction. The animals were then intubated and maintained under general anesthesia using 2% sevoflurane (Sevorane Liquid Abbvie, Istanbul). Throughout the anesthesia process, a 0.9% isotonic NaCl solution (10 mL/kg/h, IV, Biofleks, Osel İlaç, Turkey) was administered. Patients were oriented in the supine position, lying on their right side, and their mouths were held open using a padan.

For lingual frenuloplasty, an initial incision was executed with tissue scissors,

originating from the tongue's apex and extending caudally along its ventral line. A subsequent incision commenced from the oral cavity's apex, tracing back to its base. These incisions converged at the location of the natural lingual frenulum. Throughout this procedure, meticulous care was exercised to preserve the integrity of the normal frenulum tissue and avoid damaging the salivary gland ducts. Any resultant bleeding was managed using gauze tampons and electrocautery. The incised line, stretching from the tongue's ventral surface to the oral mucosa, was sutured with polyglycolic acid (USP 2/0, Alcasorb®, Katsan, Turkey) employing a continuous stitching technique (Figure 2). However, the incision within the oral cavity remained unsutured. A chlorhexidine mouth spray (3 fis, PO, Andorex®, Pharmactive İlaç San. ve Tic. A.Ş., Turkey) was applied to the treated region. Postoperative care included the administration of Cefazolin sodium (22 mg/kg, IV, Sefazol®, Mustafa Nevzat İlaç San. A.Ş., Turkey) for a duration of 7 days, meloxicam (0.2 mg/kg, SC, Bavet, Turkey) for 3 days, and the chlorhexidine mouth spray (3 fis, PO, Andorex®, Pharmactive İlaç San. ve Tic. A.Ş., Turkey) continued for 15 days. During the healing phase, a diet of soft foods was recommended until the sutured site fully recuperated.

RESULTS

All animals presented with complete ventral ankyloglossia. The tongue was affixed to the gingival boundary of the mandibular incisors. The tongue's apex bore a resemblance to the letter 'W'. Due to the totality of the adhesion, no animal could protrude its tongue beyond the oral cavity or achieve unencumbered movement within it. During consumption of food and water, a

notable behavior was the complete submersion of the nasal region into the bowl, yet, despite this impediment, sustenance was successfully ingested.

It was noteworthy that the sire of case no. 2 also exhibited the ankyloglossia anomaly. However, the other two siblings of this patient presented no such irregularities. According to reports, no discernible variance in body weight was observed in comparison to the unaffected siblings; their weights were approximately equivalent. Contrarily, patient no. 6 was noted to be underweight for its age, appearing cachectic. When assessed using a body condition scale, two patients were categorized as "Ideal", three as "Underweight", and one as "Thin" (Fossum *et al.*, 2013).

Upon awakening from anesthesia, it was evident that the tongue could be easily extruded from the oral cavity, and subsequently, no hindrances were encountered in the consumption of liquids and soft foods. Although the tongue was unaccustomed to protruding from the oral cavity, instances of self-inflicted biting were not noted.

Postoperatively, in all the animals, the sutures affixed to the tongue's ventral surface self-dissolved within an average span of 4.6 days (ranging between 3 to 7 days). A minor separation was observed between the healing wound margins. Secondary healing of these wounds culminated in complete recovery, averaging 18 days post-surgery (with a range of 15 to 30 days), as outlined in Table 1. Subsequent evaluations, after the wounds had fully healed, indicated that the animals were adept at freely moving their tongues and exhibited no challenges in ingesting both food and liquids.



Figure 1: Preoperative appearance of case no.2.



Figure 2: Appearance of the same case after frenuloplasty.

Table 1: Information regarding dogs affected by ankyloglossia.

Dogs	Breed	Age (month)	Gender	Body weight (kg)	The suture material spontaneously dislodges (day)	Complete recovery (day)	Body condition chart
1	Crossbreed	24	Male	38	5	15	Ideal
2	Anatolian shepherd dog	7	Male	70	3	20	Ideal
3	Crossbreed	48	Male	31	3	18	Underweight
4	Crossbreed	7	Male	26.7	5	10	Underweight
5	Crossbreed	24	Female	26.4	7	15	Underweight
6	Crossbreed	4	Male	5.3	5	30	Thin

DISCUSSION

Congenital tongue anomalies in dogs are infrequently observed. The most prevalent among them include microglossia, macroglossia, lateral protrusion, and

ankyloglossia (as cited by Harvey CE in Slatter DH, 1993). Ankyloglossia, within this cluster, is a term collectively referring to congenital malformations hallmarked by compromised tongue mobility (Temizsoylu and Avki, 2003).

Within ankyloglossia presentations, literature notes that the frenulum lingua adheres to the gingival margin of the mandibular incisors. This adhesion significantly restricts tongue movements, preventing dogs from extending their tongues beyond their oral cavity. Notably, it's documented that puppies particularly struggle with milk suction, while adult dogs face challenges in fluid and solid food intake. Such difficulties can precipitate developmental lag in these animals (Durmuş *et al.*, 2019). In concordance with these findings, all animals in this study displayed adhesions on the tongue's ventral surface, reaching the gingival boundary of the mandibular incisors. The comprehensive adhesion markedly hindered tongue movements. Complications arose during food and liquid consumption, leading to spillages. However, diverging from conventional literature, two animals in the study exhibited an ideal body mass index (BMI). Engaging with the pet owners provided insights: these specific owners were more diligent and attentive regarding their pets' nutritional needs compared to others. Of the remaining animals, the BMI metrics aligned with the literature: four were categorized as underweight and one as thin.

In disparate studies, clinical manifestations of dogs with complete ventral ankyloglossia have varied. One study reported excessive salivation in affected dogs (Temizsoylu and Avki, 2003), while another did not observe this symptom (Özaydin *et al.*, 2000). It's theorized that drooling could arise from abnormalities in the swallowing mechanism (Kılıç *et al.*, 2004). This study, however, did not document any dogs with excessive salivation. Aside from difficulties in food and water intake, no other swallowing-related pathologies were noted.

In human cases, ankyloglossia has been associated with various other anomalies, including cleft palate, camptodactyly of the fingers, blepharophimosis, philtrum

elongation, or microstomia. In the veterinary literature, a dog diagnosed with complete ventral ankyloglossia was also observed to have bifid tongue (Özaydin *et al.*, 2000). However, comprehensive oral and general assessments of the animals in this study revealed no anomalies beyond the frenulum lingua.

An interesting postoperative observation, noted in another research, was the formation of a "W" shape at the tongue's tip in dogs that underwent frenuloplasty. This unique morphology was postulated to either be an anomaly coexisting with ankyloglossia or a gradually acquired malformation stemming from consistent tongue-tip pulling during efforts to suck and swallow (Temizsoylu and Avki, 2003). In this study, such a "W" configuration was evident postoperatively in cases 1 and 2. No similar observations were made in the remaining subjects. This "W" formation in cases 1 and 2 was hypothesized to arise due to their good body condition, which might have led them to exert their tongues excessively during feeding, consequently molding it into the distinctive shape.

In animals afflicted with ankyloglossia, the selection between lingual frenuloplasty or lingual frenulotomy hinges on the severity of the adhesion (Alkan *et al.*, 2013). Past research has indicated that for complete ventral ankyloglossia, the remedy involves a combined horizontal and vertical frenuloplasty technique. This begins with an incision from the tongue's apex to its caudal portion to liberate the tethered tongue, often resulting in satisfactory healing (Durmuş *et al.*, 2019; Temizsoylu and Avki, 2003). The methodology employed in this study mirrored that technique. The vertical incision was sealed using continuous sutures, while the horizontal incision, which started at the oral cavity's tip and extended towards the tongue's base, was left unsutured. The rationale was that post-incision, the tissue remaining adjacent to the mandibular

incisive teeth's gingival line tended to be further traumatized by suture needle passage, prohibiting adequate tissue approximation. Consequently, suturing was omitted to prevent additional trauma. On average, sutures placed along the vertical incision spontaneously dissolved by the 4.6-day mark, leaving a minor gap between the healing wound edges. Secondary healing led to complete wound closure approximately 18 days post-surgery.

In various studies, solid anesthetic agents have been favored over inhalation anesthesia for both frenuloplasty and frenulotomy (Kılıç *et al.*, 2004; Alkan *et al.*, 2013; Durmuş *et al.*, 2019). However, in this study, post-intubation, anesthesia was maintained using sevoflurane. The endotracheal tube was anchored to the maxilla using a bandage, ensuring it didn't obstruct surgical access to the tongue.

The etiology of ankyloglossia has been postulated to be linked either to prenatal teratogenic chemical exposure or mutations within T-box genes. Notably, the Kangal breed in dogs is purportedly genetically predisposed to this congenital anomaly (Özaydin *et al.*, 2000; Durmuş *et al.*, 2019; Temizsoylu and Avki, 2003). In this study's only a single dog was of the Kangal breed, and its lineage, as revealed by the owner, had a history of this condition, aligning with existing literature. All pet owners in this study were counselled on the prudence of sterilizing their dogs to prevent potential transmission.

CONCLUSION

In conclusion, this study demonstrates the efficacy of the frenuloplasty technique for cases presenting with pronounced adhesion. Postoperatively, no significant complications were observed that might compromise the animals' recovery. The immediate alleviation of challenges in food and liquid consumption post-surgery,

coupled with the swift acclimatization to enhanced tongue mobility and the noticeable improvement in physical condition, underscores the clinical significance and appropriateness of surgical intervention for patients with such conditions.

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