










Secondary Healing Following Trauma-Induced Partial Glossectomy: Case Report of an Arabian Horse

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Abstract: The tongue serves as an organ of food prehension, mastication, grooming, deglutition, taste, and vocalization, and is suspected to play a role in upper airway stability. A seven-year-old riding horse, weighing 350 kg and employed for load-carrying purposes, was brought to Atatürk University Faculty of Veterinary Medicine Hospital due to a transversal injury in the rostral part of the tongue caused by trauma from the bridle's rope. During the general examination, it was observed that the tongue protruded outside the mouth, there was a presence of necrotic odor, paralysis in the apex lingualis region, and bloodstains on the mouth corner and front limbs. After the removal of the tongue tissue, debridement of the necrotic areas in the remaining caudal portion was performed, and it was left for secondary wound healing. Postoperatively, intramuscular injections of 200,000 IU benzylpenicillin procaine were administered every 24 hours for 7 days, along with flunixin meglumine given for 3 days. Additionally, a 0.12% chlorhexidine gluconate solution was used as an oral antiseptic three times daily for a duration of 7 days. Daily phone calls were made to the patient owner to inquire about the overall condition of the patient. At the follow-up appointment on the seventh day, progress in the healing of the tongue was observed.

Keywords: Arabian horse, Tongue, Glossectomy, Secondary healing

Travma Sonrası Kısmi Glossektomi ile İkincil İyileşme: Bir Arap Atı Vaka Raporu

Özet: Dil; kavrama, çiğneme, tımar, yutma, tat ve ses çıkarma işlevlerini yerine getiren bir organdır ve üst solunum yolunun stabilitesinde rol oynadığı düşünülmektedir. Üçyüz elli kg ağırlığında yük taşıma amacıyla kullanılan yedi yaşında bir arap atı, dizgin halatından kaynaklanan travma sonucu dilin rostral kısmında oluşan transversal yaralanma nedeniyle Atatürk Üniversitesi Veteriner Fakültesi Hastanesi'ne getirildi. Genel muayene sırasında, dilin ağız dışına çıktığı, nekrotik koku, apex lingualis bölgesinde felç ve ağız kenarı ile ön bacaklarda kan lekeleri olduğu gözlemlendi. Dil dokusunun çıkarılmasının ardından, geriye kalan kaudal kısmındaki nekrotik alanların debridmanı yapıldı ve ikincil yara iyileşmesi için bırakıldı. Ameliyat sonrası 7 gün boyunca her 24 saatte bir 200.000 IU benzilpenisilin prokain intramusküler enjeksiyonları yapıldı ve 3 gün boyunca flunixin meglumin verildi. Ayrıca, 7 gün boyunca günde üç kez %0.12 klorheksidin glukonat çözeltisi oral antiseptik olarak kullanıldı. Hastanın genel durumu hakkında bilgi almak için hasta sahibine günlük telefon görüşmeleri yapıldı. Yedinci gündeki takip randevusunda dilde iyileşme gözlemlendi.

Anahtar Kelimeler: Arap atı, Dil, Glossektomi, İkincil iyileşme

1. Introduction

The tongue plays a crucial role not only in grasping, chewing, grooming, swallowing, tasting, and vocalization but also in ensuring stability in the upper respiratory tract. Tongue lacerations are common in horses, often involving reported abnormalities such as traumatic injuries, glossitis, neoplasia, and tongue paralysis (1). Typically, it involves the free portion of the tongue known as the apex lingua. These lacerations can occur due to foreign bodies, self-inflicted bites, or improper use of bits (2). The oral cavity and oropharynx can be susceptible to various diseases, many of which may present similar clinical symptoms. Among these

symptoms, partial or complete anorexia, pain during eating or swallowing, oral swelling, malodorous breath, and excessive saliva containing pus or blood may be present (3). Treatment methods for tongue injuries, such as primary closure, secondary healing, and glossectomy, are employed based on the depth, duration, and location of the injury (4).

In human medicine, glossectomies are categorized into four types: partial, subtotal, near-total, and total. A partial glossectomy involves removing or amputating any part of the tongue that is in front of the frenulum (5). Subtotal glossectomy means removing all the tongue tissue behind the frenulum, as well as a portion or the entire genioglossus and

geniohyoid muscles. Near-total glossectomy is the removal of over 75% of the tongue. Total glossectomy is the complete removal or amputation of the entire tongue. Among humans, partial glossectomies are regarded as minor surgeries, whereas subtotal, near-total, and total glossectomies are considered major surgeries. This case presentation aims to evaluate the application of wound debridement and secondary healing following partial glossectomy in horses, assessing the post-treatment performance of the horse, and examining the long-term outcomes of the procedure (6).

2. Case Description

A seven-year-old Arabian horse, weighing 350 kg and employed for load-carrying purposes, was brought to Atatürk University Faculty of Veterinary Medicine Hospital due to a transversal injury in the rostral part of the tongue caused by trauma from the bridle's rope. According to the gathered anamnesis information, trauma occurred 72 hours ago as a result of the tongue being compressed by the bridle's rope inside the oral cavity. Before being brought to the hospital, the available pelleted feed was soaked and turned into a mash in an attempt to feed the horse, but it did not receive adequate nutrition. The horse was kept in the stables without receiving any treatment until it was brought to the hospital.

During the general examination, it was observed that the tongue protruded outside the mouth, there was a presence of necrotic odor, paralysis in the apex lingualis region, and bloodstains on the mouth corner and front limbs. Clinically, the case exhibited weakness, fatigue, loss of appetite, increased salivation, and an elevation in rectal temperature. During inspection, a deep transversal laceration was identified in the rostral 1/3 portion of the tongue (Figure 1). As a result of the lack of treatment, necrosis in the tongue tissue and a necrotic odor inside the mouth were identified. General sensory paralysis was detected due to damage to the extensions of the hypoglossal nerve in the apex part of the tongue. No abnormalities were seen on radiographic examination of the head and hyoid area. Initially, due to the tachycardia and moderate dehydration in the horse, intravenous (IV) lactated Ringer's solution (65ml/kg, Polifleks Lactated Ringer I.V. Infusion Solution, Polifarma, Turkey), intravenous cefazolin (15mg/kg, Eqizolin, Tüm Ekip İlaç A.Ş., Turkey), intramuscular flunixin meglumine (1.1 mg/kg, Flumeglin, Teknovet, Turkey), and vaccination for tetanus biotoxin (Cloteid 4, Bioveta, Czech Republic) were administered.



Figure 1. The deep transversal wound on the horse's tongue was caused by trauma.

Surgical Procedure

In the administration of anesthesia for a partial glossectomy procedure, xylazine and ketamine were utilized intravenously at dosages of 1.1 mg/kg (Xylazinebio %2, Interhas, Turkey) and 2.2 mg/kg (Ketasol %10, Interhas, Turkey), respectively. After being taken into anesthesia, the horse was placed in a right lateral position on a cushion and leg restraints were applied. A gunter padan was placed in the horse's mouth, and the oral cavity was aseptically prepared with 2% chlorhexidine gluconate (Klorhex %4, Drogosan, Turkey). A local block with 2% lidocaine hydrochloride was administered to the base of the tongue. To minimize bleeding, a tourniquet was placed cranially on the frenulum of the tongue.

The selected area for amputation included the necrotic portion along with the region affected by laceration and its rostral part. The partial glossectomy was performed using a scalpel. After the removal of the tongue tissue, debridement of the necrotic areas in the remaining caudal portion was performed, and it was left for secondary wound healing. The excised tissue was examined histopathologically (Figure 2).



Figure 2. The apex of the tongue removed after partial glossectomy.

Tissue Tracking Process

Following the evaluation, the collected tissue samples were fixed in 10% formaldehyde solution for 48 hours, and after routine tissue processing procedures, they were embedded in paraffin blocks. Sections, each 4 µm thick, were obtained from each block and prepared for histopathological

examination. The prepared specimens were stained with hematoxylin and eosin (H&E) and examined under a light microscope (Olympus BX 51, Japan).

Postoperative Care

During the postoperative period, benzylpenicillin procaine was prescribed instead of cefazoline because the caretaker mentioned having an antibiotic containing benzylpenicillin procaine available in the stable and indicated they could not afford a different antibiotic. Intramuscular injections of 200,000 IU benzylpenicillin procaine (Reptopen, Ceva, France) were administered every 24 hours for 7 days, along with flunixin meglumine (1.1 mg/kg, Flumeglin, Teknovet, Istanbul) given for 3 days. Additionally, 0.12% chlorhexidine gluconate (Klorhex Plus, Drogan, Turkey) solution was used as an oral antiseptic three times daily for a duration of 7 days.

Following the operation, the patient owner declined hospitalization. The patient owner was advised to feed the animal with a diet consisting of moistened pellets, soaked sugar beet pulp, and hay. Daily phone calls were made to the patient owner to inquire about the overall condition of the patient. According to the information provided by the patient owner, the animal was unable to chew effectively and swallow during the first two days, managing to ingest only small amounts of food. On the third day, a mixture of adult pellet feed and hay was provided. It was recommended to continue feeding the mixture of adult pellet feed and hay until the seventh day. Upon the follow-up appointment on the seventh day, improvement in the healing of the tongue was observed.

3. Results

The biopsy specimen taken from the horse's tongue was histopathologically examined, revealing severe acanthosis and marked anaplasia in the stratum spinosum cells due to cell proliferation in the tongue epithelial layer. Additionally, the formation of keratin pearls (Glob Corne) was observed in the epithelial layer of the tongue. (Figure 3).

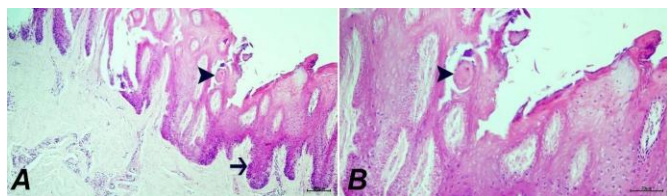


Figure 3 (A) Tongue of the horse showing Squamous Cell Carcinoma with acanthosis (arrow) and keratin pearl formation (glob corne) (arrowhead) due to proliferation in epithelial cells. H&E stain, Scale bar: 70 μ m. (B) Tumor tissue displaying keratin pearl formation (glob corne) (arrowhead). H&E stain, Scale bar: 40 μ m.

Insufficient communication with the animal owner following the partial glossectomy procedure complicated the

assessment of the recovery process. By the sixth month, it was observed that the granulation tissue had covered the remaining transverse incision in the radix region of the tongue, indicating successful healing. The owner, who was reached by phone, reported no issues with food or water intake.



Figure 4. Granulation tissue formation in the horse's tongue six months after a partial glossectomy procedure.

4. Discussion

In horses, as previously indicated in prior studies, the partial glossectomy method may be applied for the treatment of severe tongue traumas (1-4). The use of traumatic glossectomy or glossectomy as a treatment modality for cases involving severely traumatized tongues has been reported in earlier studies, particularly in instances of devitalized or minimally connected tongue traumas (7). Taking into consideration the classification of glossectomy methods applied in humans and the categorization of treatment approaches for tongue injuries in dogs (6), the glossectomy described in this report has been classified as "partial glossectomy". This classification defines the amputation of either a portion or the entirety of the pre-frenulum free tongue.

Potential causes of protrusion or paralysis in the horse's tongue include abnormal behavior, congenital abnormalities, clostridium botulinum infection, abnormalities in the hypoglossal nerve or nerve roots, and parasitic diseases (2). Cheetam et al. stated that the styloglossus, hyoglossus, and genioglossus muscles receive their motor innervation in the tongue from the hypoglossal nerve (Cranial Nerve XII) and emphasized that damage to the hypoglossal nerve is associated with the protrusion of the tongue (8). Similarly, the protrusion observed in the tongue of the patient in this report was determined to be due to a deep wound occurring in the transverse plane of the tongue.

The radiography of the oral cavity can assist in imaging radiopaque foreign bodies or fractures as the cause of clinical symptoms. Its utility is limited in identifying soft tissue lesions (1,9). In the radiographic imaging utilized in our case,

no lesions were observed in the bone structure or soft tissues. Magnetic resonance imaging and computed tomography can be employed to visualize the locations and extensions of soft tissue lesions (1).

Squamous cell carcinoma (SCC) is a frequently encountered neoplasm in horses. Horses with lingual SCC may experience dysphagia, weight loss, increased salivation, difficulty chewing, and tongue ulceration. The recognition of lingual SCC in horses may be challenging, as it can present with clinical symptoms similar to more common diseases in the oral cavity (1). SCC in any species typically initiate as small, non-healing, slowly growing ulcerations or proliferative cauliflower-like masses with a broader base, resembling papillomas. In this case, the patient was brought in with a complaint of tongue trauma, and morphological changes indicative of SCC in the tongue were not observed. Horses developing tongue lesions due to various causes often experience difficulties in functions such as eating, chewing, swallowing, and vocalization (2). In consideration of these circumstances, the cachectic posture noted during the clinical examination in this case was considered to potentially originate from the SCC in the oral cavity. Additionally, when the patient was brought to the hospital with tongue trauma, no symptoms related to SCC were observed on the tongue.

Surgical intervention may be a treatment option for lingual tumors, although its applicability depends on the size and location of the tumor. Partial glossectomy may be a suitable treatment approach for horses with SCC, depending on the size and location of the tumor. Furthermore, in dogs, this treatment method has yielded successful results (2). Glossectomy has been previously described as a treatment for severely traumatized tongues, which may involve loss of vitality or minimal attachment to the main portion of the tongue (9, 10, 11, 12), and in cases, they have regained their previous functions in the long term. Particularly in horses, partial glossectomy may be considered as a successful treatment option for conditions resistant to medical intervention. Schoonover et al. noted that when wounds involving a significant amount of muscle were left for secondary healing, good recovery was observed, although they specified that the tongue was not one of these areas (4). On the contrary, Sadan et al. indicated in their study on glossopharyngeal and wound conditions in foals that, if early results are not expected, secondary intention healing can yield excellent outcomes for achieving optimal results (3). In parallel, White et al. have mentioned that in the treatment of tongue injuries in horses, most lacerations heal well with secondary intention healing, and surgical repair is not necessary. (13). In light of this information, in our case, a partial glossectomy was performed, and wound debridement was carried out, allowing the process to proceed to secondary intention healing.

4. Conclusion

This report demonstrates the successful secondary healing of a wound after partial glossectomy in a horse, following wound debridement, and indicates good tolerance of the procedure. Based on these findings, glossectomy may be considered as a treatment option for aggressive tongue tumors and other conditions where the tongue is irreversibly compromised. In this study, a glossectomy classification system following the framework developed for humans was employed. This system could contribute to the standardization and reporting of future cases and aid in determining post-treatment prognosis.

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