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# Bir Kedide Bilateral Dudak Avülzyonu ve Symphysis Mandibula Ayrılması

## Bilateral Lip Avulsion and Mandibular Symphyseal Separation in a Cat

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### Öz

Köpeklerde ve kedilerde orofasiyal travma genellikle dudak avülzyonu ve symphysis mandibula ayrılmasıyla sonuçlanır. Isırık yaraları ve trafik kazaları yaygın nedenlerdir. Bu çalışma, bir kedide başarıyla tedavi edilen bilateral dudak avülzyonu ve symphysis mandibula ayrılması vakasını tanımlamayı amaçladı. Kedinin sahibi, kedinin bir ay önce bir trafik kazasında yaralanmasının ardından yakınlardaki hayvan hastanelerinde iki başarısız ameliyat geçirdiğini iddia etti. Hayvan sahibinin gittiği her klinik ve hastanede ötenazi önerilmiş, bu nedenle hayvan sahibi hayvanı fakülte hastanesine getirmeye karar vermiştir. Klinik muayenede hemimandibulalar birbirinden ayrılmıştı ve kedi depresif bir haldeydi. Dudaklar mandibulalardan bilateral olarak avülze olmuş, avülze bölgelerde irin ve yemek kalıntıları görüldü. Kedi anestezide alındı, avülze alanlar yıkandı ve debride edildi. Serklaj teli hemimandibulaları sabitlemek için kanin ve premolar dişler arasından düğümlendi. Bukkal bölgenin mukozal tabakası dikiş gerilimini azaltmak için ventral damak bölgelerine dikildi. Yedi gün meloksikam, pantoprazol, amoksisilin-klavulanik asit ve klorheksidin, 2 ay Elizabeth yakalığı, sıvı beslenme ve haftalık kontrol randevuları önerildi. Dikişler ve serklaj teli postoperatif 14. ve 60. günlerde alındı. Hayvan, iki ay sonra herhangi bir komplikasyon olmaksızın mükemmel bir şekilde iyileşti. Preoperatif müdahaleler, dokular üzerindeki kuvvetleri, ayrılma ve yerlerini dikkate alan uygun cerrahi planlama zorlu vakalarda başarıya yardımcı olabilmektedir.

### ABSTRACT

Orofacial trauma in dogs and cats usually results in lip avulsion and symphyseal mandible separation. Bite wounds and traffic accidents are common causes. This study aimed to describe a successfully treated case of bilateral lip avulsion and mandibular symphyseal separation in a cat. The cat's owner claimed that the animal underwent two unsuccessful surgeries in nearby veterinary hospitals after being injured in a car accident a month earlier. Euthanasia was recommended in every clinic and hospital the animal's owner visited, therefore the owner decided to bring the animal to the faculty hospital. Hemimandibles were separated from each other and the cat was depressed during the examination. Lips were avulsed bilaterally from the mandibles, puss and food remnants were observed in the avulsed areas. The cat was anesthetized and the avulsed areas were flushed and debrided. A cerclage wire was knotted between the canine and premolar teeth to secure the hemimandibles. The buccal area's mucosal layer was sutured to the ventral palatal areas to relieve suture tension. Meloxicam, pantoprazole, amoxicillin-clavulanic acid, and chlorhexidine were recommended for 7 days, as well as an Elizabethan collar, liquid feeding, and weekly control visits for 2 months. Sutures and the wire were removed on the postoperative 14<sup>th</sup> and 60<sup>th</sup> days. The animal recovered perfectly without any complications after two months. Preoperative interventions and proper surgical planning that takes into account the forces on the tissues and the locations of the separation and dehiscence lead to success in challenging cases.

### INTRODUCTION

It is common problem for dogs and cats to have soft tissue injuries of the maxillofacial region due to trauma.<sup>1-7</sup> The ventral cranium appears to become more involved in traffic accidents, lacerations, and animal bites in cats.<sup>2</sup> Animals with infected wounds in the cranium may become unable or reluctant to eat. The rostral and lateral margins of the oral vestibule are formed by the upper and lower lips. The upper and lower lips on either side of the commissure unite caudally, and the upper and lower lips rostrally at the philtrum.<sup>8</sup> Both the upper and lower lips' labial mucosa have a small median frenulum in the front, while the lower lips have an unnamed strong lateral frenulum distal to the canine teeth. The buccal and labial mucosa of the cheeks and lips continue as alveolar mucosa until merging with the gingiva at the mucogingival junction.<sup>9</sup> The skin, mucosa, lips, cheeks, bones, and teeth are all supplied by a complex circulatory

network that includes the superior and inferior labial arteries, infraorbital arteries, and mental arteries.<sup>7</sup> This abundant vascular supply promotes healing. Avulsions frequently separate at the gingiva or mucogingival junction. Based on the quantity of force and the level at which the force is applied, variations in severity can be evident.<sup>3</sup>

Mandibular fractures account for 11–23% of all feline fractures and are frequently observed in cases in practice.<sup>10</sup> The majority of feline mandibular fractures can be caused by falls from heights, fights, or traffic accidents.<sup>2,5,11</sup> The mandibular symphysis is the joint where the two hemimandibulae merge rostrally to form the mandible.<sup>9</sup> Cerclage wiring, transmandibular pin, and screw applications are some of the options for treating symphysis mandibula separations; however, cerclage wiring remains the most favorable, simple, and efficient procedure.<sup>12</sup>

The purpose of this case report is to describe the successful treatment of mandibular symphysis separation and bilateral lower lip avulsion in a cat. The present case seemed as hopeless to the owner and euthanasia was suggested by veterinarians after two unsuccessful surgeries. However, success has been achieved with consistent planning and routine checkups after many factors have been accounted for.

## CASE DESCRIPTION

A traumatized 4-year-old male tabby weighing 3.2 kg was brought to the Aydın Adnan Menderes University, Faculty of Veterinary Medicine, Research and Practice Animal Hospital. According to the cat's owner, the cat was involved in a car accident one month ago and had two unsuccessful operations at nearby veterinary hospitals. The owner of the cat was advised to euthanasia the cat in the clinics and hospitals visited because the cat's condition was worsening due to dehiscence and separation following two surgeries. The animal was depressed during the examination. Hemimandibles were separated from each other and the lips were bilaterally avulsed from the mandibles (Figure 1a). Puss and food remnants were noticed in the avulsed lip areas. Rectal temperature, heart rate, respiration rate, and capillary refill time were within reference values. Radiographic images were taken to confirm that there were no further fractures. Jugular blood samples were collected for hematological and blood gas analyses. Complete blood count and blood gasses analysis results were within reference values.

Anesthesia was induced with xylazine HCl (1.5 mg/kg, XylazinBio<sup>®</sup> %2, Bioveta PLC, Ivanovice na Hane, Czech Republic) and ketamine HCl (15 mg/kg, Ketamol<sup>®</sup> %10, Richter Pharma Ag, Wels, Austria) i. v. and maintained with 1.5% isoflurane (Isoflurane USP<sup>®</sup>, Adeka Ilac, Istanbul, Turkey) in 100% oxygen as

a standard anesthesia protocol of the hospital. Before surgery, the oral cavity was inspected and teeth were cleaned. Gingivitis, broken left canine teeth, and osteitis were noticed in the examination. The oral cavity and avulsed areas were flushed with Lactated ringer (Laktatli ringer<sup>®</sup>, Polifarma, Tekirdag, Turkey) and 0.1% ethacridine lactate (Rivanol<sup>®</sup>, Merkez Iac, Turkey). The periosteum of the hemimandibles and the mucosal layer of the lips were debrided to promote adhesion between the lips and the mandibles (Figure 1b). The area was prepared aseptically for surgery. Hemimandibles circumferentially encircled in a length of 1.0 mm Kirchner wire for fixation, and the incisor teeth were inspected to make sure they were still in alignment after fixation (Figure 1c). The skin was closed over the wire knot. Horizontal single interrupted sutures were used to suspend the lips from the lower palatal area with 2/0 monofilament polyglactone 25 (Monocryl<sup>®</sup>, Ethicon Inc., Raritan, New Jersey, USA) around avulsed areas. Sutures were placed as close to the mandibular bones as possible. Special attention was given when suturing the subcutaneous tissue of the torn lip to the mylohyoid muscle in the intermandibular space and the submucosal tissue to the fibrocartilaginous tissue of the mandibular symphysis to eliminate the dead space (Figure 1d). Pantoprazole (1 mg/kg, i.v., q.d.), meloxicam (0.05 mg/kg, s.c., q.d.), chlorhexidine (0.12%, p.o., q.i.d.) and amoxicillin-clavulanate (13.75 mg/kg, s.c., q.d.) were prescribed for the first seven days following surgery. Elizabeth collar and liquid feeding were suggested until full recovery. The cat's vital signs were normal during anesthetic recovery, and 4 hours after the procedure, the cat was discharged. The owner was encouraged to regularly visit a local veterinarian clinic and to keep in touch with us for monitored care and controls. Sutures and the cerclage wire were removed postoperative 14<sup>th</sup> and 60<sup>th</sup> days based on the presence of adhesions between the lips and mandible, and the stability observed in the radiographs (Figure 1e-f). After two months, the animal had fully healed without any complications (Figure 1f).

## DISCUSSION

Lip avulsion injuries are consequences of orofacial trauma and are most frequently caused by traffic accidents or animal bites.<sup>7</sup> These avulsions are led by dorsal or caudodorsal forces on the upper lip and nose, whereas lower lip avulsions are caused mainly by caudally or laterally directed forces on the upper lip and nose, whereas lower lip avulsions are caused mainly by caudally or laterally directed forces on the lower lip and chin.<sup>7</sup> Based on the quantity of force and the level at which the force is applied, variations in severity can be changed. Variations in severity can

be identified based on the quantity and intensity of the delivered force.<sup>7</sup>

Second-intention closure is not advised because of the possibility of losing the oral vestibule, long-term bone exposure, and rigidity of the tissues.<sup>13</sup> In preoperative interventions, particular attention should be given to tissues that appear to be undergoing necrosis or ischemia, or that are separating from supporting tissues.<sup>7</sup> Debridement can be applied in a step wise manner to provide tissues time to fully reflect their need for definitive treatment.<sup>7,14</sup> Lip avulsion injuries can be operated with using a variety of suture techniques, some of which involve incorporating tooth crowns or nearby bone.<sup>7</sup> For lower lip avulsion injuries, several tacking sutures can be used to reduce dead space and create proper alignment. These sutures connect the subcutaneous tissue of the torn lip with the mylohyoid muscle in the intermandibular space and the submucosal tissue with the fibrocartilaginous tissue of the mandibular symphysis.<sup>7</sup> Previous studies recommended using absorbable monofilament suture material to repair lip avulsions due to its superior tensile strength, handling qualities, lack of capillarity, and low tissue reaction.<sup>7,15</sup> Non-absorbable suture material was not preferred in the presented case due to the impracticality of routine sedation or anesthesia, which would be required to remove oral sutures in the most of the veterinary patients.<sup>7</sup>

Feline mandibular fractures commonly result from falls, fights, or traffic accidents.<sup>1,5,11</sup> Cerclage wires remain to be the best treatment for the treatment of symphyseal fractures, according to previous researchers discussed tape muzzles, plates, cerclage wires, and external fixators.<sup>7,10,16-19</sup> We preferred to use cerclage wiring due to its' simplicity and current local infection may be spread with further manipulations such as plates or screws. In the present case, the animal exhibited perfect adaptation and recovery with cerclage wiring.

The most common postoperative complication of lip avulsion and symphysis separation were described as dehiscence, wire failure, infection, separation, abscess, and necrosis.<sup>7, 17</sup> Most lip avulsions recover without any complications if the tissues are handled carefully, debrided, and flushed before wound closure. In the lower lip, where gravity and the bilateral lateral labial frenula create a higher ventral pull on the tissues, failure to accomplish tension-free closure would lead to partial or complete dehiscence.<sup>7</sup> In the present case report, intensive care was taken when suturing the avulsed lips, and stress was attempted to be minimized by suspending the lips from the lower palatal area. Also, the cerclage knot was positioned in a ventral position to relax the tension on the suture line.

In the present case report, meticulous pre-, intra-, and post-operative interventions resulted in full recovery without any complications. In the present case where euthanasia was considered, interventions and appropriate surgical planning that considered the forces and complications on the tissues led to healing.



**Figure 1.** Treatment of a bilateral lower lip avulsion and mandible separation in a cat. (a) The visual appearance of the cat. (b) Debridement of the area. (c) Placement of the Kirchner wire. (d) Post-operative image of the cat. (e) Image of the cat one week after the surgery. (f) Image of the cat two months after the surgery.

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