

Multiple jaw fractures and hiatus linguae in a dog*

İbrahim AKIN**, Murat SARIERLER, Nuh KILIÇ, Ali BELGE

Department of Surgery, Faculty of Veterinary Medicine, Adnan Menderes University, 09016 Aydın, Turkey

Received: 27.05.2011 • Accepted: 15.05.2012 • Published Online: 22.01.2013 • Printed: 22.02.2013

Abstract: The case of a 3.5-year-old male Norwegian Elkhound crossbreed dog, seen the day after a traffic accident, is reported. Fractures in the symphysis mandibulae and the right corpus mandibulae were diagnosed. The apex linguae hung down laterally; a 2-cm cut wound was present on the right side. Two more cut wounds (6 cm long on the ventral surface and 3 cm long on the dorsal aspect) of the tongue in a direction oblique to its long axis were connected by a cut through the entire thickness of the tongue. Tooth 103 was broken at the gingival line and 104 under the apex. X-ray examination showed a fracture of the right maxilla between teeth 108 and 109, a fracture of the left maxilla between teeth 205 and 206, another fracture at the symphysis mandibulae, and an oblique fracture of the right corpus mandibulae located between teeth 406 and 407. Following routine protocols, 2 cerclage wires were applied to the right corpus mandibulae fracture and a figure-of-8 cerclage was applied to that on the symphysis mandibulae. The maxilla fracture was fixed with a cerclage between the right and left canine and molar teeth. The dog was healthy at the 6-month follow-up clinical examination.

Key words: Dog, jaw fracture, hiatus linguae

1. Introduction

Mandibular and maxillary fractures represent 3%–6% of all bone fractures in cats and dogs. These fractures can be open or internal, unilateral or bilateral, and simple comminuted or multiple. They are most often open and infected. One or several of the following treatment methods or applications, in any combination, may be preferred for the treatment of these types of fractures: plates and screws, special miniplates, intraoral splints, acrylic splints and external fixators, intramedullary mandibular pins, intraosseous and interfragmentary cerclage, interdental cerclage, dental composite, and muzzle (band, medical plaster, or plastic). The aim of the treatment is to prevent damage to the soft tissue and dental structures, implement ideal anatomic reduction, and conserve correct occlusion and alignment with the rigid fixation provided. Mandibular recovery takes from 3 to 6 weeks (1–3), and its radiologic consolidation is completed in 6–9 weeks (4).

With a maxillary fracture reaching toward the nasal space, extraoral applications can also be indicated beside the intraoral applications. Because of the thin structure of the maxillary bone cortex, miniplate and screw applications should be preferred in this area (1,2). Transversal fractures of the maxilla extend toward the palatine bone. They can be fixed by using thick (0.8–1.0 mm) interfragmentary

cerclage wires. Longitudinal fractures of the palatine bone are minimally dislocated and are amenable to conservative treatment. If such fractures are accompanied by dislocation or other fractures, it is very important that they be stabilized (5).

Symphysis mandibulae fractures are seen frequently in the dog. They are usually observed together with other injuries (canine teeth injuries, soft tissue lesions, ramus mandibulae and caudal mandibular fractures, etc.). These fractures can be stabilized by means of any of several methods, such as stabilization with intraoral cerclage wires and screw applications. Cerclage wires can be taken out after 6–8 weeks in fractures of the symphysis mandibulae (5).

In this case, we considered multiple jaw fractures and hiatus linguae in a 3.5-year-old male Norwegian Elkhound dog, weighing 30 kg, who had been injured in a traffic accident and whom a private veterinarian had recommended for euthanasia.

At first glance, treatment was evaluated as very difficult and euthanasia was proposed by a private clinic. This study shows that suitable and accurate applications, which can easily be implemented clinically by colleagues and private clinics, could give good and precise response. It is thought that this study could contribute to clinical practice.

* Part of this research was presented as a poster at the 12th National Congress of Veterinary Surgery, 19–22 May 2010, Antalya, Turkey.

** Correspondence: ibraak@hotmail.com

2. Case history

A 3.5-year-old Norwegian Elkhound crossbreed male dog weighing 30 kg was brought to our surgery clinic. There was a history of a car accident the day before the consultation; the patient had already been taken to a veterinary surgeon who had suggested euthanasia.

On clinical examination, the patient was able to walk; there was a bloody discharge around the mouth and the lower portion of both front legs. Fractures were present on both maxillae, the symphysis mandibulae, and the right corpus mandibulae. The free fragment between these 2 fractures was dislocated inferiorly. The apex linguae hung down and outwardly, and there was a 2-cm-deep cut injury in the right anterior area of the apex. Hiatus on the corpus linguae was also found, which was in an oblique direction to the long axis of the tongue, with cut wounds of 3 cm on the dorsal aspect and 6 cm on the ventral aspect. The mouth was opened for clinical examination; the dorsal side of the tongue was dry, but fresh bloody discharge was

coming from both nostrils, with more on the right side. The palatine bone was broken toward the middle line on the right, between the teeth numbered 108 and 109, and between 205 and 206. As for the incisive teeth, tooth number 103 was broken at the gingival line, while canine tooth 104 was broken near the tip. The dental cavity of tooth 103 was open (Figure 1).

The X-rays showed a fracture of the symphysis mandibulae, another oblique fracture of the right mandible between premolar teeth 406 and 407, a transversal fracture of the right maxilla between 108 and 109, and a fracture of the left maxilla between teeth 205 and 206. The fracture line on the right maxilla headed toward the nasal conches (Figure 1).

The patient was sedated with an intramuscular injection of 1 mg/kg xylazine HCl (Alfazine®, Egevet, Turkey). and anesthetized with an intramuscular injection of 2 mg/kg ketamine HCl (Alfamine®, Egevet, Turkey), followed by intravenous (IV) ketamine.

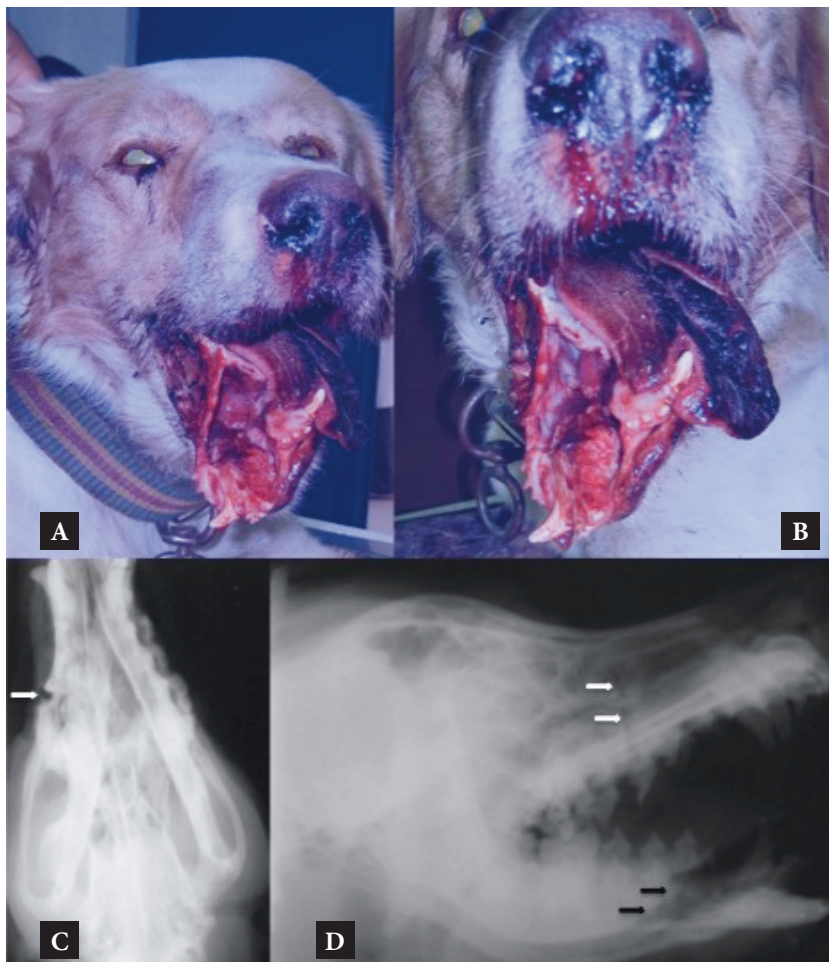


Figure 1. Initial pictures (A, B) and X-rays (C, D) of the patient (maxillary fracture: white arrows; corpus mandibulae fracture: black arrows).

The patient's lingual and oral mucosa and the adjoining areas were cleaned with physiologic serum (Biofleks® 0.9% NaCl, 1000 mL, Biosel, Turkey). Fragment ends of the right corpus mandibulae fracture were lightly curetted and fixed by 2 full cerclages. The symphysis mandibulae cerclage was in a figure-of-8 shape, applied on the mandibular canine teeth and fixed after passing in front of the incisive teeth. The maxillary fracture was fixed with 2 cerclages applied between the right (104–109) and left (204–209) molar and canine teeth of the upper jaw (Figure 2).

The cut of the body of the tongue was curetted and the necrotic tissue was excised. The cut edges on the superior and inferior aspects of the tongue were closed with, respectively, 4 and 7 simple separate 2/0 polyglactin 910 sutures (Vicryl®, Ethicon, UK). The right apical wound

was curetted and sutured, and the other soft tissue injuries of the mouth mucosa were closed with the same simple separate sutures. The number 103 tooth, which exposed an open tooth cavity, was extracted (Figure 2).

After the operation, penicillin–streptomycin (Iemycine®, I.E. Veteriner, Turkey) was injected intramuscularly, and an oral antiseptic (glycerin iodine) was applied and prescribed for the next 10 days. Feeding through an IV catheter for 2 days was recommended, followed by liquid foods, such as soup, and a muzzle for 1 month (6). After the 10th postoperative day, the patient could be fed soft food, and could eat normally after a month. The patient was healthy at the 6-month follow-up examination (Figure 3).

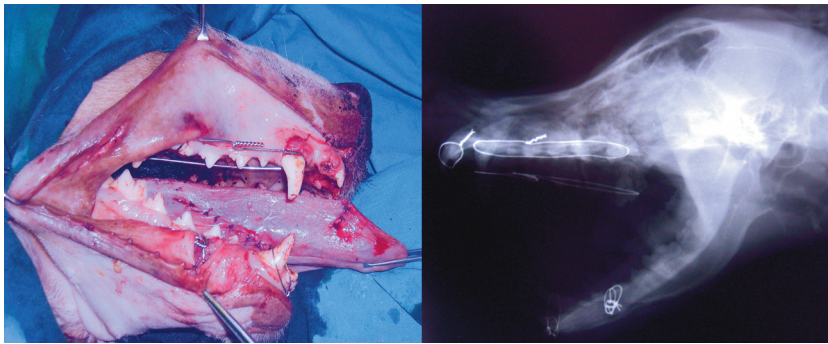


Figure 2. Intraoperative picture and postoperative X-ray.

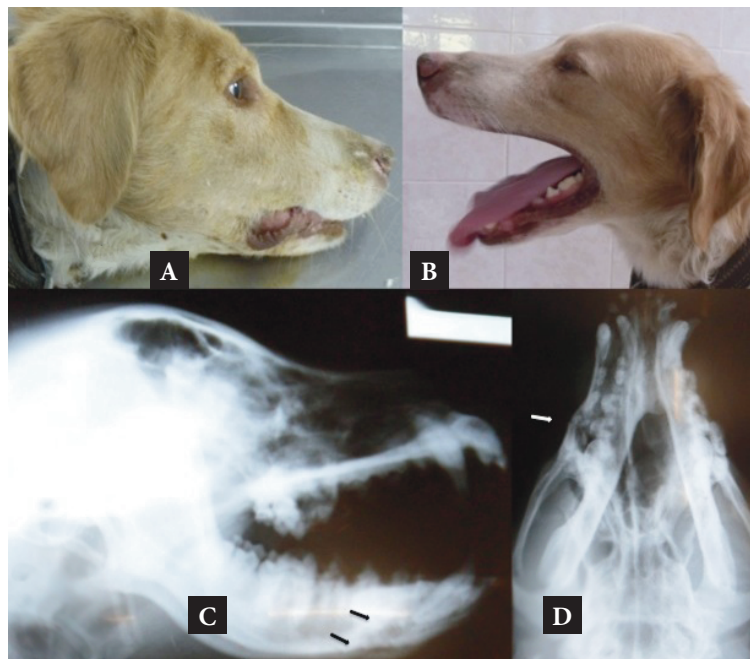


Figure 3. Pictures (A, B) and X-rays (C, D) at the 6-month postoperative follow-up (maxillary fracture: white arrow; corpus mandibulae fracture: black arrows).

3. Results and discussion

Plates and screws, special miniplates, intraoral splints, acrylic splints and external fixators, intramedullary mandibular pins, intraosseous and interfragmentary cerclage, interdental cerclage, dental composite applications, muzzles (adhesive plaster or plastic), or the application of any combination of these methods can be used in mandibular and maxillary fractures (1–3). In the operative treatment of this case, anatomic reductions were carried out using only thick cerclage wires (diameter: 1 mm). Since a rigid fixation was obtained by the end of the operation, it was thought that the occlusion would be conserved, and no additional precautions were considered necessary.

Transversal maxillary fractures may continue toward the palatine bone; thick cerclage wire can be used to stabilize them, and the longitudinal fractures, being minimally dislocated, can be treated conservatively (5). In this case, both the right and the left maxillae were fractured transversally and the palatine bone was also fractured on the right side, from the teeth toward the midline. The presence of abundant discharge from the right nostril led us to conclude the presence of a physical communication between the right maxillary-palatine fracture, the nasal space, and the oral cavity.

Oronasal fistulas may develop during the healing period of maxillary fractures. The use of both intraoral and extraoral operative applications in the repair of maxillary fractures that extend toward the nasal cavity is well established (1,2). In the reported case, the oral cavity was cleansed with normal saline (Biofleks® 0.9% NaCl, 1000 mL, Biosel). Normal saline lavage of the nasal cavity through the intraoral maxillary fracture line and the nostrils was also performed. No oronasal fistula formation was observed.

Mandibular fractures usually develop together with surrounding tissue injuries (5). In this case, too, mandibular, maxillary, and palatine fractures occurred along with lesions of the teeth, tongue, and cheeks. Injuries on the lingua are observed in small animals, and most of them are lacerations caused by licking sharp surfaces. Clean lacerations on the lingua could be sutured with absorbable materials and jagged lacerations should be debrided before suturing (7). In this case, the primary, lingual, and oral mucosae were cleaned by normal saline (Biofleks® 0.9% NaCl, 1000 mL, Biosel). Afterwards, wounds on the lingua were curetted and the necrotic tissues were excised prior to suturing. An absorbable suture material, polyglactin 910 (Vicryl®, Ethicon), and a simple separate suture technique were used for suturing.

It was reported that the healing process in mandibular fractures may take up to 3–6 weeks (1), while cerclage wires used in symphysis mandibulae fractures can be removed after 6–8 weeks (5). In our case, the patient's owner was notified that the cerclage wires should be removed after 6 weeks. Because the owner lived in a different city, the cerclage wires were not removed in our surgery clinic. During this period, however, the patient's recovery status was followed by phone, and information about the removal of the cerclage wires was obtained at the proposed time. The patient underwent a final 6 months of follow-up after the operation and its status appeared unremarkable (Figure 3).

During the operation, the tensile force applied to the cerclage wires adequately joined and stabilized the fractured fragments, and so there was no need for additional fixations. The method applied in this case was evaluated as more practical and economical than other surgical methods and it appeared to be a good example of simple treatment by the appropriate use of cerclage wires and appropriate postoperative care; sharing this case report was therefore deemed useful.

References

1. Verstraete, F.J.M.: Maxillofacial fractures. In: Slatter, D., Ed. *Textbook of Small Animal Surgery*. 3rd edn. W.B. Saunders Co., Philadelphia. 2003; 2190–2207.
2. Yanık, K.: *Ortopedi ve Travmatoloji*. Uludağ University Printing House, Bursa, Turkey. 2004 (in Turkish).
3. Aslanbey, D.: *Veteriner Ortopedi ve Travmatoloji*. Medisan, Ankara, Turkey. 1996; 98–105 (in Turkish).
4. Bilgili, H., Kurum, B.: Treatment of fractures of the mandible and maxilla by mini titanium plate fixation systems in dogs and cats. *Aust. Vet. J.*, 2003; 81(11): 671–673.
5. Turner, M.T., Shires, P.K.: Fractures of the skull, mandible, spine, and ribs. In: Olmstead, M.L., Ed. *Small Animal Orthopedics*. Mosby, St. Louis, MO, USA. 1995; 171–194.
6. Bercier, D.L.: How to use parenteral nutrition in practice. In: 49th Annual Convention of the American Association of Equine Practitioners, New Orleans, Louisiana. American Association of Equine Practitioners, Lexington, KY, USA. 2003. Available at <http://www.ivia.org/proceedings/aaep/2003/bercier/IVIS.pdf>.
7. Harvey, C.E.: Diseases of the oral cavity and pharynx. In: Slatter, D., Ed. *Textbook of Small Animal Surgery*. 3rd edn. W.B. Saunders Co., Philadelphia. 2003; 629.