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CASE STUDY **OPEN ACCESS**

BILATERAL CORONOIDECTOMY ASSOCIATED WITH THE USE OF ACRYLIC RESIN FOR FIXATION OF FRACTURES IN THE MANDIBLE OF A DOG - CASE REPORT

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ABSTRACT

Mandibular fractures are relatively common in dogs, and damage to the temporomandibular joint (TMJ) can cause jaw immobility. A mixed breed dog with a history of escape and trauma of unknown origin and time of occurrence was treated at Animal Care Barueri Veterinary Clinic, in Barueri, São Paulo, due to which he returned home with lesions distributed throughout the body, mainly located in the face. The animal was sent for radiographs that showed a fracture in the mandibular symphysis, left mandibular ramus and bilateral mandibular coronoid processes. We then opted for bilateral coronoidectomy followed by fixation of the symphysis and mandibular ramus fractures. A curvilinear incision was made over each temporomandibular joint followed by exposure of the fragment of the coronoid processes which were then excised. The correction of symphysis and mandibular ramus fractures was performed by applying acrylic resin throughout the lower dental arch. Finally, an esophageal tube was passed for food and medication and external coaptation of the mouth and muzzle was made with Vetrap elastic bandage. The postoperative period was performed with enrofloxacin, tramadol hydrochloride, meloxicam dipyrone and tube fededing. After 60 days of post-surgical evaluation, no complications were observed and good outcome was reached with treatment.

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INTRODUCTION

Mandibular fractures are relatively common in dogs and, in some cases, they can be concomitant with maxillary fractures, which are less frequent than mandibular fractures (Lopes, 2005). Most fractures are the result of vehicular accidents (Legendre, 2005). Among other causes are falls, kicks and firearm injuries (Kitshoff et al., 2013). The anatomical location and conformation of these fractures can play an important role in the selection of treatment methods and can aid fracture prognosis (Glyde and Lidbetter, 2003). The most indicated means of fixation for mandibular fractures rostral to the first molar and in the separation of the mental symphysis in dogs include dental acrylics, which allow closed reduction while preserving the periosteal insertions and bone blood supply (Legendre, 2005). Damage to the temporomandibular joint (TMJ) can cause jaw immobility and difficulty in eating, causing weight loss and general malaise. The coronoidectomy technique has been described as a means of treatment for dysplasia of the temporomandibular joint in dogs andcats (Nutt et al., 2018), having been reported as a treatment of fracture in the mandibular coronoid process only in horses (Magri et al., 2021). This paper aims to report a case in which dental acrylic resin was used for fracture of the mandible ramus and mental symphysis together with the technique of bilateral coronoidectomy for correction of fracture of both mandibular coronoid processes in a dog, associated with adequate postoperative management, obtaining complete resolution without further complications.

CASE REPORT

A 5-year-old mixed breed, male, 13 Kg, male dog with a history of escape and trauma of unknown origin and time of occurrence was treated at Animal Care Barueri Veterinary Clinic, in Barueri, São Paulo, due to which he returned. home with lesions distributed throughout the body, located mainly on the face. On clinical examination, he was active, with no ocular, neurological, thoracic or abdominal alterations, and it was possible to identify only rostral mandibular and temporomandibular joint instability (Figure 1).

Figure 1. View of rostral mandibular instability

The animal was sent for radiography and for that was anesthetized with 4mg/kg of propofol (Cristália, Itapira, SP, Brazil), IV. The results showed a fracture in the mandibular symphysis, left mandibular ramus and in bilateral mandibular coronoid processes (Figure 2). We then opted for bilateral coronoidectomy followed by fixation of the fractures of the symphysis and mandibular ramus. Pre-anesthetic medication was administered with 1mg/kg of methadone (Cristália, Itapira, SP, Brazil) IV, associated with 0.03mg/kg of medetomidine (Virbac do Brasil, São Paulo, SP, Brazil) IV. A wide shaving was performed followed by antisepsis of the skin with degerming chlorhexidine and alcoholic chlorhexidine, and before the beginning of the surgery, 2% iodine. During the trans-surgical period, continuous intravenous infusion was performed with 3.5µg/kg of fentanyl (Cristália, Itapira, SP, Brazil), and 0.35mL/kg of ketamine (Syntec, Barueri, SP, Brazil) and maintenance with isoflurane. It was also administered 5mg/kg of enrofloxacin 10% (Chemitec, São Paulo, SP, Brazil), SC and 0.1mg/kg of meloxicam (Ourofino Animal Health, Cravinhos, SP, Brazil), IV.

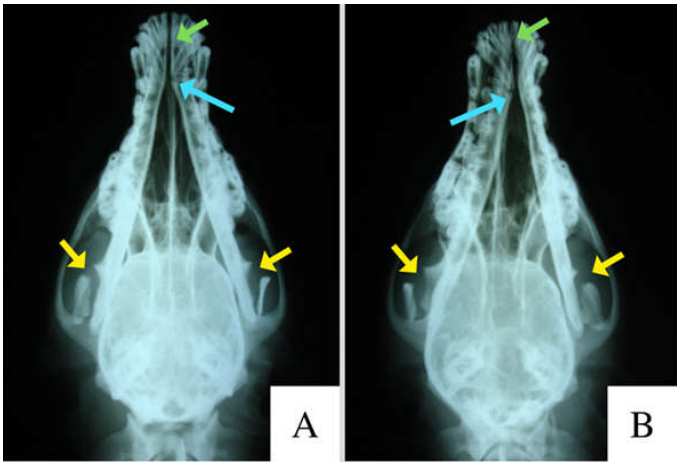

Figure 2. Skull ventrodorsal (A) and dorsoventral (B) radiographs showing fractures of the right and left mandibular coronoid processes (yellow arrows on A and B), mandibular symphysis (green arrows on A and B) and left mandibular ramus (blue arrows on A and B).

The procedure was performed starting with bilateral coronoidectomy with the animal in lateral decubitus, with the side to be operated facing upwards. A curvilinear incision was made over the left temporomandibular joint, followed by dissection of the subcutaneous tissue, dissection of the adjacent mandibular periosteum and exposure of the fracture, enabling the visualization of the fragment of the left coronoid process (Figure 3), which was then excised. Myorrhaphy was then performed with 2-0 nylon thread (Technofio, Cajamar, SP, Brazil) in Sultan pattern and demorrhaphy with the same thread in a separate simple pattern. After synthesis, we proceeded with coronoidectomy on the right side.

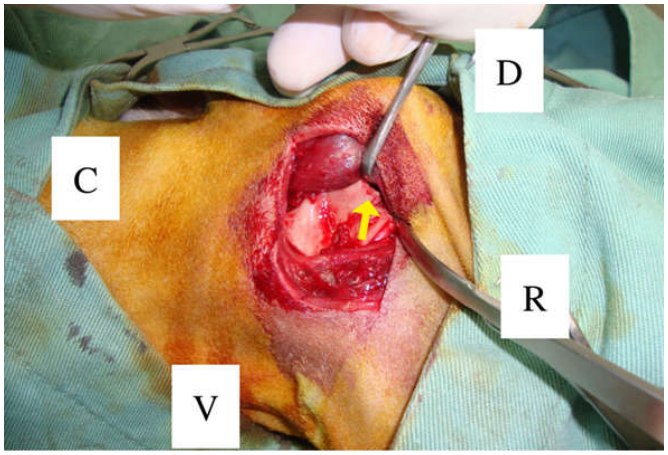

Figure 3. Exposure of the fractured right mandibular coronoid process (yellow arrow). R = rostral, C = caudal, D = dorsal, V = ventral

After removing both coronoid processes, antisepsis of the oral cavity was performed with 2% degerming chlorhexidine (Riohex, IndústriaFarmacêuticaRioquímica, São José do Rio Preto, SP, Brazil) and saline solution of 0.9% sodium chloride, followed by application of acrylic resin throughout the lower dental arch. To minimize the temperature effects produced by the exothermic drying reaction of the resin, a 0.9% saline solution of sodium chloride was used during its application. After the ramus and symphysis of the mandible were realigned, external coaptation of the mouth and muzzle was performed with Vetrap elastic bandage (3M from Brazil, Sumaré, SP, Brazil), to reduce movement and provide mandibular stability. Finally, an esophageal probe was placed for enteral nutrition for 15 days (Figure 4).

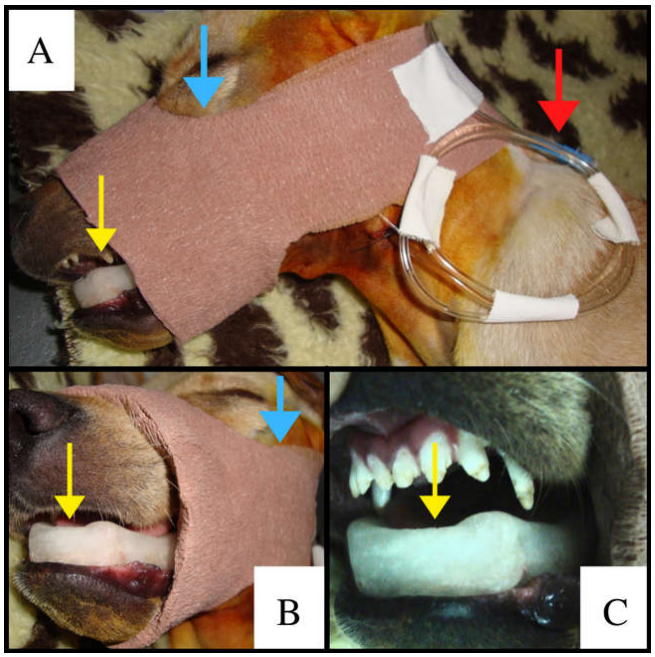

Figure 4. Postoperative appearance with acrylic resin (yellow arrow on A, B and C), Vetrap™ external coaptation (blue arrow on A and B) and esophageal tube (red arrow on A)

The therapeutic approach in the postoperative period was with the use of 5mg/kg of enrofloxacin, once a day, for 10 days (LabgardSaúde Animal, Araçoiaba da Serra, SP, Brazil), 4mg/kg of tramadol hydrochloride, three times a day, for 7 days (União Química Farmacêutica Nacional, Embu-Guaçu, SP, Brazil), 25mg/kg of Dipyrone Monohydrate 500 mg, three times a day, for 7 days (Novamed Pharmaceutical Products Manufacturing, Manaus, AM, Brazil) and 0.2mg/kg of meloxicam , once a day, for 7 days (Vetnil, Louveira, SP, Brazil). All medications were macerated, diluted in mineral water and administered via esophageal tube. In addition, the elastic bandage was removed three times a week to clean the oral cavity and the region where the acrylic resin was installed, with 0.12% Chlorhexidine Digluconate (Periovet Spray, Vetnil, Louveira, SP, Brazil), gauze and cotton swabs. The removal of the elastic bandage and the esophageal tube took place after 15 days and only pasty food was offered until the complete recovery of the animal. Finally, the removal of acrylic resin occurred 60 days after surgery (Figure 5).

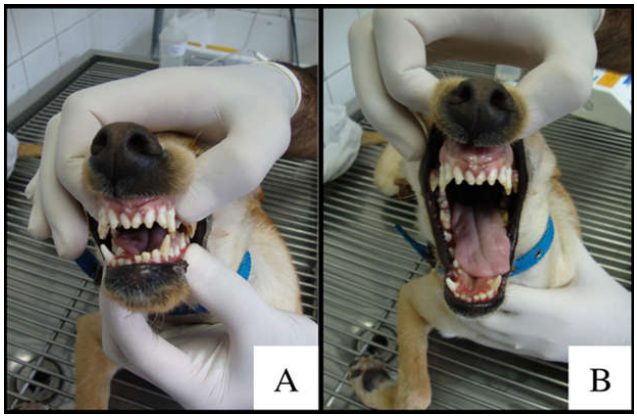

Figure 5. Occlusion (A) and opening (B) of the mouth after removal of the acrylic 60 days after the operation

DISCUSSION

Mandibular fractures are relatively common in dogs, representing between 1.5 to 6.0% of all fractures diagnosed in these animals, being mostly caused by trauma (Gioso, 2003), as described in this case. In a retrospective study of 121 mandible fractures, no fracture occurred in the coronoid process (0%) and 21.6% in the mandibular symphysis (LOPES et al., 2005). In human medicine, fractures of the coronoid process are rare and represent only 0.6% to 4.7% of all facial fractures, because both in humans and animals, they are sheltered from external forces by the structures involved in the temporomandibular and zygomatic-malar joint and musculature (Kitshoff et al., 2013). In veterinary medicine, reports are even rarer.
The treatment of fractures in this structure is little discussed, mainly because of the low number of patients, but a proper approach is essential because, due to its location, it can lead to problems in oral occlusion due to poorly consolidated fracture or pain due to friction between the fragment and the zygomatic arch. In a report of three cases in horses, coronoidectomy was performed to resolve a case of oral malocclusion and mandibular deviation due to a previously untreated fracture of the coronoid process, which demonstrates the importance of an appropriate intervention in these cases (MAGRI et al., 2020).

In small animals, the coronoidectomy technique is related to the treatment of open-mouth jaw locking, which can originate from a dislocation or dysplasia in the temporomandibular joint, and ankylosis of the joint, both pathologies occurring atraumatically (Aghashni et al., 2020). To our knowledge, this is the first report of coronoidectomy for the treatment of a traumatic fracture of the coronoid process in a dog associated with other mandibular fractures treatments. In symphysis mentalis fractures, it is necessary to maintain the occlusal alignment, providing adequate stability for the bone union (Legendre, 2005). The application of self-curing acrylic resin gave this stability to the fracture site. This was the method recommended as it is an effective, direct and minimally invasive technique. Complications are minimal when applying acrylic, since open surgical techniques are not performed (Legendre, 2005). The placement of a external coaptation using a muzzle in the mandible and maxilla together provides mediolateral stability to the mandible and stabilization of the vertical plane, by limiting movement, in addition, by restricting movement, it can be a supporting tool in other techniques, as observed in this case.

There is a need for periodic cleaning, a conduct followed in this case, where cleaning and regular replacement of the elastic bandage was implemented. The use of an esophageal tube allowed for an adequate nutritional management of the patient. Enteral nutritional support using an esophageal tube is a method that is well tolerated by patients, practical, safe, economical and physiological, with minimal morbidity (Breheny et al., 2019). The main complications in jaw fractures in dogs are edema and swelling of the region, infection mainly due to direct contact with the microbiota of the oral cavity and the external environment, suture dehiscence, periodontitis and other functional aspects related to chewing and swallowing (Hayashi et al., 2019). The follow-up of this animal was carried out for 60 days, with no postoperative complications being identified.

CONCLUSION

Given the above, the feasibility of using thecoronoidectomy technique to resolve fracturesin the coronoid process and the use of self-curing acrylic resin in the treatment of fractures in the mandibular symphysis in dogs can be assured with minimal or no problems associated, reaching a good estability of the mouth after a period of time.

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