

LABIAL LOCKING WITH BUTTONS FOR MANAGING MANDIBULAR FRACTURES IN CATS

UTILIZAÇÃO DO BLOQUEIO LABIAL COM BOTÕES NA CORREÇÃO DAS FRATURAS MANDIBULARES EM GATOS

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SUMMARY

Fractures of the mandible are relatively common in cats. Mandibular symphysis separation represents the most frequent injury reported. Several procedures have been described for managing this condition. The aim of this study was to evaluate the labial locking for the adjuvant treatment of the mandibular fracture and symphysis detachment in cats. Five cats with mandibular fracture and detachment of the symphysis were evaluated. They were submitted to a cerclage wire technique at the symphysis, labial locking with buttons and enteral feeding. Four cats showed mandibular healing after 30 days. One animal could not be submitted to enteral feeding and a hemimandibulectomy was performed after 15 days postoperatively. The labial locking with buttons is simple, little invasive and easily performed.

KEY-WORDS: Feline. Mandible. Mandibular symphysis separation. Surgical treatment.

RESUMO

As fraturas de mandíbula ocorrem com relativa frequência em gatos, sendo as separações da sínfise mentoniana a apresentação mais comum. Muitos procedimentos são propostos para a correção destas fraturas, cabendo ao cirurgião a escolha pelo melhor método. O presente estudo objetivou avaliar uma técnica não invasiva baseada na aplicação de um bloqueio labial com botões para tratamento das fraturas do corpo da mandíbula associadas à disjunção da sínfise mentoniana em gatos. Foram avaliados 5 animais com fraturas de mandíbula e disjunção de sínfise mentoniana, nos quais foram realizadas osteossíntese da sínfise com cerclagem de fio de aço e oclusão dentária com a técnica de bloqueio labial com botões, associado ao uso de sonda esofágica para alimentação enteral. Quatro animais apresentaram consolidação óssea após 30 dias. Em um deles foi necessário a realização de hemimandibulectomia após 15 dias da cirurgia, devido a impossibilidade de alimentação via sonda esofágica. O emprego da técnica de bloqueio labial com botões mostrou-se eficaz, pouco invasiva e simples nos casos avaliados.

PALAVRAS-CHAVE: Felinos. Mandíbula. Separação da sínfise mentoniana. Tratamento cirúrgico.

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INTRODUCTION

Mandible fractures are common in cats and account for 15-23% of all fractures reported for cats (ADAMANTOS & GAROSI, 2011). Disjunctions of the symphysis are the most common traumatic injuries of the skull in domestic cats representing 73% of the cases (LEGENDRE, 2005; PIERMATTEI *et al.*, 2009). Often these fractures cause anatomical changes in basic functions such as mastication, phonation and swallowing (GOMES, 2007).

Surgical repair of mandibular fractures is essential to restore function and cosmetic appearance (JOHNSON *et al.*, 2005). Surgical repair of oral fractures is a challenge for veterinarians because different forces act simultaneously in opposite directions (PEREIRA *et al.*, 2008). The treatment of choice should aim at reestablishing perfect functional dental occlusion (RAHAL *et al.*, 1998) as early as possible (PEREIRA *et al.*, 2008).

The methods that may be used to fix fractures of the symphysis are the interdental wire, cerclage wire, transfixing pin and screw compression. The choice depends on the presence or absence of incisor tooth, stability of the reduced fragments and the presence of infection and/or osteoporosis (PIERMATTEI *et al.*, 2009). Cunha *et al.* (2010) reported that the use of nylon clamps as implant is an effective alternative for osteosynthesis of the feline mandibular symphysis; however, when the clamps stay in place for too long they can cause complications such as the occurrence of fistulas.

Canine mandibular fractures, which are minimally deviated and have proper dental occlusion, can be treated with the application of a splint bandage (JOHNSON, 2008). In contrast, this conservative technique cannot be applied in cats due to the characteristic short nostrils of this species (JOHNSON, 2008). The alternative treatments cited are acrylic adhesion of the maxillary and mandibular canine teeth (HARARI, 1999), interarcade wiring (VERSTRAETE, 2007), in addition to lip locking with buttons (KÖSTLIN, 2007).

The aim of this paper is to describe the technique of labial locking with buttons as an alternative to stabilize mandibular fractures in cats and report the results observed.

MATERIAL AND METHODS

The cases described are five cats that were seen due to disjunction of the symphysis associated with fractures of other regions of the jaw and/or dislocation of the temporomandibular joint (Table 1).

The animals underwent thorough clinical examination in order to check for possible injury to other organs. The cats underwent complete blood count (CBC) tests and an X-ray was performed to determine mandible bone changes.

Subsequently, the cats were taken to the

operating room to perform the labial locking with buttons. All animals were premedicated, intramuscularly, with meperidine (4 mg/kg) and chlorpromazine (0.4 mg/kg), anesthetized with propofol (2 to 4 mg/kg) intravenously, followed by tracheal intubation and maintenance with inhalational anesthesia with isoflurane, provided by an open circuit.

The cats were positioned on the operating table in lateral decubitus with elevated neck. Only needle penetration sites were shaved to keep it to a minimum, that is, the right and left sides of nose wings and chin.

After antiseptics of the shaved area with a solution of 2% chlorhexidine and alcohol, a 40x12 needle was used to introduce the steel wire through the mandibular mucosa, immediately caudal to the lower canine teeth, passing ventrally to the hemi-mandibles and bringing up to the opposite side. The mandibular rami were maintained opposite, manually, following the tightening, twisting and cutting of the cerclage wire according to the technique described by Piermattei *et al.* (2009).

The lip locking with buttons technique was used to maintain the anatomical position of the hemi-mandibles. After dental occlusion, a resistant non-absorbable nylon wire (number 0) was initially passed either by the right or left side, approximately 5mm away from the nasal wing/ala, from the inside to the outside, near the jaw through the upper lip, through one of the button holes. Through the lower lip, the wire was passed from the inside out, near the symphysis and near the contralateral side, by skin traction, thus fixing a second button. Subsequently, a similar suture was performed on the opposite side, positioning the third button, so that the wire ends are seen to the right and left nose wings, forming a "V" shape. After tying the wire ends in a knot, cyanoacrylate adhesive (Superglue®) was applied to hold the knots to the respective buttons for better fixation (Figure 1).

The cats were monitored postoperatively. Only liquid feeding was allowed by gavage and careful hygiene of the buttons and wires was performed.

Immediate postoperative radiographs, as well as after 15 and 30 days (Figure 2) were obtained for the purpose of evaluating bone alignment and fracture healing.

After the onset of bone consolidation (three to four weeks), the suture was withdrawn in order to end the labial locking and the steel wire of the symphysis was removed.

RESULTS AND DISCUSSION

In the present study, the mandibular fracture suspected during clinical examination due to the presence of palpable instability was confirmed by dorsal-ventral and lateral X-rays. Piermattei *et al.* (2009) and Venturini (2006) cite the disjunction of the symphysis and mandibular body fractures, observed in the reported cases, as the most frequent in cats.

Table 1 - Description of the types of mandibular fractures and dislocations observed in the animals of the present study.

Animal	Type of fracture
1	Fracture in the rostral portion of the right mandibular body and disjunction of the symphysis
2	Alteration of articular temporomandibular joint, areas of bone loss in the left mandibular body and disjunction of the symphysis
3	Fracture in the caudal third of the left mandibular body and disjunction of the symphysis
4	Fracture in the rostral portion of the right mandibular body, disjunction of the symphysis and right temporomandibular dislocation
5	Subluxation of left temporomandibular joint and disjunction of the symphysis

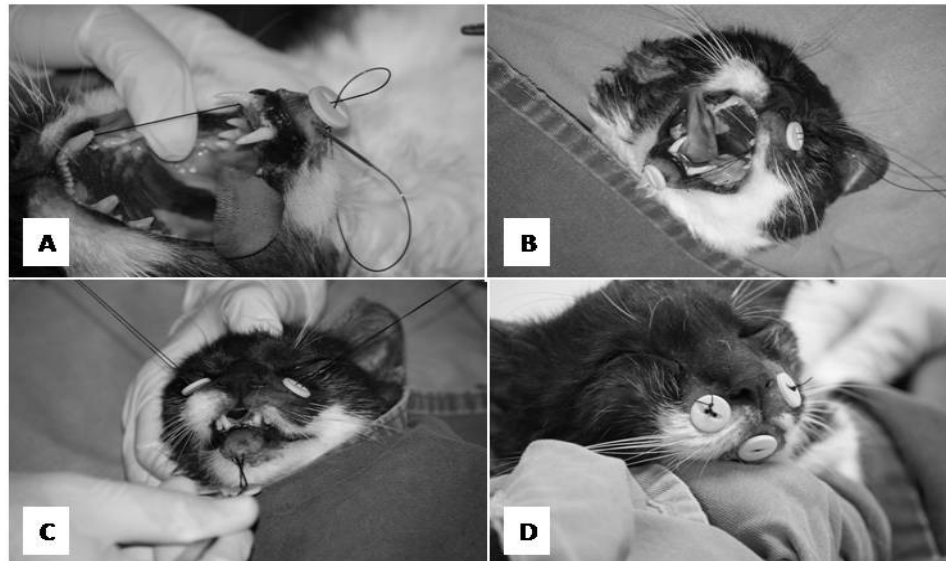


Figure 1 - Sequence of images showing the technique of labial locking with buttons. A: passing of nylon wire through the chin; B: Buttons fixed with the nylon wire, in the shape of a "V"; C: buttons fixed with the nylon wire forming a "V"; D: final result the labial locking with buttons.

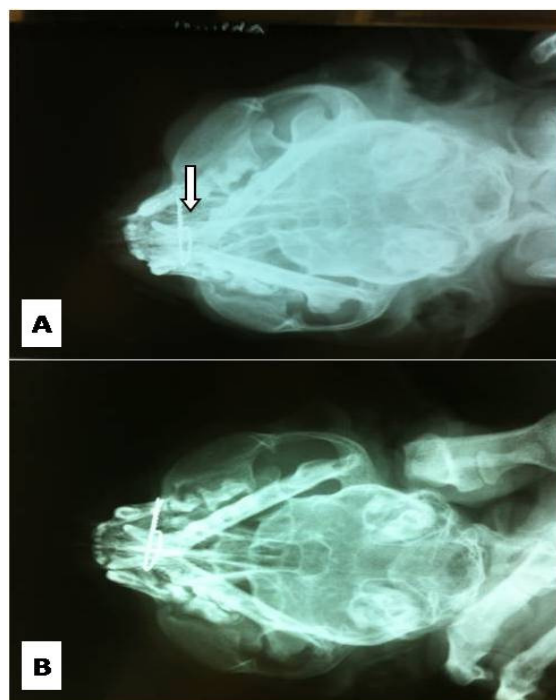


Figure 2 - Postoperative X-rays of the cat in case 2. A: Immediately post-operative showing good fracture alignment in the mandibular body caudal to the left canine tooth (arrow). B: After 30 days, the fracture healing can be seen.

The main purpose of repairing these fractures is to prevent damage to soft tissues and dental structures, in addition to providing adequate anatomical reduction (BILGILI & KURUM, 2003).

As demonstrated in the study of Vilaça (2008), several techniques for repairing mandibular fractures have been proposed. The choice of a non-invasive treatment to correct this type of fracture is justified since most mandible fractures may be treated simply by anatomical realignment of bone fragments with subsequent restoration of occlusion (JOHNSON *et al.* 2005), and the intramedullary pins method is not appropriate, while the plate with screws should be used with caution due to the possibility of injury to dental roots (ADAMANTOS & GAROSI, 2011).

One option for a non-invasive treatment of these fractures is using a tape muzzle (HARARI, 1999), but this technique can bring potential complications, besides being impractical in cats (JOHNSON, 2008). It is not, therefore, the method of choice for the treatment of cats.

Fractures in the region of the symphysis can be corrected using the canine teeth as support for stabilization (ADAMANTOS & GAROSI, 2011). Based on that, disjunction of the symphysis was fixed according to the technique recommended by Piermattei *et al.* (2009), which consists of repairing using steel cerclage wire to allow proper bone alignment.

Bearing in mind that when treating a mandible fracture, dental occlusion comes before fracture reduction (ADAMANTOS & GAROSI, 2011), and that fixation needs to be neither too rigid nor prolonged (VERSTRAETE, 2007), the labial locking technique was performed as described by Köstlin (2007), in order to maintain dental occlusion after alignment for as long as needed until the onset of bone union. The technique proved to be an excellent option for non-invasive correction of mandibular fractures, allowing proper alignment of the occlusal fracture line, in addition to functioning as a restraint to support the steel wire correction of the disjunction of the symphysis.

This less invasive technique prevented the occurrence of common complications associated with other fixation techniques of mandibular fractures such as gingivitis, accumulation of food between teeth and implants, injury to tooth roots and neurovascular structures, development of endodontic disease in addition to breaking and loosening of the implant (BILGILI & KURUM, 2003; LEGENDRE, 2005; GOMES, 2007; HARASEN, 2008; VILAÇA, 2008).

At the end of the surgical procedure, the resulting blockage has minimal shifting space, thus allowing the patient to move the tongue only for fluid intake. However, since the rigid blocking was necessary in this study, the animals were tube-fed, post-operatively.

After surgical treatment, many animals are functionally cured within two to three weeks (HARASEN, 2008). The animals were clinically cured approximately 30 days after surgery, ranging from 17 to 33 days, at which time the buttons and tube-feeding were removed with gradual return to normal eating.

In general, consolidation is quickly (three to five weeks) in the rostral portion of the mandible, but slower (four to seventeen weeks) in the caudal region. The exceptions are fractures in infected sites and symphysis in old animals (PIERMATTEI *et al.*, 2009).

The complication rate for the treatment of mandibular fractures is high, greater than 34% (HARASEN, 2008). Only one animal (case 1) had complications, which was caused by the inability of the animal to remain with gavage feeding. It had recurrent episodes of emesis, requiring faster healing of the fracture which was obtained by hemimandibulectomy performed 18 days after the first surgical intervention.

The basic principles for the treatment of mandibular fractures were followed by combining the techniques of labial locking with buttons and cerclage wire, with full recovery of animals.

The labial locking with buttons is a current and underutilized technique, so there are still few studies reporting results, advantages, disadvantages and complications. It is, however, a non-invasive option of easy execution to repair mandibular fractures.

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