Modified Labial Button Technique for Maintaining Occlusion After Caudal Mandibular Fracture/Temporomandibular Joint Luxation in the Cat

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Maxillofacial trauma in cats often results in mandibular symphyseal separation in addition to injuries of the caudal mandible and/or temporomandibular joint (TMJ). Caudal mandibular and TMJ injuries are difficult to access and stabilize using direct fixation techniques, thus indirect fixation is commonly employed. The immediate goals of fixation include stabilization for return to normal occlusion and function with the long-term objective of bony union. Indirect fixation techniques commonly used for stabilization of caudal mandibular and temporomandibular joint fracture/luxation include maxillomandibular fixation (MMF) with acrylic composite, interarcade wiring, tape muzzles, and the bignathic encircling and retaining device (BEARD) technique. This article introduces a modification of the previously described “labial reverse suture through buttons” technique used by Koestlin et al and the “labial locking with buttons” technique by Rocha et al. In cases with minimally displaced subcondylar and pericondylar fractures without joint involvement, the labial button technique can provide sufficient stabilization for healing. Advantages of the modified labial button technique include ease of application, noninvasive nature, and use of readily available materials. The construct can remain in place for a variable amount of time, depending on its intended purpose. It serves as an alternative to the tape muzzle, which is rarely tolerated by cats. This technique can be easily used in conjunction with other maxillomandibular repairs, such as cerclage wire fixation of mandibular symphyseal separation. The purpose of this article is to demonstrate a modified labial button technique for maintaining occlusion of feline caudal mandibular fractures/TMJ luxations in a step-by-step fashion.

Keywords
button, mandibular fracture, temporomandibular joint luxation, cat, maxillofacial trauma

Maxillofacial fractures in cats commonly result in mandibular symphyseal separation as well as injuries involving the caudal mandible and/or temporomandibular joint (TMJ).¹ Due to the unique anatomy and very thin bone, caudal injuries present inherent challenges for stabilization. Fractures in this region can be difficult to stabilize with direct fixation methods, so indirect fixation is often employed. The goals of fracture fixation, whether direct or indirect, include stabilization that results in a bony union and reestablishes normal occlusion to allow return to normal function.²

Commonly utilized indirect fixation techniques for stabilization of caudal mandibular and temporomandibular joint fracture/luxation include maxillomandibular fixation with acrylic composite (MMF), interarcade wiring, tape muzzles, and the bignathic encircling and retaining device (BEARD) technique.¹³⁴ The choice of technique depends on a number of factors including, but not limited to, the extent of injuries, available equipment, clinician’s skill level, financial resources of the owner, and patient factors such as the presence of canine teeth, age, conformation, and anesthetic risk.

Alternative indirect stabilization techniques have been described.⁵⁶ In the study by Koestlin et al, follow-up was obtained in 72 cats with caudal mandibular fractures and TMJ luxations treated using the “labial reverse suture through buttons” technique. Upon reevaluation, 94% of the treated patients were free of discomfort, and 68% of the fractures and luxations

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showed radiographic healing.\textsuperscript{5,7} Rocha et al found the “labial locking with buttons” method to be successful in achieving proper occlusion, with clinical healing occurring between 17 and 33 days.\textsuperscript{6} Accordingly, in cases with minimally displaced subcondylar and pericondylar fractures without joint involvement, the labial button technique can provide sufficient stabilization for healing.\textsuperscript{8}

In the traditional version of this technique described by Koesktlin and Rocha, 2 lines of suture are used, each connecting a ventral button to the left or right lip with knots tied over each labial button.\textsuperscript{5,6} The method described here is a modification, using a single line of suture for all three buttons with only one knot secured on the ventral chin. In the authors’ opinion, this modification allows for improved accuracy in achieving appropriate occlusion via simultaneous application of tension to both sides of the construct when securing the ventral knot (see Figures 1-11).

Advantages of the modified labial button technique include ease of application, noninvasive nature, and use of readily available materials. It is an alternative to the tape muzzle which can be difficult to fit and is poorly tolerated by cats. The labial button technique is preferred over MMF in immature patients, as it avoids rigid fixation that can interfere with normal development and growth.\textsuperscript{1} The construct can remain in place for a variable of amount of time, depending on its intended purpose. It can serve as a short-term, first-aid measure to prevent further trauma prior to planned surgery, remain in place for 7 to 14 days after TMJ luxation reduction, or be maintained for 5 weeks for stabilization of more complicated fractures.\textsuperscript{1,6,8} This technique can also be easily used in conjunction with other maxillomandibular repairs, such as cerclage wire fixation of mandibular symphyseal separation.\textsuperscript{7}

Postoperative management includes multimodal analgesia, nutritional support, and possibly antibiotic therapy in cases of open fractures and significant soft tissue trauma. Placement of an esophagostomy feeding tube is recommended to ensure proper nutrition during the immediate postoperative period. An Elizabethan collar will be necessary to prevent self-trauma to the fixation device and/or esophagostomy site.

The objective of this article is to demonstrate a modified labial button technique for maintaining occlusion of feline caudal mandibular fractures/TMJ luxations in a step-by-step pictorial.
Figure 4. Photograph showing suture passing through the ipsilateral upper lip from within the oral cavity starting just apical to the mucogingival line and caudal to the left maxillary canine tooth (A). The needle is directed dorsally through the soft tissue and exits the skin 5 mm lateral to the left alar fold (B). A second button is held to the skin as the needle threads the medial button hole (C).

Figure 5. The needle is redirected through the unused button hole, penetrating the skin and soft tissue of the lip (A) while directing the needle ventrally. The suture enters the oral cavity just 2 mm from the initial suture entry point, just apical to the mucogingival line (B).

Figure 6. The needle is inserted through the lower lip on the ipsilateral side starting in the oral cavity rostral to the mandibular labial frenulum, 2 mm away from the initial suture site (A). The needle is directed in a ventromedial direction through the soft tissue and exits the skin on the ventral chin through the ipsilateral button hole (B). Half the length of suture is pulled through the button hole in order to have enough working length for the other half of the procedure (C).
Figure 7. The needle is guided through the unused/contralateral button hole on the chin (A), and the same procedure is repeated on the contralateral side of the mandible and maxilla, first entering the oral cavity just rostral to the right mandibular frenulum (B). The suture is passed through the right upper lip (C), exiting the skin 5 mm lateral to the left alar fold (D), threading the needle through the third button while securing it to the skin (E). The suture is redirected through the unused button hole (F), through the skin and into the oral cavity (G), then through the mucosa rostral to the right mandibular frenulum (H), and out the button hole on the right side of the chin (I).
After passing the needle through the skin of the ventral chin, any necessary adjustments can be made to ensure proper occlusion (A). The authors use the endotracheal tube diameter as a guide for how much of a mouth opening to maintain, as it will provide approximately 5 mm of space between the maxillary and the mandibular arcades. This amount of space allows tongue movement for drinking and lapping up a slurry of liquefied food. However, endotracheal intubation using a pharyngotomy or transmylohyoid technique will allow more accurate occlusion evaluation without extubation. It is important that the suture is not overly tightened, compressing the buttons too tightly to the skin. After the degree of opening has been established, the end of suture clamped by the hemostat is tied to the leading end of suture over the ventral button using an initial surgeon’s knot, then excess suture is cut away (B).

Occlusion prior to extubation of a cadaver (A) and of a patient (B).

Photograph of a cadaver after extubation showing the mouth in proper occlusion with a small space between the upper and the lower incisor teeth.
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