FACIAL RECONSTRUCTIVE SURGERY: LABIAL AND BUCCAL DEFECTS

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Introduction

There are a variety of defects of the lips, cheek and planum nasale encountered in the dog and cat. Defects resulting from trauma, wide tumor resection and congenital disorders are particularly challenging to the veterinarian faced with restoration of function of the oral cavity and achieving satisfactory cosmetic results for the concerned owner.

Dogs are graced with large upper labial and buccal surfaces which facilitate closure of moderate sized defects. Cats, with their more refined facial conformation, lack the fullness and elasticity of the canine lips and cheeks. While dogs generally present with the greater number of wounds and oral neoplasms of the lips and cheeks, the following techniques employed by the author are equally applicable to the dog and cat. Selection of the most appropriate method of closure is based on the size and location of the defect, the donor tissues available for closure, and the inherent tissue elasticity unique to the species, breed and individual patient.

Restoration of function is the primary goal of the veterinarian. Although our patients have no interest in the cosmetic outcome, most owners do have a variable degree of concern about their pet’s appearance especially as it pertains to the face. It has been my experience that most clients readily accept cosmetic imperfections when the potential outcome is discussed prior to surgery. Fortunately most cases involving wide tumor resection and single stage reconstruction result in very acceptable cosmetic results.

The large adjacent donor areas of skin and mucosa facilitate wound closure without resorting to multi-staged reconstructive procedures utilized in human plastic surgery. Dense fur growth helps to cover scars and mask deficits. The elongated muzzle of the dog and cat essentially divides the facial area into "halves" and makes any facial asymmetry less obvious to the human eye, unlike the flatter, completely exposed, hairless human face in comparison.

Anatomic Considerations

The lips (labia oris) form the anterior and most of the lateral boundaries of the vestibule. The upper and lower lips (labia maxillaria et mandibularia) join at acute angles caudally forming the commissures of the lips (commissurae labiorum). A deep straight cleft, the philtrum, marks the union of the halves of the upper lips rostrally. The mucosal surface of the upper lip has a larger surface area compared to the lower lip which tapers in width anteriorly. The lower lip has a firm attachment to the gum between the lower canine and first premolar (interdental space). The interdental attachment maintains the position of the lower lip and prevents it from sagging.

The lips and cheek have two epithelial surfaces: the outer skin and inner mucosa. Between these two surfaces are two thin muscles, the outer orbicularis oris muscle and the inner buccinator muscle. Other
facial muscles insert at this level, including the levator nasolabialis, caninus, levator labii maxillaris, platysma, zygomaticus and sphincter colli profundus - pars palpebralis. The cheeks (buccae) which form the lateral walls of the vestibular cavity are morphologically similar to the lips with which they are continuous.

A rich arterial and venous network supplies the skin, mucosa, muscle and fibroelastic tissue of the lips and cheeks. The facial artery divides to form the superior labial artery, inferior labial artery and the angularis oris artery. The infraorbital artery contributes circulation to the upper lip and cheek whereas the posterior, middle, and anterior metal arteries supplement circulation to the anterior aspect of the lower lip. Because of this tremendous collateral circulation, the flap techniques developed for labial and buccal defects have a high probability of survival when care is taken to incorporate one or two branches of these vessels into the flap base.

The partoid duct opens into the buccal cavity opposite the caudal margin of the fourth upper premolar or shearing tooth. On occasion it is necessary to excise this area during tumor removal. Although the duct may be ligated, it easily can be preserved by relating the duct through a small mucosal incision, spatulating its end and securing to its new position with 4-0 or 5-0 absorbable sutures using a simple interrupted pattern.

**Surgical Conditions**

**Avulsion Injuries**

Avulsion wounds of the lips most commonly occur along the gingival border of the incisors. From the author's experience, lower labial avulsions are more common in cats. They are usually the result of the animal being struck from the rear by a vehicle, driving the head downward and forward into the pavement or falling face forward from an elevated position. Although these injuries are rather gruesome to behold, they are not particularly difficult to close.

After judicious debridement and copious pressure lavage with sterile saline, the lip is gently grasped with skin hooks or Adson-Brown thumb forceps and elevated to the level of the incisor teeth. Because there is usually little or no soft tissue to suture to, horizontal mattress sutures are looped around intact incisors by driving the needle as close to the mandible as possible. If teeth are missing, small holes can be driven into the border of the mandible using a K-wire or sixteenth inch Steinman pin to permit passage of your suture material. The use of 3-0 absorbable or nonabsorbable suture material may be used. A Penrose drain can be inserted through a cutaneous stab incision to manage deadspace. Drains are usually removed by the third day. Because of the excellent collateral circulation to the lips, massive tissue sloughing is uncommon. Major skin loss generally will require closure with a local skin flap.

**Labial Tumors**

Previous veterinary articles have emphasized the use of the triangular or "wedge resection" technique for excision of lesions involving the lip in order to facilitate closure. However, wedge resection can leave an inadequate tissue margin during resection of malignant tumors. The author has noted that full-thickness square and rectangular defects in the lips and cheek can be easily closed in a "Y" fashion with excellent functional and cosmetic results. The mucosa is apposed with the placement of simple interrupted
absorbable sutures (3-0) in the submucosal layer. A suture is placed at the labial margin to assure proper cosmetic alignment of the lip. Simple interrupted skin sutures are placed to complete the closure. The jaw should be manipulated during closure to assure that the mouth will function normally without placing undue tension on the suture lines.

**Closure of Major Labial/Buccal Defects**

**Full-thickness Labial Advancement**

The upper and lower lips can be completely mobilized to form a full-thickness composite flap when rostral labial defects require closure. The superior and inferior labial arteries (and veins) help to assure an adequate blood supply to maintain these flaps.

The upper lip is incised down to the mucosa. The scalpel blade is redirected slightly to leave a 5mm strip of mucosa along the gingival border. (The mucosal strip has greater suture holding strength compared to the gum.) The length of the full-thickness labial advancement flap will vary with the size and location of the defect as well as the flap length required to stretch over the wound without excessive tension. Any "tension bands" of tissue palpated as the flap is stretched must be carefully divided at the base of the flap to avoid compromise to the blood supply. A small wedge shaped area can be trimmed off the rostral border of the flap to better conform the flap to the curvature of the opposing lip margin. The mucosal surface is initially closed with 3-0 absorbable sutures in a simple interrupted pattern. The skin is closed in similar fashion with 3-0 nonabsorbable sutures. Tension sutures may be utilized in any area under moderate tension if necessary. The jaw should be opened and closed during closure to ensure function is not compromised.

The lower lip is comparatively easier to advance rostrally, since the mucosa/submucosa is the major restricting tissue plane. By incising the mucosa 5mm from the gingival border, the undermined lower lip will stretch forward without the need to incise the skin to the degree required for mobilization of the upper lip. The rostral segment of the lower lip can be advanced caudally in a similar fashion.

**Buccal Rotation Technique**

A variation of the labial advancement flap is the full-thickness buccal rotation flap. If a significant length of the upper lip is resected, the remaining caudal labial margin and cheek can be grasped, rotated and stretched forward. A portion of the lip margin is trimmed off before opposing the respective borders of the flap to the remaining labial margin using the suture technique previously described. The mouth is manipulated to assure that function is not compromised during closure. Although the buccal rotation technique will advance the labial commissure forward, the mild facial asymmetry created is noticeable only to the more discriminating observer.

**Labial "Lift up" Technique**

Masses involving the labial tissue adjacent to the gingival margin can be excised without removing the entire lip by incising through the entire thickness of the lip outside the margin of the mass, thus forming a bipedicile labial flap. The labial flap is lifted and the involved mucosa and adjacent tissue is excised.
Closure is accomplished by opposing the mucosal margins followed by skin borders, as previously described. Cosmetic results are excellent since the normal labial margin is preserved. The reduction in the width of the lip creates little functional disturbances.

**Labial/Buccal Reconstruction with Skin Flaps**

On occasion, there is insufficient skin and/or mucosa available for closure of the lips or cheeks. Local transposition flaps are particularly useful to close the cutaneous surface; they also can be utilized to replace major segments of labial/palatine mucosa.

Small mucosal gaps can heal by second intention with the exposed dermal or muscular surface serving as a vascular scaffold for the advancing epithelium. Large mucosal defects are unlikely to heal by second intention without causing significant contraction, scarring and distortion to the overlying tissues. A skin flap can be used as a satisfactory substitute for the mucosal lining. Pedicle grafts have been used successfully by the author to close oronasal fistulas when insufficient mucosa is available. Transposition skin flaps can be folded into position or partially sutured into an inverted tube and tunneled beneath the skin into its oral location. The inverted tube segment can be excised once healing is complete in 4 to 6 weeks.

**Reconstruction of the External Nose**

On occasion, tumors of the nasal cartilages are encountered. Depending upon the specific tumor and its regional involvement, cryosurgery and surgical excision are the two surgical options available for their removal. Complete loss of the external nose does not impair normal function of the patient, although mucosal inflammation and irritation may be noted from exposure of these delicate tissues. Cosmetic results are considered poor. Advancement flaps, transposition of the rolled alar cartilages, musculofascial island labial flaps, and utilization of the adjacent pigmented labial margin are options to protect the exposed mucous membranes and obtain a better cosmetic result.

Nasal reconstruction in veterinary surgery is considerably more difficult to achieve compared to human patients. The nasal tissues in the dog and cat are more specialized than the human. There are no pigmented, hairless tissues that can achieve the unique shape and polygonal surface of this structure in fur-bearing animals. In veterinary medicine, it is difficult to justify multiple surgeries in order to achieve optimal cosmetic results in patients who have no interest in personal appearance. As noted, improved cosmetic results can be achieved at the time of closure by using the above techniques, without subjecting the small animal patient to multi-staged reconstructive procedures.

**Reference**