Use of a subdermal plexus flap to reconstruct an upper eyelid following radical tumor resection in a cat

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CASE DESCRIPTION

A 15-year-old neutered male domestic shorthair cat was examined because of recurrence of a neoplastic mass in the left upper eyelid. The mass had been excised and submitted for histologic evaluation 6 months earlier by the referring veterinarian. Histologic results indicated that the mass was an incompletely excised cutaneous adenocarcinoma.

At the time of the examination, the patient was receiving benazepril (0.5 mg/kg [0.23 mg/lb], PO, q 24 h) for ongoing management of chronic renal failure. Results of physical and ophthalmologic examinations were unremarkable except for the presence of an apparently nonpainful (ie, no signs of pain were elicited during palpation) firm cutaneous mass (approx 2 X 2 mm) located on the lateral third of the left upper eyelid near the scar from the previous surgical excision. Results of a CBC, serum biochemical analysis, and urinalysis were all within reference limits except for abnormally increased BUN (16.5 mmol/L; reference limits, 56 to 153 µmol/L) concentrations. Schirmer tear test was 5 mm/min (reference limits, 10 to 20 mm/min). There was no fluorescein stain uptake in either eye. No remarkable abnormalities were identified on thoracic and abdominal radiographs.

It was decided to surgically excise the mass and reconstruct the eyelid with a subdermal plexus (lip-to-lid) flap. The cat was administered clavulanate-potiated amoxicillin (8.75 mg/kg [3.98 mg/lb], SC) 45 minutes prior to surgery and then premedicated with methadone (0.1 mg/kg [0.045 mg/lb], IM). Anesthesia was induced with alfaxalone (2 mg/kg [0.91 mg/lb], IV) and maintained with isoflurane in oxygen following tracheal intubation. The cat was positioned in right lateral recumbency, and the area around the eyelid mass and proposed flap site was clipped and aseptically prepared.

A sterile marker pen was used to outline the proposed incisions (Figure 1). The length of the left upper eyelid to be resected to achieve an approximately 1-cm margin around the mass was measured with a sterile ruler to determine the length of the donor site required to cover the defect. The length of the proposed donor flap was approximately 5 mm more than the length of the proposed eyelid incision to allow for tissue contraction. A No. 15 scalpel blade was used to excise the lateral two-thirds of the left upper eyelid, including the mass, en bloc (a rectangular area [approx 50 X 40 mm] of the eyelid was removed). The conjunctiva was transected as close as possible to the upper fornix. The No. 15 scalpel blade was then used to make a full-thickness incision of the left lateral oral commissure and oral mucosa of the upper lip (the oral mucosa was incised leaving approx 1 cm of buccal mucosa attached to the lip margin around the lateral oral commissure to be used to form the new conjunctival fornix). Two parallel skin incisions were made from the lateral oral commissure and upper lip to create a subdermal plexus flap (approx 130 X 50 mm). The flap angle was modified to facilitate placement of the labial

TREATMENT AND OUTCOME

Approximately one-third of the left upper lip was used as a subdermal plexus (lip-to-lid) flap to cover the defect created by en bloc excision of the eyelid mass. A bridge incision between the donor and recipient sites was used so that the eyelid could be reconstructed in 1 procedure. Histologic evaluation confirmed that the mass had been completely excised. Both the donor and recipient flap sites healed well without complications. The procedure resulted in excellent functional and cosmetic results with no recurrence of the mass at 14 months after surgery.

CLINICAL RELEVANCE

The described lip-to-lid technique was a simple 1-stage method for reconstructing an upper eyelid of a cat following radical tumor resection that provided excellent functional and cosmetic results. (J Am Vet Med Assoc 2017;250:211–214)
mucosal border into the full-thickness upper eyelid defect. Care was taken during dissection and elevation of the donor site to not damage the parotid papilla and duct.

A bridge incision was made between the donor and recipient sites; the incision extended caudoventrally from the lateral canthus of the left eye to the caudodorsal base of the donor flap. The graft was transposed (Figure 1) and sutured to the recipient site with 4-0 poliglecaprone 25 in a simple interrupted pattern. The labial mucosa was sutured with the remaining dorsal margin of the ocular conjunctiva with 6-0 polyglactin 910 in a simple continuous pattern. The SC tissues were sutured with 3-0 poliglecaprone 25 in a simple continuous pattern. The skin was apposed with 3-0 monofilament nylon suture material in an interrupted cruciate suture pattern.

The cat remained hospitalized for 5 days after surgery, during which the flap was inspected every 8 hours to assess its viability. It also received meloxicam (0.05 mg/kg [0.023 mg/lb], PO, q 24 h) and clavulanate-potentiated amoxicillin (12.5 mg/kg [5.68 mg/lb], PO, q 12 h) for 7 days after surgery. Fusidic acid and a carbomer lubricating gel were applied topically to the left eye for 10 days after surgery.

Histologic examination of the excised mass revealed that it was a multicentric basal cell carcinoma and that it had been excised with clean margins. Two weeks after surgery, the skin flap appeared viable, and the skin sutures were removed. Results of an ophthalmologic examination performed at that time were unremarkable; Schirmer tear test results for the left eye were within reference limits, and there was no fluorescein stain uptake by either eye. The cat was unable to blink spontaneously, but retraction of the ocular globe and passive protrusion of the third eyelid were allowing tear distribution across the eye, and no ocular surface lesions were detected. The owner was instructed to continue topical application of the lubricating gel to the left eye for 8 more weeks.

At 12 weeks after surgery, the donor site had healed, the graft was viable, and an excellent overall cosmetic appearance had been achieved (Figure 2). Results of an ophthalmologic examination revealed evidence of a superficial cornea ulcer in the left eye, which was confirmed by uptake of fluorescein stain. Schirmer test results were within reference limits for both the left (18 mm/min) and right (21 mm/min) eyes. Topical application of fusidic acid and a cross-linked hyaluronic acid product every 8 hours was prescribed. Results of an ophthalmologic examination 6 weeks later (18 weeks after surgery) revealed that the corneal ulcer had resolved. Fourteen months after surgery, the cat was alive with no ocular surface abnormalities of the left eye, and the healed surgical site had an excellent cosmetic appearance.

Figure 1—Photographs of a 15-year-old neutered male domestic shorthair cat before, during, and after radical resection of a recurrent neoplastic mass in the left upper eyelid and reconstruction of the eyelid with a subdermal plexus (lip-to-lid) flap. A mass at the same location was excised 6 months earlier by the referring veterinarian. A—The skin margins of the recipient and donor flap sites were marked with a sterile marker pen. B—The mass and lateral two-thirds of the left upper eyelid were excised en bloc to achieve an approximately 1-cm margin around the mass. C—Two parallel, full-thickness incisions were made beginning at the left lateral oral commissure and upper lip and were extended caudally to create a subdermal plexus flap (approx 130 X 50 mm). Then a bridge incision that extended caudoventrally from the lateral canthus of the eye to the caudodorsal base of the donor flap was made, and the subdermal plexus flap was elevated and transposed to the recipient site. D—The graft was sutured to the recipient site, and the defect at the donor site was closed.

Figure 2—Photograph of the cat of Figure 1 twelve weeks after surgery. The graft and donor-site defect healed without complications, and the procedure resulted in excellent functional and cosmetic results.
Discussion

Tumors of the eyelid are generally benign in both dogs and cats.1,2 Compared with eyelid tumors in dogs, eyelid tumors in cats, albeit less common, are more likely to be malignant and locally invasive and have a greater metastatic potential.2,3 Eyelid tumors most frequently develop in cats > 10 years old; however, no sex or breed predictions for the development of eyelid tumors have been identified.2,4

Squamous cell carcinoma is the most frequently reported eyelid tumor of cats.1,5,6 Other types of tumors identified in the eyelids of cats include adenocarcinoma, basal cell carcinoma, hemangiosarcoma, fibrosarcoma, melanoma, hemangioma, neurofibroma, and trichoepithelioma.1,2,4,6,7 The eyelid tumor excised from the cat of the present report was a basal cell carcinoma, which is typically a slow-growing and isolated cutaneous tumor that can be locally invasive but rarely metastasizes7–9; therefore, wide resection of the tumor with clean margins was likely curative.

Enucleation and reconstructive techniques with local pedicle flaps are the most frequently performed ocular procedures in veterinary medicine.10,11 Reconstructive techniques are particularly important when the primary goal is to maintain eyelid function.12 Lesions that affect less than one-third of the eyelid margin can be excised and closed by direct apposition of the skin margins.11,13,14 Several techniques involving local pedicle flaps have been described.11,12,15,16 The type of flap selected for an individual patient is dependent on several factors such as the extent of the wound created, the availability of skin around the wound, and the location of the lesion, which is particularly important when mucosa is affected by a traumatic or neoplastic process and needs to be reconstructed or replaced.17

A lip-to-lid procedure similar to that used for the cat of the present study was first described in 1982 by Pavletic et al18 as a mucocutaneous subdermal plexus flap for reconstruction of the lower eyelid in dogs. A lip-to-eyelid transposition technique has also been described for the treatment of cats with upper eyelid agenesis.18

Blepharoplastic techniques may be required following tissue loss, eyelid trauma, tumor removal, or the treatment of congenital or acquired abnormalities.16,17,19–21 The aims of those reconstructive techniques are to provide stable eyelid margin and protection, prevent corneal irritation and trichiasis, achieve acceptable cosmesis, and, if possible, maintain or restore the patient’s ability to blink.12,16,18

Several surgical techniques have been described for eyelid reconstruction, including the subdermal plexus technique described in the present report, a free graft of oral mucosa for the reconstruction of the upper eyelid, a lip-to-lid technique for the lower eyelid, reconstruction of the lower eyelid by ventrolateral advancement of the third eyelid, and local transposition of a cutaneous flap, a semicircular skin flap, and a split-eyelid flap.12,14,16,20,22,23

In addition to the cat of the present study, the lip-to-lid technique has been used to treat a cat with eyelid agenesis.12 Advantages of that technique include the ability to perform wide resection of neoplastic processes with achievement of good functional and cosmetic results, low risk of trichiasis or entropion, and the option to use a bridging incision to complete reconstruction of the eyelid in 1 surgical procedure. Potential complications of the lip-to-lid technique include infection, graft dehiscence, ischemic necrosis of the tip of the flap, damage to the parotid duct, and inability to blink with subsequent corneal ulceration. For the cat of the present report, the periocular structures and flap were carefully handled to avoid compromising the viability of those structures and reduce the risk for dehiscence, necrosis, and parotid duct damage. Following the procedure, the cat was unable to blink, which prevented lubrication of the corneal surface in the usual manner; however, the resulting retraction of the ocular globe and passive protrusion of the third eyelid allowed distribution of tears across the corneal surface, which at least partially compensated for the cat’s inability to blink. Nevertheless, a corneal ulcer was identified during the recheck examination performed 12 weeks after surgery. The ulcer may have been a consequence of suboptimal corneal lubrication. It could also have been the result of corneal irritation from contact with the polyglactin 910 suture material that was used to suture the ocular conjunctiva; however, that seems unlikely because the absorption time for polyglactin 910 is 8 to 10 weeks, and the ulcer was not detected until 12 weeks after surgery.

To our knowledge, the present report is the first to describe the use of a subdermal plexus (lip-to-lid) flap to reconstruct an upper eyelid of a cat following radical tumor resection. Prior to the present report, descriptions of the use of lip-to-lid flaps were limited to closure of congenital defects in the upper eyelids of cats18 and reconstruction of the lower eyelids of dogs following experimental eyelid removal14 and lower eyelids of cats12 and the upper eyelid of a dog24 following tumor resection. On the basis of our clinical experience, the use of lip-to-lid flaps to reconstruct the upper eyelid of cats following radical tumor resection provides good functional and cosmetic results, as evidenced by the cat of this report.

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Footnotes

c. Monocryl, Ethicon, Johnson & Johnson, Livingston, West Lothian, Scotland.
d. Vicryl, Ethicon, Johnson & Johnson, Livingston, West Lothian, Scotland.
g. Lubrithal, Dechra Veterinary Products Ltd, Hadnall, Shropshire, England.
References


From this month’s AJVR

Survivability of *Mycobacterium bovis* on salt and salt-mineral blocks fed to cattle
John B. Kaneene et al

OBJECTIVE
To determine the survivability of *Mycobacterium bovis* on salt and salt-mineral blocks in typical weather conditions in Michigan over two 12-day periods at the height of summer and winter.

SAMPLE
4 salt (NaCl) and 4 salt-mineral blocks inoculated with pure cultures of a strain of *M. bovis* currently circulating in Michigan livestock and wildlife.

PROCEDURES
In the summer and again in the winter, inoculated blocks were placed in secured outdoor facilities where equal numbers of each block type (2/type/season) were exposed to shade or sunlight. Samples were collected from randomly selected areas on the surface of each block beginning within 1 hour after placement (day 0) twice a day for the first 4 days and once a day from days 7 through 11. Bacterial culture of samples was performed to detect viable *M. bovis*.

RESULTS
Depending on the exposure conditions, salt blocks yielded viable *M. bovis* for up to 2 days after inoculation and salt-mineral blocks yielded viable *M. bovis* for > 3 days. Survival time was greatest on salt-mineral blocks kept outdoors in the shade during the winter. The odds of recovering viable *M. bovis* from salt-mineral block samples were 4.9 times as great during the winter (vs the summer) and 3.0 times as great with exposure to shade (vs sunlight).

CONCLUSIONS AND CLINICAL RELEVANCE
Results from this study indicated that salt and salt-mineral blocks should be considered potential sources of bovine tuberculosis when designing risk mitigation programs for cattle herds in areas with wildlife reservoirs of *M. bovis*. (Am J Vet Res 2017;78:57–62)