Surgical eye procedures

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Abstract

Membrana nictitans excision, H-plasty, and exenteration are common surgical procedures used in cattle as part of the management of ocular squamous cell carcinoma, trauma, and infectious diseases of the eye. These procedures may be performed using local anesthesia in field settings and can result in full resection of primary tumors, extending the productive life and protecting the welfare of the animal.

Key words: bovine, surgery, eye, squamous cell, carcinoma

Résumé

L'excision de la membrane nictitante, la plastie en T et l'exentération sont des procédures chirurgicales utilisées fréquemment chez les bovins dans le cadre de la gestion du carcinome des cellules squameuses oculaires, des traumatismes et des maladies infectieuses de l'œil. Ces procédures peuvent être faites avec un analgésique local sur le terrain et peuvent entraîner la résection complète des tumeurs principales prolongeant la vie en production et protégeant le bien-être de l'animal.

Introduction

Ocular squamous cell carcinoma (OSCC) is the most common indication for ophthalmic surgical intervention in cattle. Infectious diseases and trauma may also result in lesions requiring surgical intervention. Ocular squamous cell carcinoma most often affects the lower lid, lateral limbus and the third eyelid (nictitating membrane). Selection of resection procedures should be based on the location of the mass and extent of tissue invasion, including regional lymph nodes, as well as productive/reproductive status of the animal and any current drug withdrawals. Patient age, physiologic status, and behavior are important considerations for restraint for ocular procedures. Most can be performed with chute restraint with a halter holding the head in position for the target eye. Head tables are ideal for eye procedures if available, but present a choking hazard, particularly as animals fatigue from long procedures or under sedation, and their posture should be monitored closely throughout. Standing sedation may be used for fractious or anxious animals. Drug combinations that include an opiod result in the animal planting their feet and standing squarely and reliably. Regardless of the selected method of restraint, local anesthesia techniques should be employed and are fully described in the manuscript, Local Anesthetic Techniques of the Eye and Foot, located elsewhere in this issue.

Third Eyelid Resection (Membrana Nictitans Excision)

OSCC of the third eyelid can be aggressively locally invasive, making early detection and resection critical to animal longevity. Early lesions can be subtle, and I encourage clients to watch eyes as cattle come through the chute for any reason. I similarly watch eyes when pregnancy checking and as part of bull evaluation.

Lesions typically start in the center of the margin of the third eyelid and progress dorsally, ventrally, and medially. This facilitates removal early because it is possible to incise ahead of the lesion and achieve full excision.

Third eyelid resection should be performed after local anesthesia is provided, with or without sedation. There are several possible approaches using 2% lidocaine, including a Peterson Eye Block, 4-Point Block with auriculopalpebral n. block, or combination auriculopalpebral nerve (n.) block with local infusion into the third eyelid. The Peterson and 4-Point Blocks are generally more than is necessary for a simple lid resection. After the auriculopalpebral n. has been blocked and blinking is inhibited, a pair of thumb forceps may be used to extend the third eyelid, slightly separating it from the cornea. Using a 20-gauge needle, 1 mL of 2% lidocaine is infused within the layers of the third eyelid.

After anesthesia is attained (5 to 10 minutes) 2 pairs of Kelly forceps are used to isolate the mass. An assistant should support the weight of the forceps to prevent trauma to the cornea or tearing of the third eyelid. The free portion of the mass is grasped with thumb forceps and a #10 scalpel blade is used to excise the mass, following along the border created by the Kelly forceps (Figure 1). The mass is removed and the Kelly forceps are left in place, while being supported. After 2 to 3 minutes the forceps can be removed. Hemostasis is partially achieved with this additional crimping time, but some hemorrhage may still occur. This generally occurs at an acceptable level and care should be taken not to wipe across the incision with gauze which will damage forming clots. Fly spray should be sprayed on the face while the eye is covered.

Supportive and aftercare treatments include systemic anti-inflammatory administration and continued fly control. In uncomplicated removals where concurrent infection is not present, systemic antimicrobial therapy is not indicated.

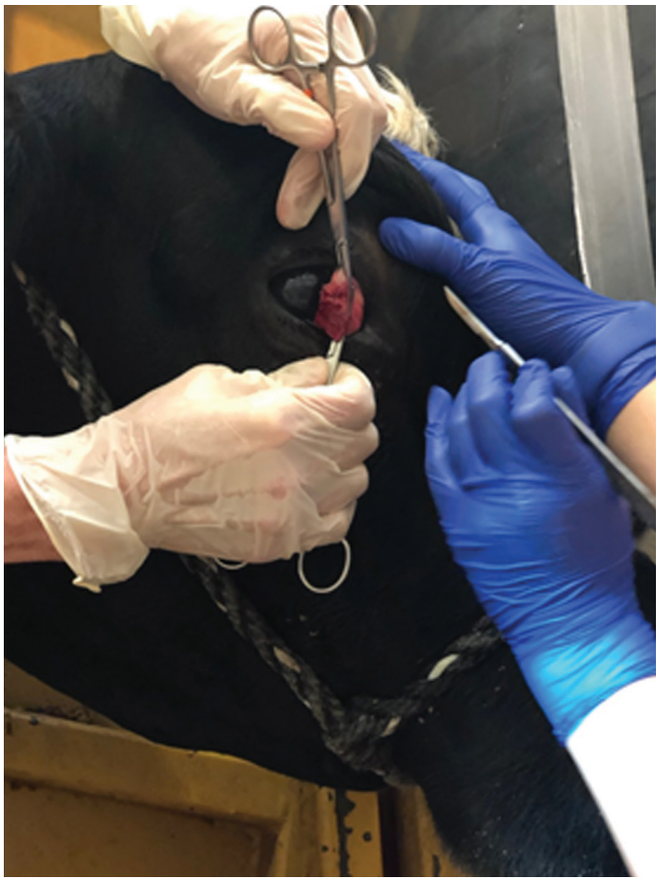

Figure 1. Kelly hemostats isolating an OSCC of the third eyelid for removal by scalpel blade.

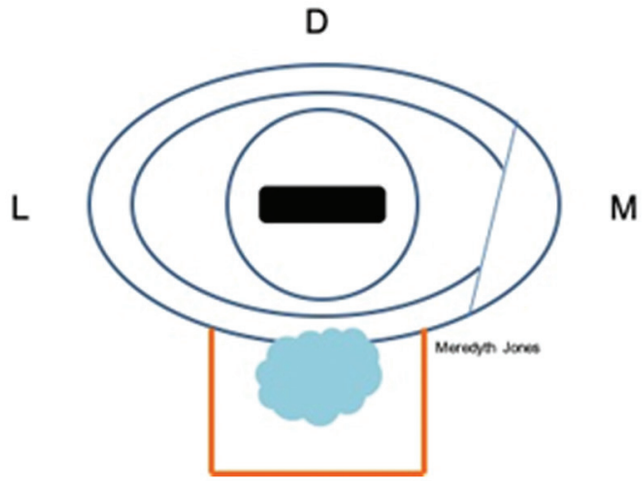

Figure 2. Schematic of an OSCC of the ventral eyelid with initial incisions for H-plasty.

H-Plasty

H-Plasty is a specialized resection technique for OSCC lesions affecting the central portion of the margin of the lower eyelid. This technique allows for removal of the tumor along with the creation of a new eyelid margin, giving a more functional and cosmetically appealing result.

H-Plasty is performed after an auriculopalpebral block along with either a Peterson Eye Block or 4-Point Block, providing both sensory and motor blockade to the eye and adenexa. The area is surgically clipped and aseptically prepared, using care to protect the cornea.

The initial incisions are made vertically, medial and lateral of the mass. The incisions should be full thickness through the skin and enter into the conjunctiva and subcutaneous tissues, so that the skin containing the mass may be freed and removed later. The vertical incisions are then connected ventrally by a horizontal incision (Figure 2). The ventral portion of this created, but attached, flap is then grasped with thumb forceps and elevated to allow sharp dissection from subcutaneous tissues. At the level of the conjunctiva (lid margin), the flap is removed. This results in a square or rectangular void in the lower eyelid.

Next, 2 more vertical incisions are made as extensions ventrally of the initial vertical incisions. These should be equal or slightly greater in length to the height of the removed flap. At the ventral corners of the removed flap, 2 equilateral triangles are created (Figure 3). These triangles of skin should be dissected and removed. Now, the lower flap to be advanced has been created. It should be undermined and advanced dorsally until it creates the new eyelid margin without tension.

Each new skin junction is then apposed using simple interrupted sutures, except along the eyelid margin, where

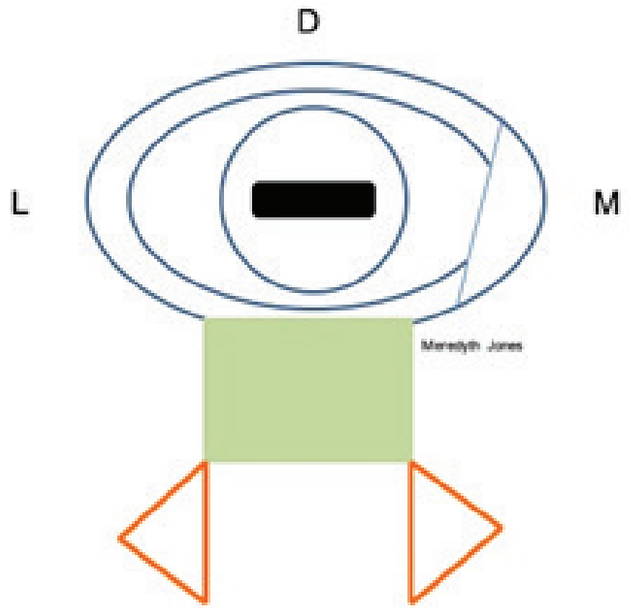

Figure 3. H-plasty procedure where the skin containing the mass has been removed (rectangle) and triangular incisions have been created to allow advancement of the lower flap.

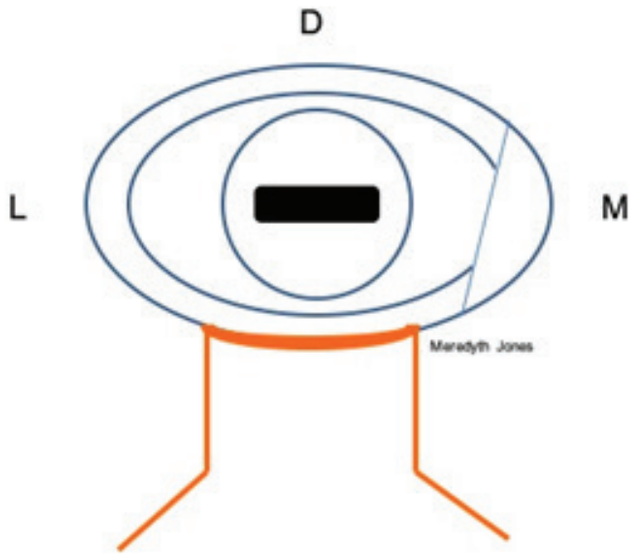

Figure 4. Final positioning of the H-plasty flap to create a new eyelid margin.

simple continuous is preferred. #1 polyglactin 910 or catgut may be used. This prevents suture tails from contacting the cornea. Interrupted sutures may be used here, but attention should be paid to how each suture tail lays.

Supportive and aftercare treatments include systemic anti-inflammatory administration (generally 3 to 5 days of therapy) and fly control. Systemic antimicrobial therapy (extralabel) may be considered based on the procedure and environment. Generally, beta lactam and specifically cephalosporins are appropriate, but extralabel, choices for control of incisional infections. Suture removal is not required where polyglactin 910 or catgut are used.

Exenteration

Exenteration, specifically, is the most common form of eye removal in cattle. It is often referred to as enucleation, which is removal of the globe. However, removal of the globe and the surrounding adenexa is more commonly indicated and performed, which is exenteration. Exenteration is indicated when OSCC has invaded the adenexa of the eye, where there has been penetrating trauma, or when infectious disease has caused the tissues within the orbit to be irreparably damaged.

Exenteration is performed after an auriculopalpebral n. block along with either a Peterson Eye Block or 4-Point Block, providing both sensory and motor blockade to the eye and adenexa. A wide area is surgically clipped and aseptically prepared. A tarsorrhaphy is initially performed, which may be done by lid closure with simple continuous suture, however, placement of 4 to 5 transpalpebral towel clamps achieves this more quickly. The initial incision is made about 1 to 2 cm ventral to the lower eyelid margin, following its margin in parallel. This incision should extend medial to the medial canthus and lateral canthus and initially be full thickness through the skin. The second incision is similarly made parallel to the upper eyelid margin, connecting to the lower incision (Figure 5). These incision locations should be altered based on the location and invasion of any OSCC or other mass, with careful planning to ensure that the final incision can be closed without tension.

Blunt and sharp dissection are used to dissect the soft tissues away from the bony orbit. A sharp pair of curved Mayo scissors follow along the curve of the orbit nicely for this dissection. The medial and lateral ligaments supporting the eye are thick and dense, making a scalpel blade the tool of choice at least for this portion. The towel clamps are used to manipulate the tissue to be removed to allow for dissection along the orbit. Care should be taken not to place excessive traction on the eye, which may damage the brain via the optic nerve. The dissection continues until the orbit is completely evacuated, which is a lengthy process (Figure 6).

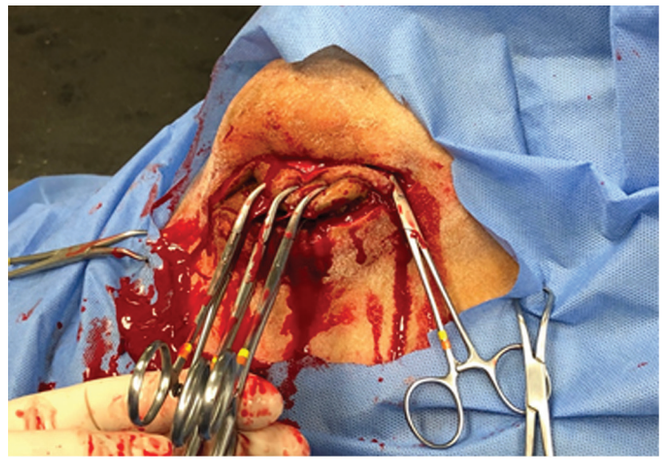

Figure 5. Transpalpebral towel clamp placement with initial dorsal and ventral incisions made parallel to the eyelid margins.

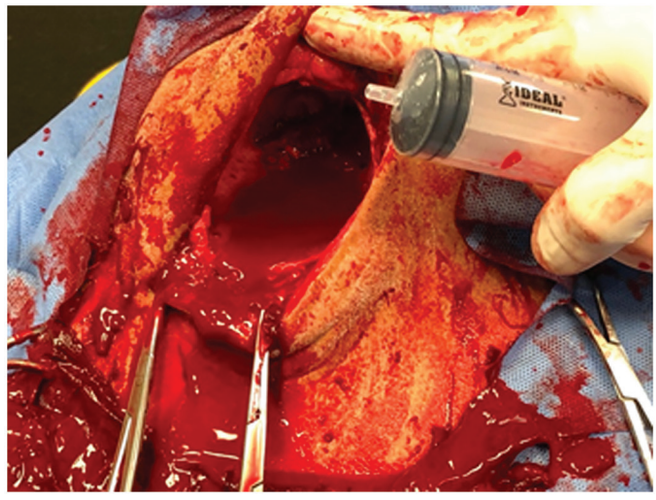

Figure 6. Exenteration with complete evacuation of the orbit.

As the optic nerve and blood supply are approached behind the eye, many sources will encourage the placement of a ligature around these structures to control hemorrhage. This is extremely challenging and often is not retained well due to the thickness of the tissue ligated. Alternatively, prepare the skin suture ahead and begin suturing skin immediately after those structures are incised and the tissue bundle removed. A rapidly-placed Ford Interlocking or other continuous pattern across the incision seals the skin (Figure 7). The ocular vessels will bleed and fill the socket with blood, which will begin to clot and place pressure on the cut vessel ends. #1 or #2 polyamide pseudomonofilament non-absorbable suture is suitable for this purpose, and a single-layer closure is used. The orbit may be packed temporarily during closure, but gauze should be removed gently to minimize clot disturbance.

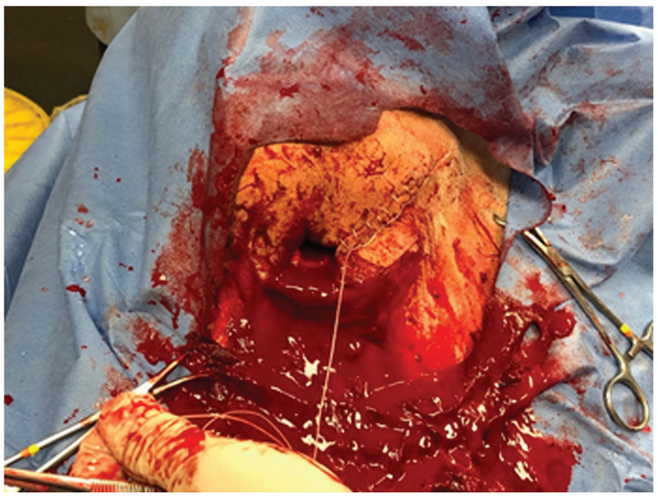

Figure 7. Ford interlocking suture pattern used for closure of the exenteration site.

Additionally, an assistant may lavage the orbit with saline during closure. The hemorrhage will result in a very large hematoma at the surgical site, which often becomes softball-sized. This will be resorbed over the course of days, giving a more asthetically pleasing result. It is not recommended to place any antimicrobials or other therapies into the orbit behind the closure. The use of a trampoline suture across the bony orbit to provide a more cosmetic result is contraindicated in cases where infection or neoplasia are present, and this technique is rarely performed in cattle.

Supportive and aftercare treatments include systemic anti-inflammatory administration (generally 3 to 5 days of therapy), systemic antimicrobial therapy, and fly control. Generally, beta lactam and specifically cephalosporins are appropriate, but extralabel, choices for control of incisional infections. The sutures should be removed at 14 days. Clients should be made aware that cattle with impaired vision may develop behavioral changes due to impaired ability to monitor their environment and should be handled with care.

Suggested Readings

1. Schulz K. Field surgery of the eye and para-orbital tissues. *Vet Clin North Am Food Anim Pract* 2008;24:527-534.
2. Schulz KL, Anderson DE. Bovine enucleation: A retrospective study of 53 cases (1998-2006). *Can Vet J* 2010;51:611-614.