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Subconjunctival Enucleation Surgery in Dogs & Cats

Enucleation surgery, a common procedure in small animal practice, is indicated when an eye is painful or infected and vision can't be saved. However, enucleation should not be used in place of a correct diagnosis or treatment for ocular disease.

Indications

- End-stage glaucoma
- Severe corneal or scleral laceration with loss of intraocular contents
- Phthisical eye with discharge accumulating in the conjunctival sac
- Unresponsive painful dry eye with corneal scarring (accompanied by owner's inability to pursue other treatment options)
- Severe proptosis with extraocular muscle avulsion
- Progressive intraocular tumors not involving the sclera
- Blinding unresponsive infectious or inflammatory uveitis, with or without hyphema (Figure 1)

Alternative Techniques

Eyes that have been irreversibly damaged from severe panophthalmitis or a retrobulbar abscess, or that have an extensive or invasive intraocular tumor, should be removed by using an exenteration or transpalpebral technique, not simple subconjunctival enucleation.



In eyes blinded from glaucoma (not caused by neoplasia) or traumatic loss of intraocular contents, evisceration and placement of an intrascleral prosthesis is an alternative to enucleation. Owners who prefer an intrascleral prosthesis should be referred to an ophthalmology practice for this procedure. However, many owners prefer enucleation to intrascleral prosthesis because it involves less postoperative care.

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STEP BY STEP SUBCONJUNCTIVAL ENUCLEATION

What You Will Need

- General surgery pack, vacuum pack for positioning the head, standard surgery room and anesthesia equipment, & adjustable-height chair (seated position for ocular procedures increases surgeon's hand stability)
- Jar of 10% neutral buffered formalin (10 parts formalin:1 part eye tissue). This volume is needed to adequately fix the eye for histopathology.
- 3/0 or 4/0 absorbable suture (such as PDS* II, Monocryl monofilament or Vicryl braided suture; ethicon.novartis.us) on a cutting (FS-2) needle. Monofilament sutures have less tissue drag and are preferred for this use. Skin sutures should be 2/0 to 4/0 (depending on animal size) nonabsorbable suture (such as Ethilon or Prolene; ethicon.novartis.us) on a cutting needle.
- Surgical clippers, 4 × 4 sponges, mild surgical scrub, water and eye wash for rinsing, dilute 1:25 povidone-iodine solution for final surgical preparation of the skin, and cotton-tipped applicators to clean and prepare the conjunctival sac with the solution
- Injectable 1/1000 epinephrine diluted to 1/10,000 (using saline) in a 6-mL syringe to be used as a subcutaneous injection or irrigation to control hemorrhage
- *Optional:* Electrocautery with a cutting tip for the eyelid margin and cautery tip for controlling hemorrhage. A tonsil snare attachment is useful, if available, for removing the eye at the optic nerve.



1 Clip hair from around the eye before positioning the head. Then place the animal in lateral recumbency, with the head positioned and stabilized. Adjust the surgeon's chair or stool so that the surgeon's arms and hands are supported comfortably, and set the overhead light position so that all ocular structures are well illuminated.

After positioning, prepare the area for surgery by using a mild surgical scrub and solution (eye damage from a scrub is not a concern if the eye and conjunctiva will be removed at enucleation) (A). The conjunctival fornix should be flushed first with dilute povidone-iodine solution to sterilize the area and then with eye wash to remove all clipped hairs (B). Cover the head and body with sterile drapes.

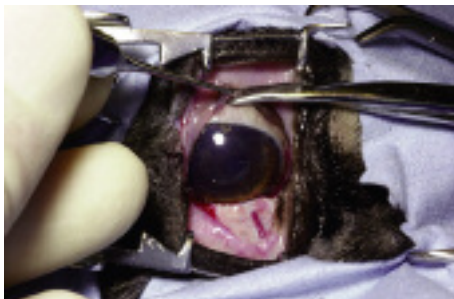


PROCEDURE PEARL

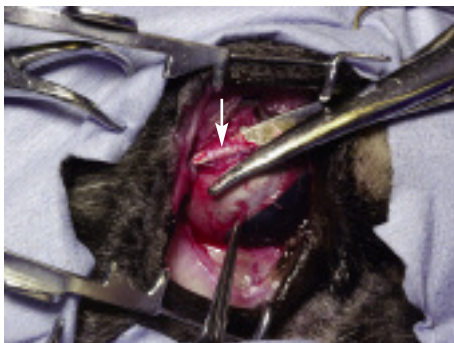
Using a vacuum pack (to position the head) and tying the endotracheal tube behind the head or to the lower jaw allows the head to be positioned at any convenient angle during surgery. (It is critical to ensure that the tongue is not inadvertently clamped if the tube is tied to the lower jaw.) Using a wired tube to prevent the tube lumen from collapsing is helpful but not necessary.

2 Make a 1- to 2-cm lateral canthotomy incision with Mayo scissors or a #15 scalpel blade for exposure. Before cutting, clamp this incision with a hemostat or inject the incision with 1/10,000 epinephrine subcutaneously to control hemorrhage. The third eyelid may be removed at this time with Mayo scissors (or electrocautery scalpel) after clamping the base with hemostats.





3 Hold the bulbar conjunctiva attached to the limbus with a toothed tissue forceps. Use curved tenotomy or small Metzenbaum scissors to make a 360° incision 3 to 4 mm back from the limbus and down to the level of the sclera.



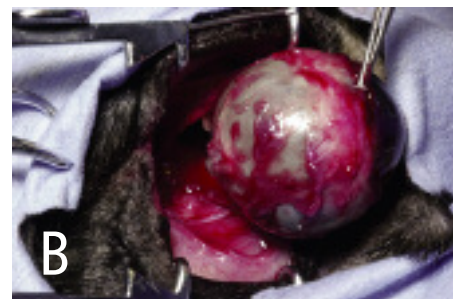
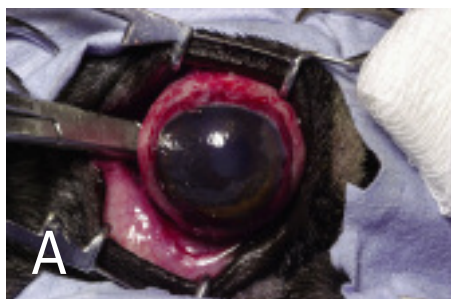
4 Continue blunt and sharp dissection around the eye by using the scissors against the scleral wall until reaching the back of the globe. During dissection, the globe is held by the conjunctiva that remains at the limbus. The conjunctiva and extraocular muscles are cut from the globe during the dissection (*arrow*) and are left in the orbit. The superior lacrimal gland may be removed with the globe or left in place.

While cutting around the globe, apply as little tension as possible while elevating the eye from the orbit. This precaution is especially important and more difficult to avoid in the cat. The opposite eye may be blinded from mechanical or ischemic damage to the chiasm if traction or twisting occurs to the optic nerve of the eye being removed.

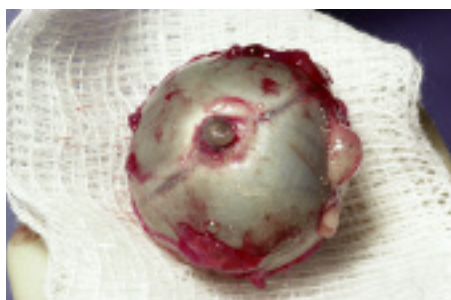


PROCEDURE PEARL

In cats, to help maneuver and elevate the eye from the orbit, remove approximately 1 mL or more of aqueous humor by paracentesis to reduce the size of the globe at the start of the enucleation procedure.



5 Once the eye is completely free and can be gently rotated (but not too aggressively, especially in the cat), cut the optic nerve after clamping from the lateral side for 3 minutes with curved Kelly or mosquito forceps (**A**). Cutting with Metzenbaum scissors (rather than a blade) helps control hemorrhage (**B**); alternatively, remove the eye by cutting with a tonsil snare wire attached to the electrocautery unit. With the latter, little to no hemorrhage occurs after the globe is removed. Slight hemorrhage can be controlled with the coagulation cautery tip.



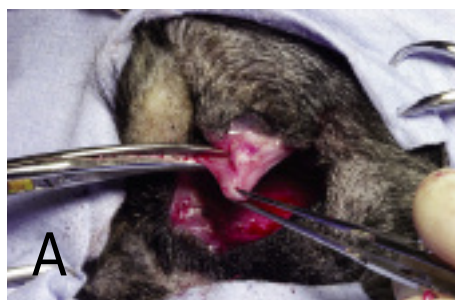
PROCEDURE PEARL

Making a small atraumatic slit or injecting formalin through the posterior sclera allows formalin to penetrate the eye and fix the retina before autolysis occurs.

6 Pack the orbit with 4 × 4 sponges and apply light pressure for several minutes to facilitate clotting and minimize postoperative hemorrhage. The deepest sponges may be left in place while the lacrimal gland and eyelid margins are removed. Only a 2-mm stump of optic nerve on the back of the globe should remain after removal if the globe has not been retracted too aggressively. Place the eye in a formalin container as soon as it is removed for submission to a histopathology laboratory.

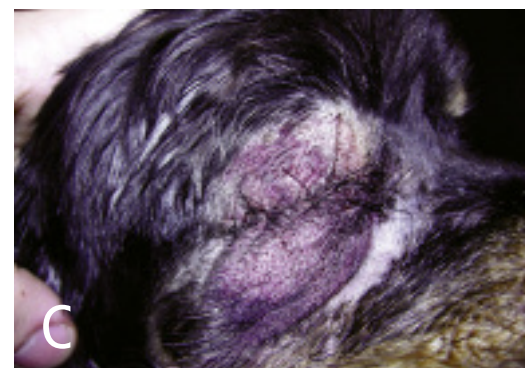
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7 Remove the eyelid margins (4–5 mm from edge, including the pigmented margin and all skin edges) with Metzenbaum or Mayo scissors (*shown*) or the electrocautery scalpel. The latter greatly reduces the possibility of postoperative hemorrhage from the cut skin margins. Carefully remove all medial canthus skin and the medial caruncle at the conjunctival margin so that a tract into the orbit does not remain. In this area, bluntly dissect under the skin to avoid the angularis oculi vein, which can be a significant source of hemorrhage.



8 Trim the remaining conjunctiva from the orbit (A). Remove the superior lacrimal gland if it has not been removed with the globe (B). Doing so prevents production of aqueous tears in the orbit after wound closure.

9 Assess hemorrhage again—it is optimum to have a dry orbit that can be inspected before closing sutures are placed. Most postoperative complications result from postoperative orbital hemorrhage. If bleeding continues from the stump of the optic nerve after the sponges are removed, place ligatures around the nerve and the ciliary vessels.



10 It is ideal to place 2 layers of sutures using 3/0 or 4/0 absorbable sutures in a simple continuous pattern with buried knots. The first layer closes the orbital muscle and fat, and the second layer is a subcutaneous suture line (A). Monofilament or braided synthetic sutures are preferred for subcutaneous layers because of longer tissue life and knot security; however, chromic gut may be adequate in noncontaminated surgeries.

Before completely closing the first suture line, inspect the orbit for sponges and hemorrhage one last time. If the orbit has been irrigated

See Aids & Resources, back page, for references, contacts, and appendices.
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with dilute antibiotic solution (diluted 1/10 povidone-iodine solution is excellent for this purpose), aspirate it before inspecting the orbit and tying the suture (B). Close the eyelid incision with a 2/0 to 4/0 nonabsorbable simple continuous suture pattern or interrupted sutures (C).

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Submit removed globe for histopathology to rule out neoplasia or an unexpected intraocular infection, which could have sys-

temic implications. If an owner can't afford the cost of histopathologic evaluation by a veterinary ophthalmic pathologist (preferred

for the specificity of the diagnosis), most state veterinary laboratories have adequate ocular pathology services available for a modest charge. It could be a useful continuing education tool for the veterinarian to absorb the cost of this diagnostic service (if necessary) in order to confirm the clinical diagnosis made before the eye was removed.

Postoperative Care

Postoperative pressure or protective bandages are rarely necessary; however, if hemorrhage occurs, a bandage is an excellent way to apply pressure after the incision is closed. See **Aids & Resources** for bandage placement techniques. An Elizabethan collar is useful to prevent postoperative trauma to the surgery site.

I prefer to keep patients in the hospital for one night to monitor for hemorrhage. Owners often have emotional difficulties with enucleation surgery, and postoperative bleeding from a bruised and clipped surgery site at

home the night after surgery can be a very bad experience. Owners should be warned about postoperative appearance or even shown pictures of what it will look like before they are reunited with their pet at discharge.

Postoperative analgesia can be used in the hospital (nonsteroidal antiinflammatory drugs, fentanyl, morphine) as needed, and patients can be released the next day with oral analgesic medications (carprofen, deracoxib, tepoxalin, or meloxicam in dogs; meloxicam in cats) for 3 to 5 days. Systemic antibiotics are recommended to prevent intraocular infection. Reevaluation 5 to 6 days after surgery and suture removal 12 to 14 days postoperatively are recommended. ■

Acknowledgment

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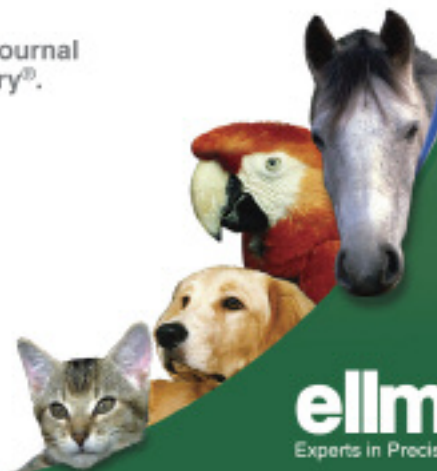
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