OPHTHALMIC TRAUMA IN THE HORSE

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Many ophthalmic and orbital injuries in the horse are secondary to trauma. The prominent orbit, eye, and adnexal structures in the horse leave them vulnerable to traumatic injury.

Ophthalmic trauma should be treated aggressively. A thorough physical and ophthalmic examination should be performed as soon as possible to establish the extent of the injury and the structures involved. The therapeutic aims are: preservation of site, pain relief, restoration of function, and cosmesis.

The most common injuries following trauma to the periorbital region include eyelid and nictitans lacerations, orbital rim fractures, orbital foreign bodies, and eyelid contusions. Sequelae include blepharitis, orbital cellulitis or abscessation, loss of eyelid function, sinusitis, exophthalmos (secondary to retrobulbar haemorrhage or oedema), and blindness following optic nerve damage.

Examination of the Traumatized Eye and Periorbital Region

The horse should be observed in their normal environment to check for altered mentation or vision. Epistaxis, depression or instability of bones of the skull and orbit, and subcutaneous emphysema are consistent with fractures over the sinus or orbit.

Cranial nerves are evaluated via the menace response (CN II and VII) and the palpebral reflex (CN V, VII). The direct and indirect pupillary light reflex evaluates the integrity of the retina, optic nerve, midbrain, oculomotor nerve (CN III), and iris sphincter muscle. If exophthalmos is evident then retrobulbar disease (cellulitis, haemorrhage, oedema) should be suspected. Epiphora and blepharospasm may indicate corneal laceration or traumatic uveitis.

Examination of the eyelids and eye usually require sedation and local nerve blocks. The globe may be difficult to examine if eyelid swelling is pronounced, excessive force should be avoided to prevent inadvertent rupture of a damaged globe. The pain may necessitate more potent sedation (e.g., detomidine and butorphanol). The tremor induced by butorphanol in some horses can make the exam difficult. Patency of the nasolacrimal system can be evaluated by lavaging from the distal nasal punctum, or visualisation of fluorescein dye at the nostril after application to the eye.

The frontal or supraorbital nerve can be blocked at the supraorbital foramen (sensory to medial two thirds of the upper lid). This foramen is palpated medially at the supraorbital rim here the supraorbital process begins to widen. A line block can be used near the orbital rim to desensitise other regions. The auriculopalpebral nerve (motor to orbicularis oculi muscle) can be palpated under the skin just lateral to the highest point of the zygomatic arch. Two-3 ml of local anaesthetic is placed under the skin at each of these locations to facilitate examination. Topically applied ophthalmic local anaesthetic may also be useful.

The cornea should be assessed for ulceration, laceration, or foreign bodies. Fluorescin staining is recommended after all structures have been assessed. The anterior chamber should be examined for hyphema, hypopyon, aqueous flare, or miosis of the pupil. Examination of the retina may require use of a short-acting topical mydriatic (1% tropicamide). The retina and the optic nerve are evaluated for evidence of retinal detachment. Optic nerve atrophy due to traumatic optic neuropathy may be evidenced as pallor of the optic nerve 2-4 weeks following trauma.

Eyelid and Nictitans Injuries

Eyelids are thin and highly vascularized, they contain muscles, connective tissue, cilia, glands, and are lined by conjunctiva. The tarsal plate gives the free edge of the lid support. Upper eyelid lacerations are more significant because the upper lid moves over more of the equine cornea than does the lower lid. Lacerations usually occur when the eyelid gets caught on a hook, nail or pointed object.

Diagnosis: Clinical signs usually result in blepharospasm, haemorrhage, epiphora, and an ocular discharge. The lacerations are usually horizontal and extend from the lateral canthus. Medial canthal lacerations result in damage to the nasolacrimal canaliculi. Blunt trauma of the skin against the orbital rim may cause an irregular laceration with substantial eyelid swelling. The diagnosis is usually obvious, but an ocular examination should be

performed to rule out any other damage. Small eyelid punctures can cause infectious retrobulbar cellulitis or abscess with resultant exophthalmos. Ultrasonography can help identify regions of abscessation or cellulitis.

Treatment

If cellulitis or an abscess is present, the wound should be cultured for bacteria and fungi. Removal of sequestra or foreign bodies, and debridement of necrotic tissue is important. Broad-spectrum antibiotics, anti-inflammatories, and warm compresses will reduce infection and inflammation of the eyelids.

Eyelid lacerations should be repaired surgically as quickly and as accurately as possible to restore eyelid function and prevent scarring. Repair under GA is preferred, however can be done in the sedated horse with local blocks. Preservation of the eyelid margin is critical for appropriate lubrication and protection of the cornea. Eyelids have a great capacity to heal. Skin preservation is key and hanging skin flaps of the eyelid margin should never be excised. Wound preparation includes preparation with sterile saline or a 2-5% solution of povidone-iodine. Clipping should be avoided. Never use surgical scrub preparations or detergents in the periocular region. Debridement is rarely necessary due to the abundant eyelid circulation.

A two-layer closure should be performed on full thickness eyelid lacerations. In the field, single-layer closures of the tarsal plate with meticulous deep bites are acceptable. For a two-layer closure, a deep continuous layer should be placed in the tarsal plate using 4-0 to 6-0 absorbable suture, ensuring not to penetrate the tarsal conjunctiva as this will cause corneal ulceration. A routine skin closure (including the orbicularis muscle) using 4-0 to 6-0 non-absorbable suture material is then performed ensuring the ends do not touch the cornea. The skin closure should be started at the lid margin to allow perfect apposition. A figure-eight suture pattern is useful to appose the eyelid margin. This technique speeds healing and rapid return to function by minimizing lid cicatrization and deformity.

Larger lid lacerations with loss of tissue require general anaesthesia and advanced blepharoplastic grafting procedures.

The nictitans or 'third eyelid' consists of a conjunctiva line membrane, a T-shaped cartilage, and a seromucoid gland at the base. It functions to protect the cornea and distribute the tear film. Lacerations to the margin or body of the nictitating membrane should be repaired with absorbable suture material ensuring to avoid corneal irritation. Removal of the entire third eyelid should only be performed if it is severely damaged. Check for foreign bodies posterior to the third eyelid adjacent to the cornea.

Nonsteroidal anti-inflammatories and perioperative antibiotics are indicated in uncomplicated eyelid laceration repair. Additional ocular medication may be indicated if there is concurrent corneal damage or uveitis.

Orbital Contusions and Fractures

Peri-orbital fractures of the orbital rim, zygomatic arch, and supraorbital process can result from collisions, kicks, or blows to the head. Diagnosis is based on palpation, overt facial deformity, ultrasonography, and radiography. Concurrent clinical signs include epistaxis, oedema of the eyelids, subcutaneous emphysema, corneal ulceration and uveitis, retrobulbar haemorrhage or cellulitis.

Treatment

Treatment of orbital contusions is symptomatic and specific to the structures involved. Systemic anti-inflammatories and antibiotics are indicated to minimize infection and reduce pain and eyelid swelling. Cold eyelid compresses in the acute stages, and hot compresses in more chronic trauma will help reduce swelling.

Minor orbital rim fractures do not require surgical reduction and stabilisation unless the fragments are impinging on the globe. More complex and unstable fractures require surgical reduction and stabilisation. Techniques vary depending on the fracture complexity but include simple reduction via bone hooks, interfragmentary wiring, and bone plating with cancellous bone grafts.

Foreign Bodies

The effect of a foreign body depends on size, location, type of material, and the length of time in the tissue. Common locations for foreign bodies include the eyelids, conjunctival fornices, posterior to the third eyelid, cornea, and intra-ocularly. Intra-ocular foreign bodies are difficult to identify and remove. Diagnosis requires ultrasonography and radiography. Iron, copper, and vegetative material are poorly tolerated within the eye.

Treatment

Treatment involves removal of the extra-ocular foreign body. Foreign bodies of the eyelids and periobital soft tissues can be surgically removed under ultrasound

guidance, ensuring to preserve anatomical function of structures during the dissection. Superficial corneal foreign bodies can be removed readily with topical anaesthetic, sensory and motor blocks, and sedation. Penetrating or deep foreign bodies should be removed under general anaesthesia. The corneal puncture wound following removal should be treated with topical antibiotics. Systemic antibiotics, anti-inflammatories (flunixin meglumine), and topical mydriatics (atropine 1%) may also be beneficial. Corticosteroids are contra-indicated in any corneal lesion associated with vegetative matter. Foreign bodies in the anterior chamber should be referred as a limbal incision may be required to remove the object.

If the foreign body is not resulting in the ocular tissues reacting to the insult, surgical removal may be contra-indicated if the surgery will create more inflammation than the foreign body.

Corneal Injury

Traumatic corneal injury includes superficial abrasions, stromal ulcers, corneal lacerations, and full thickness perforations with iris prolapse. Uveitis is common. For these reasons, all corneal injuries should be treated promptly and aggressively with topical antibiotics and mydriatics, and systemic anti-inflammatories.

Ulcers and abrasions: A pen light and fluorescein stain uptake are used to diagnose superficial corneal ulcers. Concurrent blepharospasm, epiphora, reddened conjunctiva, and corneal oedema are often present. Streptococcus, Staphylococcus, and Pseudomonas are common pathogens of the equine cornea. Many saprophytic fungi are present such as Fusarium and Aspergillus. Topical corticosteroids are always contra-indicated in corneal injury as these saprophytic fungi are capable of causing a fungal keratitis. Cytology with culture and sensitivity is indicated.

Treatment

Treatment for uncomplicated corneal ulcers includes topical antibiotics (such as triple antibiotic), mydriatics (atropine 1% ophthalmic solution) and systemic anti-inflammatories (flunixin). If the ulcer becomes deep and progressive, or a descemetocele forms, conjunctival or corneal grafts may be required. Diagnosis of a descemetocele include observation of a dark clearing at the bottom of an ulcer and failure of uptake of fluorescein. Administration of topical therapy is facilitated by the placement of a subpalpebral lavage, particularly if the horse is difficult to medicate or if prolonged therapy is likely to be required.

Corneal lacerations and perforations: All corneal lacerations are accompanied by uveitis. Medical treatment for partial thickness corneal lacerations should be adequate. Full thickness corneal lacerations must be surgically repaired to prevent infection and/or phthisis bulbi. Direct corneal suturing for small simple full thickness lacerations is adequate. Corneal and conjunctival grafts are indicated for deep, large, or irregular corneal lacerations, in conjunction with more aggressive medial therapy. Iris prolapse also needs to be managed surgically including debridement of devitalised areas and placement into the anterior chamber before corneal repair. Complications of full thickness lacerations include persistent uveitis, infection, anterior and posterior synechiae, iris prolapse, and cataract formation. Iris prolapse of greater than 2 weeks duration secondary to infected or melting ulcers; and corneal lacerations greater than 15mm in length, are associated with a poor prognosis for sight based on endophthalmitis or phthisis bulbi and in such cases enucleation is indicated.

Uveitis

Uveitis is a common sequelae to ocular trauma, and if severe and untreated, can lead to phthisis bulbi (globe atrophy) of the eye. Hyphema, miosis, aqueous flare (increased protein in the anterior chamber), hypopyon, fibrin, and synechiae are all signs of anterior uveitis. Posterior uveitis can lead to retinal detachment.

Treatment

Treatment is aimed at minimizing uveal tract inflammation and ciliary muscle spasm resulting in miosis. Atropine 1% topical ophthalmic solution should be used 2-4 times a day to dilate the pupil and minimise synechiae formation. Systemic non-steroidal anti-inflammatories including flunixin meglumine (preferable for ocular inflammation) or phenylbutazone are also indicated.

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