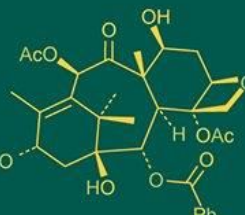


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; 9(9): 409-413
www.biochemjournal.com
Received: 19-07-2025
Accepted: 23-08-2025

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10' O clock limbal incision for retrieval of *Setaria digitata* eyeworm in horses

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DOI: <https://www.doi.org/10.33545/26174693.2025.v9.i9f.5655>

Abstract

Two Marwari horses were presented with a history of progressive corneal opacity, excessive lacrimation, and impaired vision since 2 to 4 weeks. Ophthalmic examination revealed corneal opacity with a thread-like worm visibly undulating and swirling in the anterior chamber of the eye. The eyeworm was surgically retrieved through a 10' o' clock limbal incision under regional nerve blocks and general anesthesia. Auto-blood therapy was performed, and topical antibiotics and steroids were prescribed postoperatively to prevent secondary bacterial infection and reduce corneal opacity. Postoperative management included systemic antibiotics and analgesics administered for three days. Vision was restored, and corneal opacity gradually diminished after worm removal. All horses recovered without any complications. Morphological analysis identified the worm as *Setaria digitata*.

Keywords: 10' o clock limbal incision, eye worm, Marwari horses, morphological analysis, *Setaria digitata*

Introduction

Equine ocular filariasis is a clinical condition caused by the ectopic migration of parasites belonging to the genus *Setaria* spp. (Gangwar *et al.* 2008) [4]. Although the peritoneal cavity is the usual site for adult *Setaria* worms, they may also be found in the uterus, urinary bladder, heart, lungs, rumen, reticulum, abomasum (Mandal and Ray, 1994) [8] and occasionally in the eye or central nervous system (Yadav *et al.* 2006) [16]. The disease is transmitted via mosquito bites and is most frequently observed during the summer and autumn seasons.

The lashing movements of the worm cause severe trauma and irritation to the cornea, leading to opacity that can progress to blindness if left untreated (Basak *et al.* 2007; Jaiswal *et al.* 2006) [1, 6]. Common clinical signs include excessive lacrimation, photophobia, and conjunctivitis (Basak *et al.* 2007; Gangwar *et al.* 2008) [1, 4]. The condition typically affects only one eye, however bilateral ocular parasitism has also been reported (Shin and Wee, 2002; Buchoo *et al.* 2005) [13, 2].

Treatment aims to remove the worm, either surgically—which offers the best results (Tuntivanich *et al.* 2011) [15] or through medical management (Muhammad and Saquib, 2007) [10]. Medicinal treatment may lead to the death of the worm in situ, causing it to adhere to the corneal endothelium and release toxins into the anterior chamber, resulting in corneal edema (Basak *et al.* 2007) [1]. Potential complications include cataracts, iris adhesions, and retinal detachment (Paglia *et al.* 2004) [11].

This article details the 10' o clock limbal incision technique for eyeworm retrieval in cases presented to the Department of Veterinary Surgery and Radiology, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Sardarkrushinagar, Gujarat, India.

Materials and Methods

Case history

Case 1: A 22 months old, female Marwari mare was presented with a chief complaint of progressive corneal opacity, excessive lacrimation and impaired vision in the OS (left eye; oculus sinister) since 4 weeks. The mare was raised for marriage procession and did not have a history of deworming.

Case 2: A 13 months old, Male, Marwari stallion was presented with mild corneal opacity, excessive lacrimation and reduced vision in OS since 2 weeks and anamnesis revealed no deworming was done.

Ophthalmic examination

Ophthalmic examination revealed blepharospasms, mild conjunctivitis and a whitish, hazy cornea with moderate opacity (Fig. 1). Close observation revealed a white, thread-like worm continuously swirling in the anterior chamber of the eye (Fig. 2).

The affected eye showed positive menace reflexes but pupillary light reflexes (PLR) that were not clearly evident as pupil was not visible. A Schirmer Tear Test (STT) (Fig. 3) was performed to assess tear production, and a fluorescein dye test (Fig. 4) was conducted to evaluate corneal epithelial integrity. In the mare with severe corneal opacity, ocular ultrasonography confirmed the worm's presence in the anterior chamber.

Pre-operative preparation

Preoperatively, the horses were fasted for 24 hours and water was withheld for 12 hours prior to general anesthesia. Preoperatively both horses were administered 5 ml of tetanus toxoid intramuscularly. Dexamethasone and gentamicin eye drop were instilled topically in the affected eye before surgical intervention for better visualization of eye worm during surgery.

Operative procedure

The horses were sedated with xylazine hydrochloride at @ 1.1 mg/kg body weight (BW) intravenously. Side-line restraint was applied, followed by induction using ketamine hydrochloride at @ 2.2 mg/kg BW intravenously. General anaesthesia was maintained with top up dose of xylazine and ketamine mixture (1:1) by administering half of induction dose as per need.

Local anaesthesia was achieved via auriculopalpebral and peterson nerve blocks using 2% lignocaine hydrochloride to minimize ocular movement during surgery. Horses were positioned in lateral recumbency on a padded surface with the affected eye facing towards surgeon. The eye was flushed thoroughly with betadine solution diluted with 0.9% sterile normal saline, and a surgical drape was applied.

In both cases, the worm's movement was most prominent in the upper right quadrant of the eye; therefore, a small corneal stab incision was made at the 10 o'clock limbal position using a No. 11 BP blade (Fig. 5).

In Case 1, the aqueous humour flowed out naturally through the incision, carrying the worm along with it (Figs. 6, 7). In Case 2, where the worm did not emerge spontaneously, a mosquito forceps was inserted through the extended incision to retrieve it (Fig. 8). As the aqueous humour volume decreased, the worm's free movement became restricted. The anterior chamber was flushed with sterile normal saline using a blunt, manually curved needle attached to a syringe to avoid trauma to ocular tissues. Following irrigation, the worm was easily removed (Fig. 9).

Corneal incisions were left unsutured to heal naturally. Auto-blood therapy was performed by collecting 2 ml of the horse's own blood and injecting it sub-conjunctively into both dorsal and ventral palpebral conjunctiva to promote healing of the limbal incision and reduce the corneal opacity (Fig. 10). A temporary tarsorrhaphy was placed using non-

absorbable suture material to protect the eye from external contaminants.

Post-operative care

Post-operative management included Inj. Streptopenicillin 5 gram intramuscularly and Inj. Flunixin meglumine at @ 1.1 mg/kg BW intravenously were administered for three days. The temporary tarsorrhaphy sutures were removed after 24 hours. Post operative topical therapy included gentamicin eye drops, dexamethasone eye drops, and Placentex® gel thrice a day for one week. Bolus fenbendazole (3000 mg) and ivermectin (100 mg) was prescribed for deworming.

Both cases recovered uneventfully. Corneal opacity gradually diminished over a 14-day period, with complete restoration of vision (Fig. 13).

Morphological analysis

The worm collected in a physiological normal saline solution and sent for parasitological examination. Gross examination showed the worm to be long, milky white, and thread-like, with tapering ends particularly at the posterior end (Fig. 11). Microscopic examination of the anterior and posterior ends revealed characteristic prominences at the anterior end (Fig. 12), confirming the species as *Setaria digitata* (Kaur *et al.* 2015) ^[7].

Results and Discussion

In present study Marwari mare was presented with history of progressive corneal opacity, ocular discharge and conjunctivitis since 4 weeks whereas Marwari stallion presented with mild corneal opacity and ocular discharge since 2 weeks. Similarly, (Dabas *et al.* 2021) ^[3] stated that ocular discharge and conjunctivitis is main clinical sign in early presentation followed by the cloudiness of cornea and ultimately corneal opacity in later presentation. Patil *et al.*, (2012) ^[12] concluded that B-mode ultrasonography using 12 to 18 MHz linear transducer is valuable examination tool for horses with severe corneal opacity. Similarly in present study ultrasonography was used for better visualization of worm in anterior chamber of eye in Marwari mare with severe corneal cloudiness.

In both cases of present study, we remove eye worm through taking clear corneal stab incision at 10 o'clock limbal position using a No. 11 BP blade. This incision was helpful in prevention of excessive leakage of aqueous humour post operatively and for easy retraction of worm if worm's movement was most prominent in the upper right quadrant of the eye in both cases. Various incision sites such as the 2 to 9 o'clock (Gosai *et al.* 2025) ^[5] and even the 12 o'clock position (Buchoo *et al.* 2005) ^[2] have been used for removal of eye worm. According to (Patil *et al.* 2012) ^[12] the site of clear corneal stab incision was decided on the basis of corneal edema, corneal opacity and movement of the worm. In Case 1, the aqueous humour flowed out naturally through the incision, carrying the worm along with it however, in Case 2, where the worm did not emerge spontaneously due to reduction of aqueous humour volume, anterior chamber was flushed with sterile normal saline solution to facilitate worm retrieval. Patil *et al.*, (2012) ^[12] suggested that whenever the worm could not be retrieved by a single stab, viscoelastic substance was injected into the anterior chamber to decelerate the vigorous movement of the worm. Later the worm was grasped with capsular forceps and taken out.

Post operative Placentrex® gel, gentamicin eye drops along with dexamethasone eye drops prescribed for one week. Placentrex facilitate post-surgical healing at the insertion site in equine ocular setariasis (Mritunjay *et al.* 2011) [9]. Polydeoxy ribonucleotide present in placental extract possess anti-inflammatory, immunomodulatory properties and promote neovascularization, epithelization, fibrogenesis, collagenases and enhance wound healing (Shukla *et al.* 2004) [14].

Oral deworming with bolus fenbendazole and ivermectin was done in present study for further prevention of *Setaria digitata* migration. Muhammad and Saquib (2007) [10] appreciated ivermectin as medicinal treatment in case where surgical management is difficult and stated that death of the parasite in the eye took place in 15 days with a single subcutaneous injection of 0.3 mg/kg body weight ivermectin.



Fig 1: Appearance of normal eye (OD) and corneal opacity in eyeworm affected eye (OS)

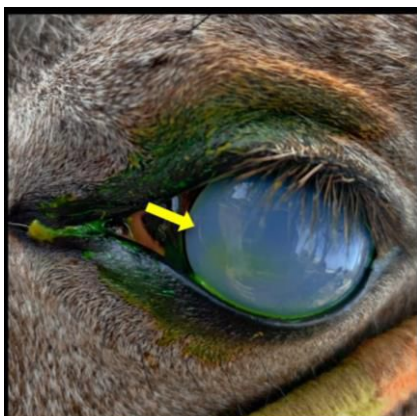


Fig 4: Fluorescein dye test showing no uptake of dye by corneal epithelium and presence of eyeworm in anterior chamber (arrow)

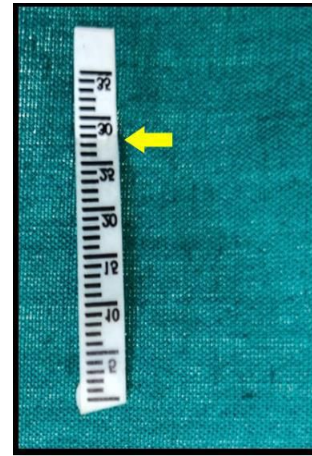


Fig 3: STT reading noted after 1 minute (27 mm)

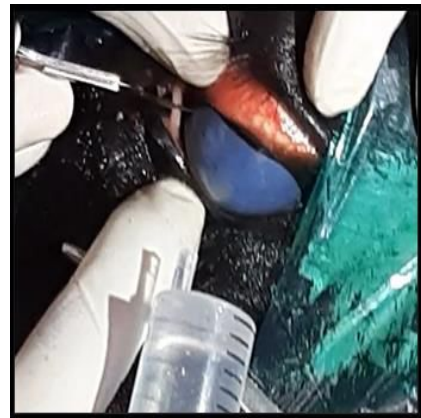


Fig 5: 10 o'clock limbal incision



Fig 6: Aqueous humour freely flowing out of incision made.



Fig 7: Worm flowing out of anterior chamber along with aqueous humour.



Fig 8: Use of mosquito forcep to retrieve the worm.



Fig 9: Worm flowing out of anterior chamber after flushing with normal saline.



Fig 10: Auto-blood injected into palpebral conjunctiva

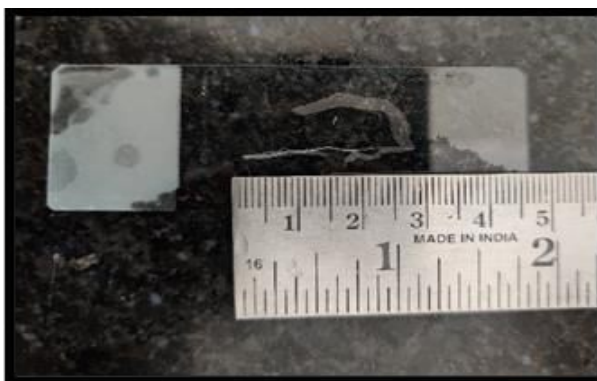


Fig 11: Worm coiling soon after removal (left) and gross appearance of worm (right).



Fig 12: Microscopic appearance of anterior (left) and posterior (right) end of *Setaria digitata*.



Fig 13: Healing of eye post-operatively

Conclusion

Corneal stab incision at 10 o'clock limbal position using a No. 11 BP blade were helpful if worm's movement was most prominent in the upper right quadrant of the eye and also in prevention of excessive leakage of aqueous humour post operatively.

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