RESEARCH ARTICLE

Surgical Removal of Eye Worm (Ocular Setariasis) in Equines

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Abstract

Ocular setariasis is a common vision threatening ophthalmic condition in equine resulting from ectopic parasitism by *Setaria digitata, Setaria equina* and *Thelazia lacrymalis*. The disease occurs mostly in summer and autumn seasons and it displays signs of lacrimation, photophobia, corneal opacity, conjunctivitis and loss of vision. Close inspection of the eye reveals a moving worm in the anterior chamber of the eye. B-mode ultrasonography using linear probe (10-18 MHz) helps in the diagnosis in case of complete opacity. *Six horses were represented for ocular setarial worms.* The best treatment is the surgical removal of the parasite under regional/ general anaesthesia. Paracentesis of anterior chamber for removal of intraocular parasite through a modified clear corneal stab incision at the limbal margins using 2.8 mm pointed tip 45^{o} angled keratome was found effective. *The visual outcome in all eyes was good with restoration of normal vision.* The present review/ communication is aimed at report etiology, diagnosis and management of ocular setariasis in equine species.

Keywords: Cornea, Horses, Keratome, Ocular setariasis, Ocular ultrasonography.

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Introduction

Among the most common surgical conditions of equine ocular setariasis is a vision threatening disease resulting from ectopic parasitism caused by *Setaria* spp (Radwan *et al.,* 2016). In India equine ocular setariosis, an important cause of corneal opacity is commonly caused by *Setaria digitata, Setaria equina* and *Thelazia lacrymalis* (Sellon and Long, 2013). *S. digitata* is a parasite of cattle and hoofed animals and is found mainly in Asia. *S. equina* infects horses and other equids worldwide. The usual predilection site of adult Setaria worms is the peritoneal cavity. Occasionally they can get into the central nervous system or the eyes (Yadav *et al.,* 2006). Microfilariae (immature larvae) are found in the blood. The parasite is transmitted by mosquitoes (*Anopheles peditaneniatus* and *Culex nilgiricus*) through the blood stream. Adult female worms release microfilariae in the abdominal cavity of their hosts. These microfilariae get into the blood stream and reach the capillaries in the skin. Mosquitoes become infected with microfilariae when they feed blood of infected hosts that contains microfilariae. These microfilariae develop to infective larvae inside the mosquitoes in 2 to 3 weeks. The infected mosquitoes then transmit these infective larvae to other susceptible hosts during their blood meals.

The ocular setariasis spreads mostly in summer and autumn when the mosquito vectors are most prevalent (Al-Azawi *et al.,* 2012). The parasite exhibits migratory behavior in unusual hosts such as horses, donkeys or human beings and can be found in various organs such as heart, lung, spleen, kidney, uterus, oviduct, ovary, and urinary bladder. All equines are generally more prone for ocular worm (Jayakumar *et al.,* 2012). The immature worm can also invade eye (Tuntivanich *et al.,* 2011) through the vascular system (Townsend, 2013). The eye infection occurs when the adult worm meanders through intraocular tissue, thus it is also called as eye worm.

Localization of worms in the anterior chamber of eye of equines leads to constant irritation and the condition is very painful (Kumar *et al.,* 2011). The infected animals usually display signs of photophobia and lacrimation (Basak *et al.,* 2007). The serrated cuticle of the worm and lashing movements within the anterior chamber of the eye caused severe trauma and inflammation to the cornea which then results into corneal opacity, which eventually results into blindness (Jaiswal *et al.,* 2006). Basak *et al*. (2007) has reported corneal edema caused by dead filarial worm attachment to the endothelium in the anterior chamber. The dead worm possibly liberates toxins into the anterior chamber, which may be lethal to the endothelium and resulting into corneal oedema. It may lead to devastating sequel like synechia, cataract, and retinal detachment (Paglia *et al.,* 2004). Though, the involvement of the eye is commonly unilateral but bilateral occurrence has also been reported (Buchoo *et al.,* 2005).

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The cornerstone of successful treatment, however, is accurate diagnosis, which is based on careful and critical examination of the eye. Ocular examination may provide an inexpensive method that helps to categorize as well as limit the number of diagnostic possibilities; tests like pupillary light response and menace reflex are commonly used as ophthalmic diagnostic tests. Special diagnostic modalities like Schirmer's tear test, fluorescein staining for corneal ulcers, ultrasonography and indirect ophthalmoscopy to evaluate fundus can also be performed (Andrade *et al.,* 2005). The objective of the present study was to evaluate surgical removal of eye worm from anterior chambers of eye of a horse using keratome without damaging the internal structures.

Materials and Methods

The present clinical study was conducted on six equines with the ocular setariasis. The horses were presented with various ocular problems comprising of epiphora, blepharospasm, corneal opacity and even blindness. Complete ophthalmic examination was performed in most of the cases using hand held slit lamp. The anterior chamber was thoroughly examined by both lateral and retro-illumination to detect the presence of worm(s) in the anterior chamber (Fig 1). In eyes with complete corneal opacity (n = 5) B-mode ultrasonography (12 MHz, corneal contact technique) was performed to visualize the anterior chamber and other intraocular structures.

Clinically the animals showed varying degrees of corneal oedema, photophobia, circumcorneal congestion, keratic precipitates and nebulous opacity depending upon the duration and movement of the worm in the anterior chamber.

During pre-surgical preparation, in all horses tetanus toxoid, 1 ml was given intramuscularly along with topical non-steroidal anti-inflammatory agent (0.3% flurbiprofen) and topical antiseptic (0.5% betadine) along with systemic non-steroidal anti-inflammatory agents (flunixin meglumine 0.5 mg/kg, b.wt. / ketoprofen 2 mg/kg, b.wt., I/V) and antibiotic-ceftriaxone 50 mg/kg b.wt. intravenously.

After overnight fasting, general anaesthesia was induced using xylazine 1.1 mg/kg followed by ketamine HCl 2.2 mg/kg, I/V, in combination with supraorbital nerve block using lignocaine HCl 2%.

Few drops of 0.5% proparacaine were instilled as topical anaesthetic. Paracentesis of anterior chamber for removal of intraocular parasite was done through a clear corneal stab incision at the margins of limbus using 2.8 mm pointed tip 45° angled keratome (2.8 mm ophthalmic micro-surgical full handle knife) made between 10-2 'O'clock position depending on the movement of worm and the parasite ejected along with the out flow of the aqueous humor (Fig. 2). The affected eye was frequently instilled with balanced salt solution to prevent drying of cornea.

In cases where the worm could not be retrieved by a single stab, viscoelastic substance (Viscomet PF: Prefilled hypromellose ophthalmic solution 2 mL USP, Ahmadabad) 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. Finally air was injected to reform the anterior chamber. In cases (n=3) where corneal opacity obscured clear visualization of filarial worm, prednisolone eye drops 6 times daily for a week was instilled. After clear visualization of the worm, surgical intervention was undertaken. In all cases the corneal stab incision was allowed to heal without suturing. The eye was bandaged after sub-conjunctival injection of dexamethasone (2 mg) gentamicin (20 mg) and atropine 1% (4 drops) combination and topical application of Neomycin and Polymyxin B sulphates and Bacitracin-Zinc ophthalmic ointment. Postoperative management consisted of topical administration of non-steroidal anti-inflammatory agent, every 2 hr interval, Neosporin ophthalmic ointment, thrice daily, and cycloplegic (atropine l%), once at night.

Results and Discussion

In 4 cases the worm was seen in the right eye and in 2 cases in the left eye. The duration since the worm was observed

Fig. 1: Eye worm in anterior chamber with diffuse corneal edema

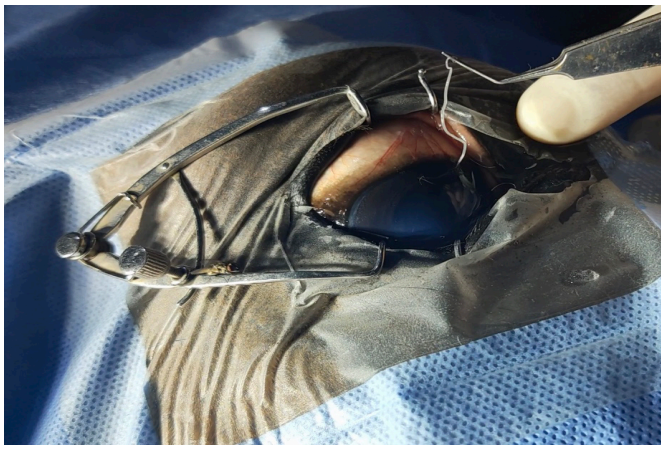

Fig. 2: Parasite ejected and grasped with capsular forceps

in the eye(s) varied from 2-20 days with an average of nine days. Among the six animals, three were of Marvadi breed, two were crossbreds and one was of Kathiyawadi breed. Higher prevalence was noticed in males (n = 4) as compared to females (n = 2).

Treatment of eye worm infection with ivermectin has been reported (Muhammad and Saqib, 2007). However, medical treatment alone has not been considered suitable because of the slow resorption of dead parasites and it is leading to uveitis (Moore *et al.,* 1983). Alternatively, surgical removal of the parasite has a higher potential for rapid and effective treatment of ocular filariasis (Patil *et al*., 2012; Gopinathan *et al*., 2013). Reports are available regarding techniques for AC paracentesis, either by aspiration or incision. There are reports of successful removal of intraocular parasites by aspiration using a 16Gneedle connected to a syringe in equine (Gangwar *et al*., 2008). Worm removal through a clear corneal stab using BP blade No. 11 under general anaesthesia was preferred in horses (Patil *et al*., 2012; Gopinathan *et al*., 2013).

In the present study, in 6 horses the location of corneal stab varied from 10 O'clock to 2 O'clock positions, with maximum (n=4) at 11 O'clock position, followed by 1 and 2 O'clock position in one horse each. The worms were removed in all six cases through modified clear corneal stab incision using 2.8 mm pointed tip 45° angled Ophthalmic Micro surgical Full Handle Knife. It was observed that stab incisions made in a closed valve manner using 2.8 mm pointed angled crescent knife could be superior to those made with BP blade in terms of minimizing possible aqueous leakage, length of incision and possible damage to iris. The 45° angle of knife facilitated corneal stab parallel to the iridial plane in spite of the juxtaposed limbus and palpebral border in horses obviating injury to iris and other intraocular structures.

On telephonic contact at a later date, the visual outcome was assessed and it was found normal in all cases. All the cases showed uneventful recovery in terms of reduction of epiphora, blepharospasm and restoration of corneal transparency. In all cases localized corneal oedema/opacity developed at the site of corneal stab incision minimized gradually in 2-3 weeks with supportive topical medications. Focal corneal opacity at the site of stab incision during the convalescence period was reported in earlier studies (Sharma *et al*., 2005).

From the results of this study it can be concluded that modified technique of dorsal/ ventral clear corneal stab incision for paracentesis of vitreous from the anterior chamber of eye was satisfactory for the successful removal of intraocular parasite through pars plana in horses.

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