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Surgical management of ocular thelaziasis in a goat - A case study

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ABSTRACT

Thelaziasis is an infestation caused by the parasite *Thelazia* spp., transmitted by the intermediate host face fly (*Musca autumnalis*). A one-year-old male goat weighing 56 kg body weight was presented at the Sahidul Alam Quaderi Teaching Veterinary Hospital of Chattogram Veterinary and Animal Sciences University (CVASU) with a history of corneal opacity, lacrimation, epiphora, partial blindness, blepharospasm, ocular discomfort, and restlessness. During a physical examination, one live adult worm was observed in the anterior chamber of the right eye. Menace reflexes for vision were partially positive. Other physical parameters like heart rate (82/min), respiratory rate (25/min), rectal temperature (102.4°F), and dehydration status were recorded. Further hematological and biochemical tests of peripheral blood samples indicated a slight elevation (14%) of eosinophil counts. Surgical removal of the worm was considered as the treatment option in this case. Sedation was achieved by injecting intravenously diazepam (@ 0.5 mg/kg body weight), while the retrobulbar nerve was blocked by using 2% Lignocaine hydrochloride (Jasocaine®). In addition, proparacaine hydrochloride (Procaine®) was used topically to control the eyeball movement. Following sedation, a sterile 10 ml syringe connected with an 18-gauge needle was inserted through the limbus to aspirate the worm. With a special maneuver, the worm was aspirated through the needle and syringe and later moved out along with the flow of aqueous humor. Following removal of eye worm, the animal was restrained for postoperative care. Further medication was prescribed that included Ivermectin (@ 0.2 mg/kg body weight subcutaneously) and topical application of civodex® eye drop (combination of ciprofloxacin and dexamethasone) for 10 days. In addition, antibiotics (streptopen®), antihistaminic (histavet®), and NSAID (dexavet®) were also prescribed for 7 days. The goat made a complete recovery with improved vision and relief from corneal opacity within 21 days following treatment. The study indicated a cost-effective and simple surgical intervention to treat ocular thelaziasis in goats with little complications and minimum postoperative care.

INTRODUCTION

Thelazia is a parasitic roundworm that can affect the eyes of many domestic animals, including cattle, dogs, cats, sheep, goats, and occationally other animals and human (Anderson, 2000 and Soulsby, 1986). The predilection site of adult *Thelazia* worms are the eyes and the tissues around it (eyelids, lacrimal ducts, and glands) (Otranto et al., 2007 and Otranto et al., 2004).

Thelazia californiensis affects dogs and cats, and very occasionally humans as well. It is found in Western North America. *Thelazia callipaeda* affects dogs and cats, and very occasionally humans as well. It occurs in the Far East, Russia and other parts of Europe. *Thelazia gulosa* affects mainly cattle, less often sheep and goats. Found in Asia, Europe and North America. *Thelazia lacrymalis* affects horses. Found worldwide. *Thelazia skrjabini* affects mainly cattle, less often sheep and goats. Found in Europe and North America (Otranto, 2003; Otranto 2005a, and Otranto, 2005b). *Thelazia rhodesi* occurs on the surface of the cornea, under the nictitating membrane, in the conjunctival sac and in the lachrymal duct of cattle, buffalo, zebu, bison, and less commonly, horses, sheep, and goats. Found in Africa, Asia, and Europe. The body is milky-white, with thick, prominent transverse striations. The adult and larval stages live in the eyes, causing conjunctivitis, keratitis,

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lacrimation, ocular discharge, and ulcers (Ikeme, 1967; Otranto and Traversa, 2005).

Thelazia is a creamy-white slender-shaped ecto- and endo-parasite which measures up to 8-12 mm in males and 12-18 mm in females. It is a round tapering on both sides in which the anterior sucker end and a posterior excretory portion is tapered. The cuticle bears prominent transverse striations. The male *Thelazia* is identified by ventral curving of the posterior end and by the number of pre-and post-cloacal papillae (Anderson, 2000 and Arbuckle and Khalil, 1976).

The parasite transmits between animals by means of non-biting dipteran flies of the genus *Musca* (Muscidae) (O'Hara and Kennedy, 1991). Third stage larvae (L3) are deposited in the eye while the adult fly feeds on lacrimal secretions where it molts into L4 and L5 stages (Otranto and Traversa, 2005). Adult parasites live in the orbital tissues of the definitive host and both the larval stage and adults can cause ocular signs (Otranto and Traversa, 2005; O'Hara and Kennedy, 1991).

The erratic movement of the worm within the anterior chamber of the eye may cause severe irritation to the cornea causing corneal opacity. Infected animals usually manifest signs of lacrimation, photophobia, conjunctivitis (Gangwar et al., 2008) and impaired vision in cases when treatment is delayed (Basak et al., 2007). Though involvement of the eye is commonly unilateral but bilateral occurrence was reported too (Shin et al., 2002; Buchoo *et al.*, 2005).

The main goal of treatment is to exterminate the parasite either by medical or surgical approaches. Various drugs like diethyl carbamazine, mercury perchloride and ivermectin have been tried with mixed response (Radostits et al., 200). Treatment with ivermectin is likely to be promising (Mohammad *et al.*, 2007). However, using this approach, a minimum of 15 days may elapse from the time of the ivermectin injection until the parasite dies, which can result in delayed resorption of the dead parasite in the anterior chamber, causing persistent ocular inflammation. The best treatment of ocular parasites is the surgical removal of the parasite (Tuntivanich et al., 2011) that can be performed under regional nerve blocks. A surgical approach is a simple and quick method, and the post-operative complications are also minimum.

The objective of this study was to describe a detailed surgical procedure for removing *Thelazia rhodesi* from an anterior chamber of the affected eye of a goat and to observe the recovery of corneal opacity and partial blindness.

MATERIALS AND METHODS

Case history and observation

The case was registered to the Sahidul Alam Quaderi Teaching Veterinary Hospital (SAQTVH), Chittagong Veterinary and animal sciences university (CVASU), Chittagong, with a history of corneal opacity, lacrimation, epiphora, partial blindness, blepharospasm, ocular discomfort, and restlessness. An ocular examination of the affected unilateral eye revealed the presence of an eye worm moving in the anterior chamber. Menace reflex for affected unilateral eye vision was partially positive; partial blindness was observed. The eye worm was located on the anterior chamber of the eye (Figure 1a,b). Primarily diagnosis was made on the basis of clinical signs and the activity of the worm in the anterior chamber.

Haemato biochemical study

For haemato-biochemical studies, the required amount of blood was collected from patients by jugular venipuncture and then transferred into a vacutainer containing EDTA anticoagulant and without anticoagulant. The Hb, PCV, TEC, TLC, and DLC were estimated within 2-6 hrs. of collection by using standard techniques (Sastry, 1985). Serum glucose, total protein, blood urea nitrogen, and aspartate aminotransferase were estimated by using the commercially available kits, and the reading was taken by using Spectrophotometer.

Restraining and Anesthesia

The goat was restrained by the sideline method and positioned in left lateral recumbency in the

operation theatre. The patient was sedated with Diazepam @ 0.5 mg/kg intravenously. The retrobulbar nerve block was performed by using 2% lignocaine hydrochloride (Figure 1c), and topically, proparacaine hydrochloride was used to control eyeball movement.

Surgical procedure

The periocular skin of the right eye was prepared for the surgery with an aseptic technique. The eyeball was held and fixed in a stable position with the hand to expose the entire cornea. The surgical site for inserting the needle was at the 1 O'clock position of the cornea, approximately 1 mm from the limbus bordering the clear cornea. A sterile 10ml syringe with an 18-gauge needle was inserted through the limbus (junction between cornea and sclera) (Figure 1d). After coming toward one end of the worm, the worm was inserted into the aspirated needle syringe with some aqueous humor. After removing the parasite, the operated eye was thoroughly flushed with normal saline. The worm was then collected and immediately submerged in 70% alcohol solution for further morphological examination. Aqueous leakage was minimal as the needle puncture hole was very small. The puncture site was left as such without suturing in the insertion site.

After removing the eye worm, postoperatively, eye drop Civodex (A combination of Ciprofloxacin and Dexamethasone) was prescribed as two drops in the affected eye twice a day for 10 days. Antibiotics, Antihistaminics, and NSAIDs were prescribed for parenteral use for 7 days, and some advice was given to the owners.

Macroscopic and Microscopic examination of the worm

The genus of the worm was confirmed by macroscopic and microscopic examination of the worm after surgical removal from the eye. In a macroscopic examination**,** lacto phenol cotton blue dye was used before measuring the worm size.

RESULTS

The goat had a history of mild blindness observed during feeding, continuous lacrimation, and worm movement in the affected eye for 10 days. The clinical examination of the eye revealed a mild degree of corneal opacity, conjunctivitis, and partial blindness. The swimming movement of the white thread-like worm in the aqueous humor was noticed. The rectal temperature, heart and respiratory rate were within normal physiological limits. There was no administration of anthelmintic history of that goat. 1st day after surgery showed mild conjunctivitis, which was diminished after 3 days. All clinical findings were gradually abolished within 7 days of surgery. The complete recovery and clearance of the corneal opacity took 21 days (Figure 2a). Good nursing and care by animal owners help to cure the animal with good recovery. It includes eye protection from flies, cleanliness, stability, and maintenance of the drug properly. The owners reported no post-surgical complications.

In a haemato-biochemical examination, blood pictures exhibited non-significant variations. Still, in the case of eosinophil counts, there was a slight elevation from the normal value, and other parameters were within the normal range (Table 1). Among various biochemical parameters studied, the test profile showed that all values were within the normal range (Table 2).

Table 1: Hematological parameters analysis

Name of the test	**Test result**	**Normal range**
Hemoglobin (g/dl)	9.7	8-12
ESR (Wintrobe tube method)	1	0 mm in 1 hour
PCV (%)	28.2	22-38
Total count of TEC (million/cumm)	12.2	8-18
Total count of TLC (Thousand/cumm)	11.4	4-13
Differential count of WBC		
Lymphocytes (%)	51	50-70
Neutrophils (%)	32	30-48
Eosinophils (%)	**14**	1-8
Monocytes (%)	3	0-4
Basophils (%)	0	0-1

Table 2: Biochemical parameters analysis

Name of the test	Test result	Normal Range
Total protein (g/dl)	7.1	6.1-7.5
Glucose (mg/dl)	62.7	48-76
Blood Urea Nitrogen (mg/dl)	15.5	13-26
Aspartate Amino Transferase (u/l)	186	66-230

A macroscopic examination of the worm found a size of about 2.8cm (28mm) measured via a measuring scale (Figure 2c). The worm's body was milky-white and slender (Figure 2b). Under microscopic examination, the body was thick with prominent transverse striations (Figure 2c). Microscopic examination of the worm also revealed the presence of posterior papillae (Figure 2d). All examined worm characteristics were similar to *Thelazia rhodesi* species' morphology.

Figure 1: (a and b): Live eye worm in eye of a goat (indicated by arrow); (c) Retrobulbar nerve block, and (d) Insertion of 18-gauge needle through limbus

DISCUSSION

Thelaziasis is a common problem in the tropical and sub-tropical zone of the world. Bangladesh lies in the temperate zone above the tropic line of cancer (23.6850° N, 90.3563° E). The parasite's intermediate host has a high seasonal activity during the spring and summer in Bangladesh. The disease is mainly seen in summer and autumn when the flies are active (Shen and Gasser, 2006). *Thelazia* infections occur seasonally and are linked to periods of maximum fly activity. *Thelazia* is transmitted from one host to another by the genus *Musca* (family Muscidae). The species *Musca autumnal* and occasionally *Musca domestica*,

Musca larvipara, and *Musca amica* transmit when feeding on the tears (Anderson, 2000).

Thelazia has been found in various tissues of the orbit (socket) of the eye, including within the eyelids, in the tear glands, tear ducts, third eyelid (nictating membrane), or in the eyeball itself (O'Hara and Kennedy, 1991). Localized irritation and inflammation is likely due to the serrated cuticle of the worms, especially for *Thelazia rhodesi* (Fitzsimmons, 1963). Invasion of the lachrymal gland and excretory ducts may cause inflammation and necrotic exudation. Mild to severe conjunctivitis and blepharitis are common. Again, the keratitis, including opacity, ulceration, perforation, and fibrosis, may develop in severe stage, particularly with *Thelazia rhodesi* infections in cattle (Fitzsimmons, 1963).

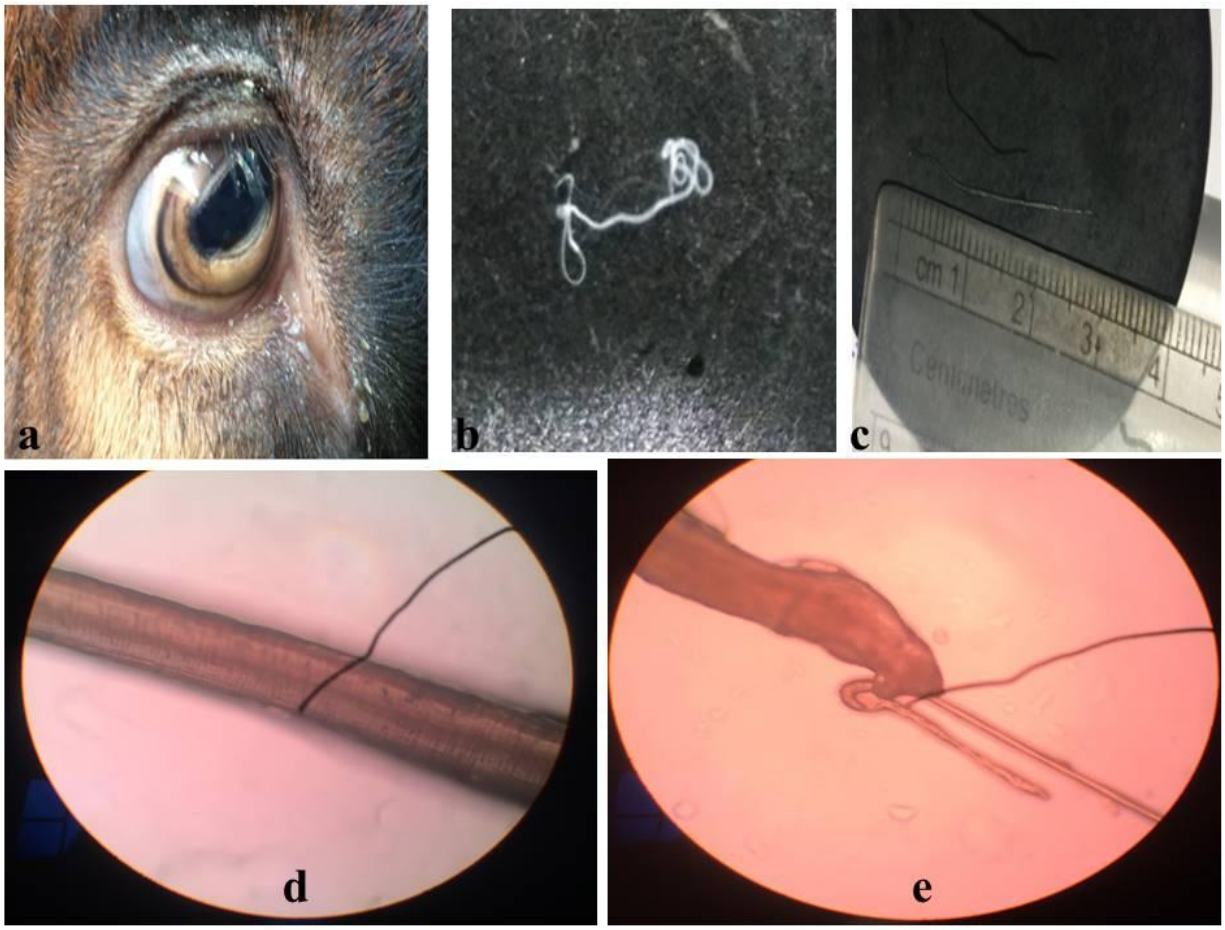

Figure 2: (a) Clearance of the cornea after 21 days of postoperative, (b) Creamy white slender shaped eye worm, (c) Measurement of the worm by measuring scale, (d) Prominent transverse striations under microscope, and (e) Presence of posterior papillae under microscope

Various clinical signs are related with thelaziasis, including keratitis, conjunctivitis, lacrimation, epiphora, photophobia, and corneal opacity (O'Hara and Kennedy, 1991; Soulsby, 1986 and Urquhart et al., 1996) report that conjunctivitis in *Thelazia rhodesi* infections occur with the dying off of adult worms and new infection with young individuals. These clinical signs were also found in the present case. In severe cases, the whole cornea can be opaque (Otranto, 2005a). The localization of the eye worms in the anterior or posterior chants or in the vitreous body and retina induces clinical symptoms, such as, decreased vision, black spots in a visual field, photophobia, excessive lacrimation ocular congestion, aqueous humor turbidity and sometimes purulent exudates under the anterior chamber (Otranto, 2007). The diagnosis of *Thelazia* infection can only be

confirmed by finding the adult or larval stage in the eye, as it was in this case.

Bovine thelaziasis can be successfully treated using local and systemic antiparasitic drugs (Radostits et al., 2007; Kennedy, 1992 and Soll et al., 1992). Muhammad and saquib (2007) had been advocated both medical and surgical treatments for equine ocular filariasis, although the surgical (needle aspiration) technique has been performed in the present study as it was possible to retrieve the worm completely. A variety of information is scientifically available regarding techniques either by aspiration or incision for removal of *Setaria* spp. from an anterior chamber of the eye. We performed the needle aspiration technique because the application of a 16-gauze needle connected with 10 ml syringe through the limbus into the anterior chamber is a simple, easy, and quick method without complication (Singh et al., 1976), but we used an 18-gauge needle without facing any problem. There are reports on the successful retrieval of intraocular parasites by aspiration from the horse eye (Gangwar et al., 2008) and cattle eye (Shin et al., 2002) using a 16-gauge needle connected to a 10 ml syringe and an 18-gauge needle connected to a 10 ml syringe, respectively. In another study, Rahman et al. (2017) successfully used a 16-gauge needle to remove *Setaria* spp. in a horse eye. In this study, we used an 18-gauge needle to puncture the cornea and to aspirate the worm.

In a study, Tuntivanich et al. (2011) used an 18-gauge needle to remove the worm but the parasite could not be removed, and an additional incision on the cornea was required. However, no additional incision was required in the present study to remove the worm. Singh et al. (1976) said not to give the stab incision because of the likelihood of shrinkage of the eyeball as a result of aqueous humor effusion. In this case study, we successfully removed the worm by using an 18-gauge needle without any aqueous humor effusion. Administration of topical antibiotics is recommended because bacterial keratitis is common in goats. A combination of antibiotics and corticosteroids is administered postoperatively to reduce intraocular inflammation and corneal opacity. Ivermectin was administered preoperatively because no anthelmintics were given to the present goat. Recovery of the corneal opacity may vary after surgery. In our study, it was observed that the corneal transparency subsided in 21 days of postoperative which was similar with the previous study where there was found complete corneal transparency in 18-21 days (Buchoo et al., 2005; and Jaiswal et al., 2006) and this finding is reverse to the finding of Rahman et al. (2017) where they have found the removal of corneal opacity and the cornea regained transparency with vision by postoperative 14 days. In this report, the clinical presentation of *Thelazia* species ocular infection in goats and its successful treatment is being described for the first time in Bangladesh.

CONCLUSION

Various species of *Thelazia* are responsible for causing ocular infection in animals. There are many treatment protocols for ocular worm infections. Among these protocols, removal of ocular parasites through the use of an 18-gauge needle technique under sedation and local anesthesia is easy and preferable, but it is somewhat costly. *Thelazia rhodesi*, an ocular eye worm, is present in the anterior chamber of an eye, and it can be successfully removed by using this technique without any serious complications. After surgery, corneal opacity was gradually reduced, and vision was found clear. This was the first study in our country to use this technique in goats, and further studies should be conducted in the study area of assessing the species of the parasite and vectors as well as their seasonal dynamics and economic impact on the disease.

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REFERENCES

Anderson RC (2000). Nematode parasites of vertebrates: their development and transmission, 2nd ed. Cabi Publishing, UK.

Arbuckle JBR and Khalil LF (1976). Thelazia worms in the eyes of British cattle. Veterinary Record, 99(19), pp.376-377.

Basak SK, Hazra TK and Bhattacharya D (2007). Persistent corneal edema secondary to presumed dead adult filarial worm in the anterior chamber. Indian journal of ophthalmology, 55(1), p.67.

Buchoo BA, Pandit BA, Shahardar RA, Parrah JD and Darzl MM (2005). Surgical management and prevalence of ocular filariasis in equines. Indian Veterinary Journal, 82(1), pp.81-82.

Fitzsimmons WM (1963). Verminous ophthalmia in a cow in Berkshire-a review of Thelazia infections as a veterinary problem. Veterinary Record, 75(40), pp.1024-1027.

Gangwar AK, Devi S, Singh HN and Singh A (2008). Ocular filariasis in equines. Indian Veterinary Journal, 85(5), pp.547-548.

Ikeme MM (1967). Kerato-conjunctiv-itis in cattle in the plateau area of Northern Nigeria. A study of Thelaziarhodesii as a possible aetiological agent. Bulletin of epizootic diseases of Africa, 15(4), pp.363-367.

Kennedy MJ (1992). The efficacy of ivermectin against the eyeworm, *Thelazia skrjabini*, in experimentally infected cattle. Veterinary Parasitology, 45(1-2), pp.127-131.

Muhammad G and Saqib M (2007). Successful treatment of ocular equine microfilariasis (*Setaria* species) with ivermectin. The Veterinary record, 160(1), p.25.

O'Hara JE and Kennedy MJ (1991). Development of the nematode eyeworm, *Thelazia skrjabini* (Nematoda: Thelazioidea), in experimentally infected face flies, *Musca autumnalis* (Diptera: Muscidae). The Journal of Parasitology, pp.417-425.

Otranto D and Traversa D (2005). Thelaziaeyeworm: an original endo-and ecto-parasitic nematode. Trends in Parasitology, 21(1), pp.1-4.

Otranto D, Cantacessi C, Mallia E. and Lia RP (2007). First report of *Thelazia callipaeda* (Spirurida, Thelaziidae) in wolves in Italy. Journal of wildlife diseases, 43(3), pp.508-511.

Otranto D, Ferroglio E, Lia RP, Traversa D and Rossi L (2003). Current status and epidemiological observation of *Thelazia callipaeda* (Spirurida, Thelaziidae) in dogs, cats and foxes in Italy: a "coincidence" or a parasitic disease of the Old Continent? Veterinary Parasitology, 116(4), pp.315-325.

Otranto D, Lia RP, Cantacessi C, Testini G, Troccoli A, Shen JL and Wang ZX (2005a). Nematode biology and larval development of *Thelazia callipaeda* (Spirurida, Thelaziidae) in the drosophilid intermediate host in Europe and China. Parasitology, 131(6), pp.847-855.

Otranto D, Lia RP, Traversa D and Giannetto S (2004). *Thelazia callipaeda* (Spirurida, Thelaziidae) of carnivores and humans: morphological study by and scanning electron microscopy. Parasitologia, 45, pp.125-133.

Otranto D, Testini G, De Luca F, Hu M, Shamsi S and Gasser RB (2005b). Analysis of genetic variability within *Thelazia callipaeda* (Nematoda: Thelazioidea) from Europe and Asia by sequencing and mutation scanning of the mitochondrial cytochrome c oxidase subunit 1 gene. Molecular and cellular probes, 19(5), pp.306-313.

Radostits OM, Gay CC, Hinchcliff KW and Constable PD eds., 2007.Veterinary Medicine E-Book: A textbook of the diseases of cattle, horses, sheep, pigs and goats. 10. ed. Philadelphia: Saunders.

Rahman M, Rana EA, Tanvir MI, Sabuj AAM, Imtiaz MA and Hasan T (2017). A case study on needling technique as a treatment for ocular setariasis in eye of a horse. Asian Journal of Medical and Biological Research, 3(3), pp.398-404.

Sastry GA (1985). Veterinary Clinical Pathology. CBS publishers & distributers, India, pp 4-35.

Shen J, Gasser RB, Chu D, Wang Z, Yuan X, Cantacessi C and Otranto D (2006). Human thelaziosis—a neglected parasitic disease of the eye. Journal of Parasitology, 92(4), pp.872-876.

Shin S, Cho K and Wee S (2002). Ocular infection of cattle with Setariadigitata. Journal of Veterinary Medical Science, 64, pp.7-10

Singh H, Chaudhuri PC and Kumar A (1976). Paracentesis oculi: a preferred technique for removal of intra-ocular parasites in horses. Indian Veterinary Journal, 53, pp.467-468.

Soll MD, Carmichael IH., Scherer HR and Gross SJ (1992). The efficacy of ivermectin against *Thelazia rhodesii* (Desmarest, 1828) in the eyes of cattle. Veterinary Parasitology, 42(1-2), pp.67-71.

Soulsby EJL (1986). Helminths, Arthropods and Protozoa of domestic animals, 7 ed. Bailliere Tindall, London, pp.289-291.

Tuntivanich N, Tiawsirisup S and Tuntivanich P (2011). Success of anterior chamber paracentesis as a treatment for ocular setariasis in equine eye: case report. Journal of Equine Veterinary Science, 31(1), pp.8-12.

Urquhart GM, Armour J, Duncan JL,, Dunnand AM and Jennings FW (1996). Veterinary Parasitology, 2nd ed. Blackwell publishing. New York, pp.79-83.