CHAPTER I

Introduction

Thelazia (Spirurida: Thelazioidea), are commonly known as eye worms and cause ocular infections in animals and humans (Anderson, 2000 and Soulsby, 1986). *Thelazia* is a genus of parasitic round worms that affects the eyes of many domestic animals, including cattle, dogs, cats, sheep, goats and other livestock. Many wild mammals and birds are affected as well. Predilection site of adult *Thelazia* worms are the eyes and the tissues around it (eye lids, lacrimal ducts and glands) (Otranto *et al.,* 2007 and Otranto *et al.,* 2004).

Thelazia californiensis affects dogs and cats, very occasionally humans as well. It is found in Western North America. *Thelazia callipaeda* affects dogs and cats, 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 rhodesii* 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 eyes causing conjunctivitis, keratitis, lacrimation, ocular discharge, and ulcers (Ikeme, 1967; Otranto and Traversa, 2005).

Morphology of the Parasite: *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 side in which the anterior sucker end and 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 manifesting 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 per chloride 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 a delayed resorption of 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. Surgical approach is a simple and quick method and the post-operative complications are also minimum.

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

CHAPTER II

Materials and Methods

2.1. 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 the history of corneal opacity, lacrimation, epiphora, partial blindness, blepharospasm, ocular discomfort, restlessness. Ocular examination of the affected unilateral eye revealed presence of eye worm moving in the anterior chamber. Menace reflex for affected unilateral eye vision was partially positive, partial blindness was observed. The eyeworm was located on the anterior chamber of eye (Figure 1). Primarily diagnosis was made on the basis of clinical signs and the activity of the worm in the anterior chamber.

2.2. Haemato-biochemical study

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

2.3. Restraining and Anesthesia

The goat was restrained by side line method and positioned in left lateral recumbency in the operation theatre. The patient was sedated with Diazepam @ 0.5 mg/kg, intravenously. Retrobulbar nerve block was performed by using 2% lignocaine hydrochloride (Figure 2) and topically propracaine hydrochloride was used to control eyeball movement.

2.4. Surgical procedure

The periocular skin of the right eye was prepared for surgery with 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 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 18-gauge needle was inserted

through limbus (junction between cornea and sclera) (Fig-3). After coming towards one end of worm, the worm was inserted into the aspirated needle syringe with some aqueous humor. After the removal of the parasite, the operated eye was thoroughly flushed with normal saline and. The worm was then collected and immediately submerged into 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 removal of eye worm, postoperatively eye drop Civodex (Combination of Ciprofloxacine and Dexamethesone) was prescribed as two drops in the affected eye twice in a day for 10 days. Antibiotic, Antihistaminic, NSAID was prescribed parenteraly use for 7 days along with some advices were given to the owners.

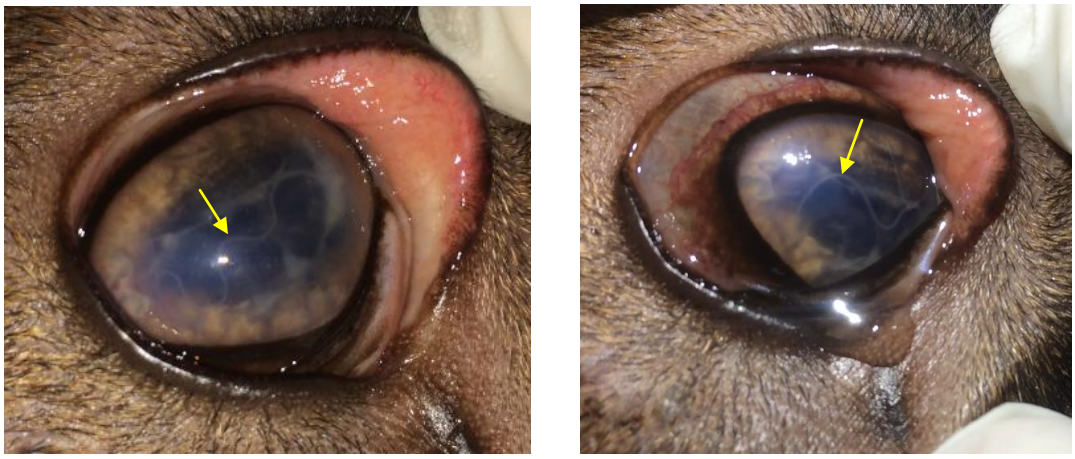

Figure 1: Live eye worm in eye of a goat (indicated by arrow)

Figure 2: Retrobulbar nerve block

Figure 3: Insertion of 18-gauge needle through limbus

2.5. Macroscopic and Microscopic examination of worm

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

CHAPTER III

Results

The goat had the history of mild blindness observed during feeding, continuous lacrimation and movement of the worm in the affected eye for 10 days. The clinical examination of the eye revealed mild degree of corneal opacity, conjunctivitis and partial blindness. The swimming movement of the white thread like worm in the aqueous humor was noticed. Heart rate, respiratory rate and rectal temperature were within normal physiological limits. There was no administration of anthelmintic history of that goat. 1st day after surgery mild conjunctivitis found 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 4). Good nursing and care by animal owner helps to cure the animal with good recovery. It includes protection of eye from flies, clean stable and maintenance of the drug properly. No post-surgical complications were reported by the owners.

Figure 4: Clearance of the cornea after 21 days of postoperative

In haemato-biochemical examination, blood pictures exhibited non-significant variations but in 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: Analysis of hematological parameters

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: Analysis of biochemical parameters

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

In macroscopic examination of worm found the size which was about 2.8cm (28mm) measured via measuring scale (Figure 6). The body of the worm was milky-white and slender shaped (Figure 5). Under microscopic examination the body was thick with prominent transverse striations (Figure 7). Microscopic examination of the worm also revealed the presence of posterior papillae (Figure 8). All examined characteristics of the worm was similar to the morphology of *Thelazia rhodesii* species.

Figure 5: Creamy white slender shaped eye worm

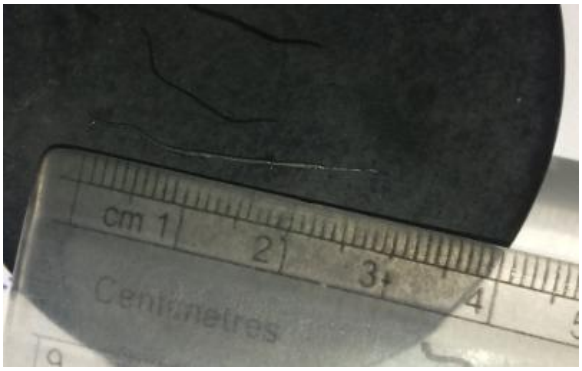

Figure 6: Measurement of the worm by measuring scale

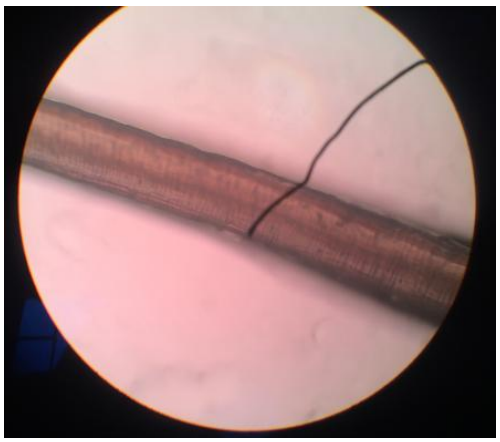

Figure 8: Prominent transverse striations under microscope (10x magnification)

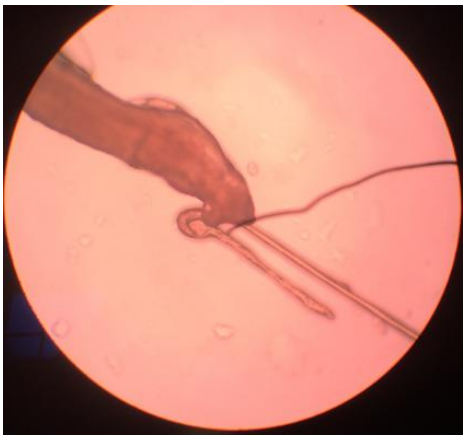

Figure 7: Presence of posterior papillae under microscope (10x magnification)

CHAPTER IV

Discussion

Thelaziasis is the common problem in the tropical and sub-tropical zone of the world. Bangladesh lies in the temperate zone above the tropic line of the cancer (23.6850° N, 90.3563° E). The intermediate host of the parasite has a seasonal high 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 to another host by the genus *Musca* (family Muscidae). The species *Musca autuminalis* and occasionally *Musca domestica, Musca larvip*ara and *Musca amica* transmit when feeding on the tears (Anderson, 2000).

Thelazia have 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 rhodesii* (Fitzsimmons, 1963). Invasion of the lachrymal gland and excretory ducts may cause inflammation and necrotic exudation. Mild to severe conjunctivitis and blepharitis are common. Also, keratitis, including opacity, ulceration, perforation and permanent fibrosis, may develop in severe cases, particularly with *Thelazia rhodesii* infections in cattle (Fitzsimmons, 1963).

Various clinical signs are associated with thelaziasis including keratitis, conjunctivitis, lacrimation, epiphora, photophobia and corneal opacity (O'Hara and Kennedy, 1991; Soulsby, 1986 and Urquhart *et al.,* 1996) reports that conjunctivitis in *Thelazia rhodesii* infections coincided 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 vitreous body and retina, inducing clinical symptom, such as, decreased vision, black spots in 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 the 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 anterior chamber of eye. We performed needle aspiration technique because application of 16-gauze needle connected with 10 ml syringe through the limbus into the anterior chamber is simple, easy and quick method without complication (Singh *et al.,* 1976) but we used 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 16-gauge needle to remove *Setaria spp*. in a horse eye. In this study, we used 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 a likelihood of shrinkage of the eyeball as a result of aqueous humor effusion. In this case study we successfully removed the worm by using 18-gauge needle without any aqueous humor effusion.

Administration of topical antibiotic 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 anthelmintic were given to the present goat. Recovery of the corneal opacity may vary after surgery. In the present study, it was observed that the corneal transparency was subsided in 21 days of postoperative which is agreement 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

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 goat and its successful treatment which probably described for the first time in Bangladesh.

CHAPTER V

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 parasite through the using of 18-gauge needle technique under sedation and local anesthesia is easy and most preferable but it is somewhat costly. *Thelazia rhodesii*, an ocular eye worm is present into the anterior chamber of 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 possibly the first study in our country by using this technique in goat 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 of the disease.

CHAPTER VI

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CHAPTER VII

Brief Biography of the student

Sabiha Zarin Tasnim Bristi is an intern student for the degree of Doctor of Veterinary Medicine (DVM), Faculty of Veterinary Medicine, CVASU. She passed the Secondary School Certificate Examination (SSC) in 2007 from Bangladesh Navy School and College Chittagong and got CGPA 5.00 and then Higher Secondary Certificate Examination (HSC) in 2009 from Bangladesh Navy School and College Chittagong and got CGPA 4.88 Then she admitted to the degree of Doctor of Veterinary Medicine (DVM), Faculty of Veterinary Medicine, CVASU in 2012-2013 session. She has great interest in animal welfare ,wildlife and small animal medicine.