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Short Communication

NON-CONVENTIONAL REMEDIAL APPROACH TO INTRAOCULAR NEMATODIASIS IN HORSES UNDER THE FIELD CONDITIONS: THREE CASE STUDIES

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ABSTRACT: Intraocular nematodiasis is a vision-threatening disease of equine, caused by *Setaria* spp. This clinical presentation describes three cases of equine intraocular nematodiasis which were successfully treated with surgical and medical interventions. Upon the clinical examination, all the horses were found having moderate corneal opacities in the eyes. The swirling movements of a white thread-like worm were evident in each case in the eye. Animals were anesthetized using 10% Xylazine (1.1mg/kg) and 10% Ketamine (2.2 mg/kg) intravenously. In case number one and two, an 18G hypodermic needle connected to a 1cc syringe was inserted through the limbus to the anterior chamber of the affected eye. In case number three, an 18 G intravenous (IV) cannula was placed instead of a hypodermic needle. The needle/cannula was carefully directed towards one end of the worm and it was aspirated with a small amount of aqueous humour. Ciprofloxacin 'eye drops' were used thrice daily for seven days. All three cases were fully recovered within three weeks without complications. This method would provide less invasive, time-saving, cost-effective, and safer techniques that can be practiced with minimum assistance and a single dose of general anesthesia even under field conditions.

Key words: Ocular nematodiasis, *Setaria* spp, Equine, Nonconventional treatment.

Equine intraocular nematodiasis is a vision-threatening disease of equine which is caused by *Setaria* spp. *Setaria digitata* and *Setaria equina* are the most common causes of equine ocular setariasis where *Setaria marshalli* also can be a cause of this condition (Gangwar *et al*. 2008, Yu *et al*. 2021). *Setaria digitata* is a species commonly found in Asia and it often affects cattle and buffaloes as definitive hosts with a common predilection site in the peritoneal cavity (Jayathilake *et al*. 2019, Yu *et al*. 2021). Also, the parasite can be seen in various organs such as the heart, lungs, kidney, spleen, and urinary bladder of them (Jayathilake *et al*. 2019, Tuntivanich *et al*. 2011). Within the definitive host, the nematodes are nonpathogenic in most cases.

Biting insects such as mosquitoes including the genera- *Aedes*, *Culex*, *Anopheles*, *Hyrcanus,* and *Armigeres* are the vectors, especially for *S. digitata*. When the mosquitoes fed on the infected blood, they become infected with microfilaria. Inside the mosquito, microfilaria is developed into infective larvae (L3) within 2-3 weeks. The infective larvae are transmitted to the susceptible aberrant hosts (goats, sheep, and horses) and migration is started during the blood meal by the infected mosquitoes. The parasite invades the eyes causing intraocular nematodiasis (Ganwar *et al*. 2008, Pratap *et al*. 2005, Yadav *et al*. 2006). However, the route of ocular migration in infected equines is yet unknown (Yu *et al*. 2021).

Infected animals usually display signs of photophobia, lacrimation, corneal opacity, conjunctivitis, synechiae, and impaired vision in cases when the treatment is delayed (Patil *et al*. 2012, Tuntivanich *et al*. 2011, Yu *et al*. 2021). In these cases, the main target of the treatment was to remove the parasite by surgical intervention with medical management successfully.

The study

Three horses were referred to the Veterinary Ambulatory Clinic, Farm Animal Teaching Hospital (FATH), Faculty of Veterinary Medicine, University of

Farm Animal Teaching Hospital, Department of Farm Animal Production and Health, Faculty of Veterinary Medicine and Animal Science, University of Peradeniya Sri Lanka.
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Peradeniya, Peradeniya, Sri Lanka with the complaint of opacity in the right eyes of three horses since 3-5 days, including the presence of a worm inside the anterior chamber of the eye in case number 03.

Case No 1: A five years old female half-bred horse that was free ranging on a five-acre land with another female half-bred horse.

Case No 02: A four-and-a-half-year-old female Marwari horse that was rearing under stall management with cattle on the same premises.

Case No 03: An eleven years old thoroughbred gelding that was reared under stall management in a tea estate where there was only one horse in the stable.

The three cases were from 80- 240 km away from the hospital. Few images and video clips of both affected and non-affected eyes were obtained using a social media platform where the presence of worms could be identified in two cases.

The owners were advised to keep the animals fasting (off food for twelve hours and off water for six hours) for a probable surgical intervention.

Clinical examination

A general clinical examination was performed for all three cases including a thorough ophthalmic examination. Other parameters such as heart rate, pulse rate, rectal temperature and capillary refilling time, etc were normal in all three cases except for signs related to the right eyes (Fig. 1). Moderate graded corneal opacity with the swirling movement of nematode larvae inside the aqueous humour of the affected eyes was observed in each case under a light source. All three cases were diagnosed as intraocular nematodiasis with the possibility of detecting *Setaria* larvae inside the anterior chamber of the host. The animals were handled in the accordance with the institutional guidelines and ethics for the care and use of animals at the University of Peradeniya. Both owners and handlers were explained the procedure to get their consent and support.

Surgical procedures and treatment

All the required instruments for the surgical approach were arranged before anesthesia. The body weight of each animal was calculated according to the equation developed by Carroll and Huntington (1988) with an accuracy of up to 99.6% (Ellis and Hollands 1998).

Sedation and anesthesia were carried out with the intravenous administration of Xylazine (Bromazine 2%, New Zealand) (1.1mg/kg) and Ketamine (Ketamil Australia) (2.2 mg/kg) respectively in two minutes gap (Hall and Taylor 1981). After putting animals into the left lateral recumbency, the affected eye was washed with normal saline in each animal. The tip of an 18G hypodermic needle connected to a 1cc syringe was inserted through the limbus to the aqueous humor in a dorso-ventral direction closer to the upper palpebra (Fig. 2A) in case numbers 01 and 02.

The needle was directed to the bottom of the anterior chamber where the non-motile worm could be visible.

In case number 03, an 18 G intravenous cannula was used instead of the 18 G hypodermic needle. The cannula was inserted through the limbus closer to the lateral canthus in the cranio-ventral direction. The stylet of the cannula was partially withdrawn once the limbus was pierced (Fig. 2B). The stylet was completely withdrawn once the cannula reached the bottom of the anterior chamber and it was connected to a 1cc syringe.

Then the needles in case number 01 and 02 and the cannula in case number 03 were carefully directed toward one end of the worm and it was aspirated with a small amount of aqueous humour (Fig. 3). Then the needles or the cannula were withdrawn carefully while applying

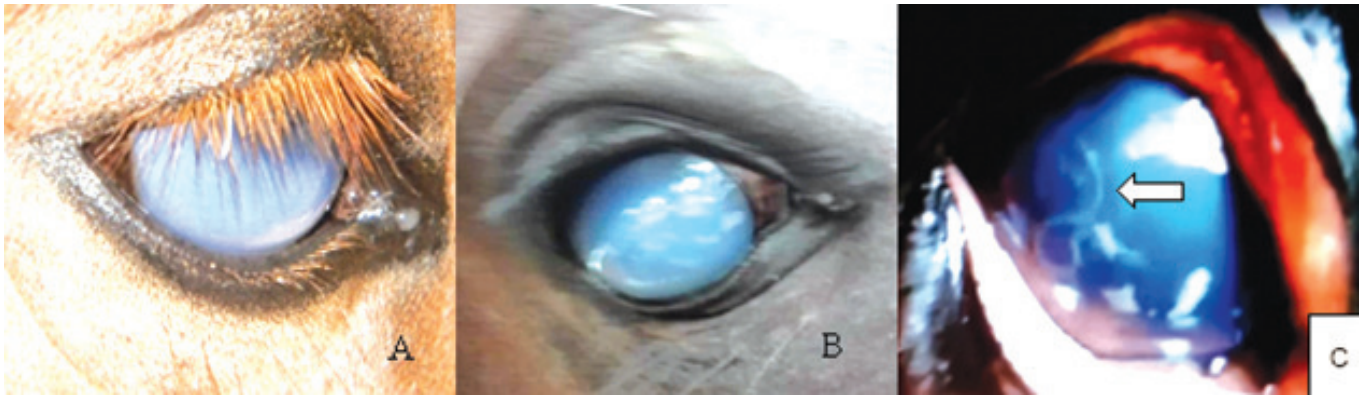

Fig 1. Appearance of the affected eyes prior to the surgery.
[(A) case no. 1, (B) case no. 2, (C) case no. 3 (Arrow- live worm in the aqueous humor)].

Fig. 2. Demonstration of the aspiration techniques of the worm.
[(A)-insertion of the 18 G hypodermic needle, (B)-insertion of the intravenous cannula, 'Arrow' indicates the level of the stylet of the cannula].

Fig. 3. Microscopic images of nematode larvae after the aspiration from the eye.
[A- case no. 1: whole larvae (10×10), B- case no. 2: ventral view of posterior region, 'Arrows'- lateral appendage, and 'Circle' terminal end (10×40)].

gentle pressure on the pierced point through the upper palpebra. The pressure was maintained for a few seconds. Finally, four drops of 'Ciprofloxacin eye drops' were administered to the eye.

Post-operative medical management

Two drops of Ciprofloxacin eye drop (Ciplox, India) were prescribed thrice daily for seven days in each case. Improvements in the eyes were evaluated using images obtained once a week until full recovery in each case.

The corneal opacity gradually decreased. All three cases fully recovered within three weeks without any impairment of the vision or any other complications (Fig. 4). It revealed the good prognosis of these techniques.

Discussion

Clinical signs and close examination of the eye can be used to diagnose this condition primarily. Using a light source could be very much supportive due to the corneal opacity of the affected eyes. For further diagnosis, hematological findings such as anemia with leukocytosis in full blood count, accelerated erythrocyte sedimentation rate (ESR) (Muhammad and Saqib 2007), microscopic examination of wet blood films for identification of *Setaria* larvae, and Knott's test (Jayathilaka *et al.* 2019, Rafee and Amarpal 2016) would be supportive. However, those laboratory tests were not practical for these cases due to the lack of such facilities closer to the locations.

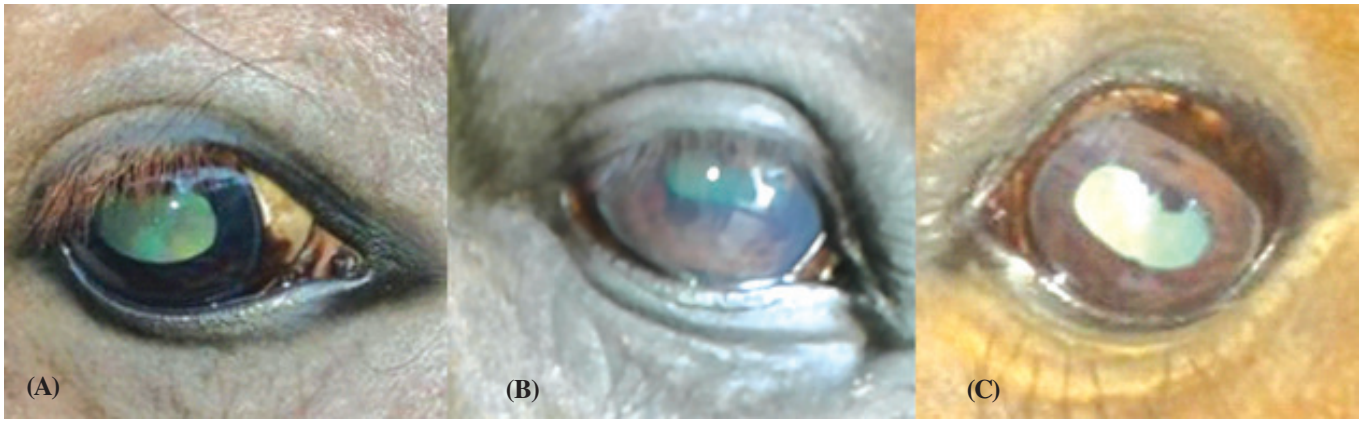

Fig. 4. Three weeks after the treatments of affected eyes in each case.
[(A) case no. 1, (B) case no. 2, (C) case no. 3].

The serrated cuticle of the worm, erratic movements, and toxins liberated by the dead worms inside the anterior chamber of the eye cause severe irritation and damage which will lead to the inflammation of the cornea, corneal opacity, corneal edema, cataract, and retinal detachment (Aswathy *et al*. 2013, Rafee and Amarpal 2016). The dead filarial worm can get attached to the endothelium in the anterior chamber gradually resulting in blindness (Jaiswal *et al*. 2006). Due to that circumstance, intraocular administration of ivermectin would not be a better solution for this condition. Further, there are reported cases of the trans-corneal injection of ivermectin (Gunaretnam *et al*. 2009, Jayathilaka *et al*. 2019). Those usages can lead to direct trauma to the eye and also it has a high risk of slow wound healing or causing ulcerations due to the low blood supply of the cornea. Permanent scar formation on the cornea leading to an iatrogenic blind zone would be the other risk.

The surgical part in all the cases was completed only with the induction dose of anesthesia within 15- 20 minutes. Minimum usage of anesthesia would be worthwhile economically as well as medically. Pre-preparation of the surgical and medical requirements could be very much supportive for such economical management of the condition.

Both medical and surgical treatments have been promising for this condition (Tuntivanich *et al*. 2011). Removal of the worm through either a stab incision placed over the cornea under general anesthesia or a regional nerve block can be performed as a surgical approach to this condition as well (Patil *et al*. 2016, Rafee and Amarpal 2016, Rahman *et al*. 2017). However, comparatively, it would be an invasive method. Thus, the needle aspiration of the larvae across the limbus would not be much invasive and it would be a more efficient technique with better wound healing. Low friction against the limbus tissue could be an advantage of the hypodermic needle for the above task. However, manipulation of the sharp tip within the aqueous humor may cause a higher risk of damaging the cornea with the use of such needle. That risk could be overcome with the replacement of the hypodermic needle with an18G intravenous cannula. Just after insertion of the intravenous cannula through the limbus, the stylet can be partially withdrawn to prevent damaging the cornea while moving towards the worm. The stylet should not be fully withdrawn before the cannula reaches the target due to the absence of enough rigidity without it. However, compared to the 18 G needle, the cannula was stickier with the tissues at the limbus. It would be the major difficulty in directing the cannula towards the worm. This method would provide a less invasive, quick, and successful approach with a minimum dosage of general anesthesia to treat equine ocular nematodiasis.

The techniques and strategies would provide a less invasive, time-saving, cost-effective, and safer approach which can be practiced with the minimum assistance and a single dose of general anesthesia even under field conditions.

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REFERENCES

Aswathy G, Kiranjeet S, Saxena AC, Khurana K.L (2013) Evaluation of two techniques for management of ocular setariasis in horses. Res Opin Anim Vety Sci 3(11): 407-411.

Carroll CL, Huntington PJ (1988) Body condition scoring and weight estimation of horses. Equine Vet J 20(1): 41-45.

Ellis JM, Hollands T (1998) Accuracy of different methods of estimating the weight of horses. Vet Record 143(12): 335-336.

Gangwar AK, Sangeetha D, Singh HN, Singh A (2008) Ocular filariasis in equines. Indian Vet J 85(5): 547-548.

Gunaretnam I, Neelawthura CJB, Amarasinghe A, Perera GDRK, Gabadage KP *et al.* (2009) Successful treatment of ocular nematodiasis in a horse with ivermectin. The Sri Lanka Vet J 61(56): 60.

Hall LW, Taylor PM (1981) Clinical trial of xylazine with ketamine in equine anaesthesia. Vet Rec 108(23): 489-493. DOI: 10.1136/vr.108.23.489.

Jaiswal S, Singh SU, Singh BSH (2006) Ocular setariosis in a horse. Intas Polivet 7: 67-68.

Jayathilake WMNK, Nizanantha K., De Silva LN (2019) Management of ocular setariasis in ponies with local ocular ivermectin injection. J Advanced Vet Res 9(3): 130-132.

Muhammad G, Saqib M (2007) Successful treatment of ocular equine microfilariasis (*Setaria* species) with ivermectin. Vet Record 160 (1): 25-26. DOI: 10.1136/vr.160.1.25.

Patil DB, Kelawala DN, Parikh PV, Sheth MJ, Sini KR, Parmar JJ (2016) Surgical management of ocular setariasis in horses. Indian J Vet Surgery 37(1): 44-47.

Patil DB, Parikh PV, Joy N, Jhala SK, Dar MUD, Tiwari DK (2012) Equine eye worm: A review of 50 cases. Indian J Vet Surgery 33(1): 61-62.

Pratap KA, Aithal HP, Hooque M, Vdekar PK, Pawde AM (2005) Survey of eye disorders in domestic animals. Indian J Anim Sci 75(1): 33-34.

Rafee MA, Amarpal A (2016) Equine ocular Setariasis and its management. J Experiment Biol Agri Sci 4: 139-143.

Rahman M, Rana EA, Tanvir MI, Sabuj AAM, Imtiaz MA, Hasan T (2017) A case study on needling technique as a treatment for ocular setariasis in eye of a horse. Asian J Medic Biol Res 3(3): 398-404.

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

Yadav A, Kumar A, Bhadwal MS, Khajuria JK, Gupta A (2006) Ocular setariosis in horses: a case study. J Vet Parasitol 20(2): 183-184.

Yu F, Liu B, Chen S, Yi Z, Liu X, Zhu Y, Li J (2021) First molecular confirmation of equine ocular setaria digitata in China. Vet Sci 8(4): 55. DOI: 10.3390/vetsci8040055.

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