

Short communication

TOXOCARIASIS IN PUPPY - MORPHOLOGICAL DESCRIPTION AND CLINICAL MANAGEMENT

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ABSTRACT: A 34-day-old, male Bully pup was presented in veterinary clinics with an uncertain anamnestic history of anorexia, lethargy, abdominal pain, and discomfort. On clinical examination, the pup had pale conjunctiva with a pot-bellied appearance and expelled cream-colored roundworms in feces. Blood and fecal samples were collected and analyzed. Hemoglobin and PCV values were lower, depicting anemia. A qualitative and quantitative examination of the fecal sample was carried out and results showed infection with *Toxocara canis* with fecal egg count (FEC) of 3200/gram of feces. Gross and light microscopic examination revealed the presence of adults of *Toxocara canis* with distinctive morphological features. Apropos, the pup was treated with a combination of pyrantel pamoate and fenbendazole orally @10mg/kg body weight, repeated after 14 days. The pup recovered successfully, as evidenced by decreased FECs, increased weight gain, and a high hematocrit score.

Keywords: *Toxocara canis*, Pup, Roundworms, Morphology, Pyrantel pomate, Febental.

Rearing of companion animals is becoming a common practice throughout the globe and the importance of maintaining the health of these animals is becoming a challenge to healthcare providers. The development of various diagnoses and treatment procedures is given importance due to that reason [1, 2]. Due to changes in the natural food and living environment, these animals suffer from many diseases that were not so common previously [3, 4, 5]. Infestation of different parasites is a common problem encountered in pet animals [6, 7] and the emergence of resistance to the anti-parasitic drugs is increasing the problem [8, 9].

Ascarids are large nematodes inhabiting the intestines of animals and occurring worldwide. Commonly encountered ascarid worm species in dogs are *Toxocara canis*, *Toxocara cati*, and less frequently *Toxascaris leonina* [10]. Among these, *T. canis* is cosmopolitan and causes a life-threatening condition in young puppies aged up to 2 months. The disease entity is manifested by clinical signs of diarrhea or constipation, vomiting, and anemia with a rough and harsh body coat leading to ill health [11]. The parasite

has an elaborate propagation strategy that utilizes both vertical and horizontal transmissions, making its lifecycle complex. Vertical transmission takes place via the prenatal/placental or lactogenic routes and horizontal transmission occurs through contaminated feed and beddings. Trans-placental route of infection is predominant in puppies and accounts for 80% of cases when compared with the lactogenic route [12]. Dormancy and the occult nature of the parasite in bitch gravitate to the infection. Once infected, bitch can transmit the infection to subsequent litters [13]. Infection through milk is most severe during the 2nd week of lactation when maximum larval output is observed; however, the bitch continues to shed larvae in milk up to the 5th week [14]. Lifecycle also utilizes rodents and other animals, including humans, as paratenic hosts [15]. The eggs of *Toxocara* species are very sturdy due to the presence of a thick protective shell and can survive for 9 years in an environment with resistance to basic chemical agents [16].

The parasite has major public health importance being the cause of visceral larva migrans (VLM) in the human host, where the parasite migrates inside visceral

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organs with the formation of eosinophilic granulomas. In rare cases, the parasite enters the eyeball, causing ocular larva migrans (OLM), leading to irreversible damage to the eye tissue [17]. Zoonotic occurrence of the disease is more common in children aged below 5 years due to their dirt eating habits and playful attitude towards dogs. Major anthroponoses (transmission from animal to human) occur at parks and play fields that are contaminated with dog feces [18].

History and clinical observation

A 34-day-old, male Pakistani bully pup, weighing 3 kilograms, was presented at the Advanced Veterinary Multispecialty Hospital in Palampur for a checkup. The owner complained that the puppy was eating abnormal objects and had decreased appetite with stomach upset for the past 3 days. The pup had irregular voiding and occasionally expelled worms in his feces. They also preferred to sit on his stomach and showed colic symptoms. The physical alertness of the pup was compromised.

Clinical examination revealed a heart rate of 115 bpm (beats per minute) and a respiration rate of 49 breaths per minute with pale conjunctiva. The animal had a potbellied appearance and exhibited a straddled leg stance (Fig. 1). To investigate, hematology was done by collecting blood in EDTA and analyzing it in a fully automated blood analyzer. Hemoglobin and PCV values of 5.2g/dl and 16.4%, respectively were obtained. Pup expelled a bunch of cream-colored roundworms, which, along with fecal material, were collected and sent for examination for parasitological investigation. The fecal sample was processed for the identification of egg type by standard flotation technique using Sheather sugar solution [10]. Based on the egg morphology and size, *Toxocara* species eggs were identified. Eggs were brown, thick-walled, with pits in the shell, giving them a golf ball-like appearance, and were in the 1-2 celled stage (Fig. 2). To know the severity of the infection and determine the efficacy of treatment, egg counting was done using the modified McMaster technique at days 0, 7 and 14 post-treatments. Initial EPG ranged to 3200, indicating a fatal infection. Further, worms were identified morphologically by clearing them in lactophenol and examining them under a microscope [19].

The male and female worms of *Toxocara canis* were identified microscopically and the findings were by previous works by [20] and [21]. The average size of male (n=9) and female (n=15) worms recorded was 3.6 ± 0.17 cm and 9.4 ± 0.29 cm, respectively (Fig. 3).

Toxocara species can be identified by the presence of three large, well-developed lips, ventriculus (posterior bulb), and cervical alae which give the worm an arrow headed appearance (Fig. 4). The caudal extremity of the male worm was coiled and terminated in a finger-like projection, which is characteristic of *T. canis* male and helps in differentiating the worm from *T. leolina*, another important ascarid of carnivores (Fig. 5a). Numerous cuticular swellings, which appeared as button-like structures in the tail region of males, were identified as papillae (Fig. 5b). In female worms, the uterus was extensive, filled with numerous eggs and occupied about 2/3 of the body. The vulva opened in the anterior 1/3rd region, with female genital organs extending anteriorly and posteriorly. It had a straight-ended caudal extremity with no papillae (Fig. 5c). The examined worms had distinct transverse striations throughout the body (Fig. 5b).

Treatment and discussion

The pup was administered an anti-flatulent and carminative drug followed by vermifugation with pyrantel pamoate and febantel @10mg/kg, which was repeated after 14 days. The pup showed excellent recovery following treatment, which was evident by the decreased FEC. Initial FEC of 3200 was reduced to 300 by day 7 and to zero by day 14, giving an efficacy of 90.62% and 100%, respectively. The findings are comparable with the work by [22], where combinations of drugs comprising febantel, pyrantel, and praziquantel were used at a dose rate of 15-5-5mg/kg. The therapeutic efficacy against ascarids as determined by FECRT ranged from 97-100%, 9-16 days post-treatment. The effectiveness of a drug is marked by its ability to kill more than 95% parasite population, a standard consideration for marking anthelmintic resistance [23]. Increased FEC up to 3600 has been reported in clinical cases with *Toxocara canis* [24]. This is due to highly prolific female worms laying 2,00,000 eggs per day and capable of adding up to 700 egg counts per day per worm to the feces [25]. Pyrantel is a well-documented drug used for treating *Toxocara* in pups and acts on neuromuscular junctions, causing flaccid paralysis of the parasite and leading to the expulsion of dead worms [10]. Simple deworming without using stool softeners can lead to gut obstruction due to the knotting of parasites as a result of drug-induced paralysis [26]. Therefore, in heavy infections, it becomes essential to opt for bowel laxation in addition to deworming. However, resistance to pyrantel pamoate has been

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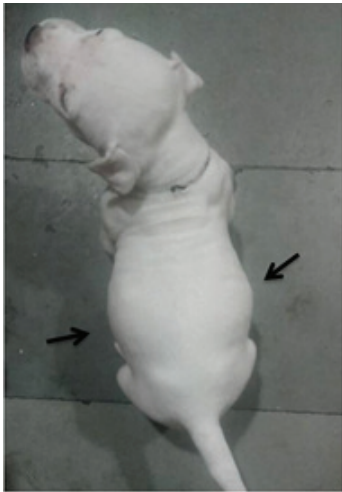


Fig. 1. Pup aged 34 days with a potbelly appearance.

reported for *Toxocara* [27]. When used as a single drug, the efficacy ranged from 85.8 to 93.5 at day 10 post-therapy, as reported by [28] and [27]. However, when used in combination with other drugs like febantel and praziquantel, efficacy increased to 97-100% at day 9 [22]. Pyrantel leads to a slow and gradual expulsion of the worms. When compared with pyrantel, fenbendazole provides an excellent anthelmintic range against both larval and adult stages. Therefore, combined therapy with benzimidazoles and pyrantel achieves good results in lowering FEC. Additionally, body weight gain of 4 kg with increased hematocrit (Hb= 9.8 g/dl, PCV= 24.2%) and improved body score were observed over 50 days post-treatment in our case. A prevalence rate of 100% with mortality up to 80% has been reported with *Toxocara* in the absence of treatment [29].

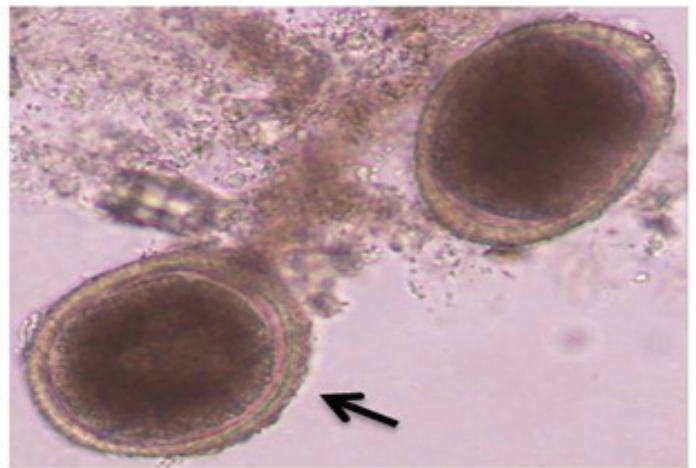
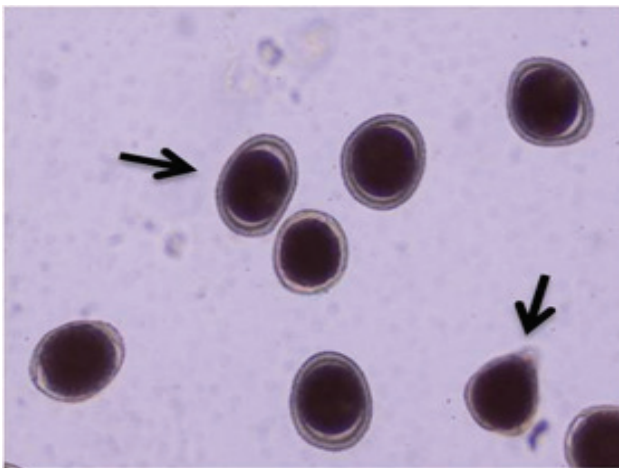


Fig. 2. Eggs of *Toxocara canis* having a golf ball like appearance and showing pitting in shell walls (marked by arrows) under 10x (left) and 40x (right) magnification of a microscope.

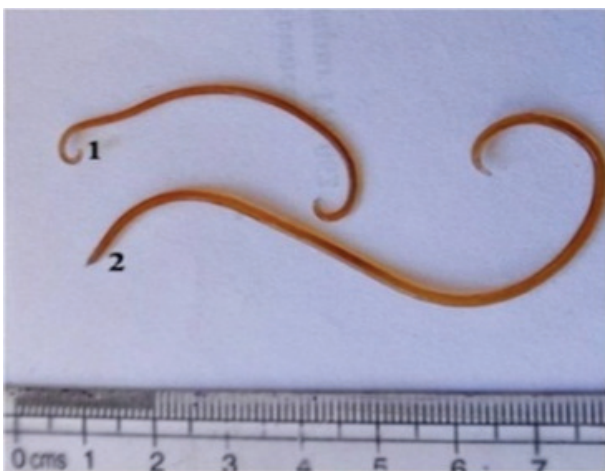


Fig. 3. Macroscopic appearance of adults of *Toxocara canis*: (1) male worm, (2) female worm.

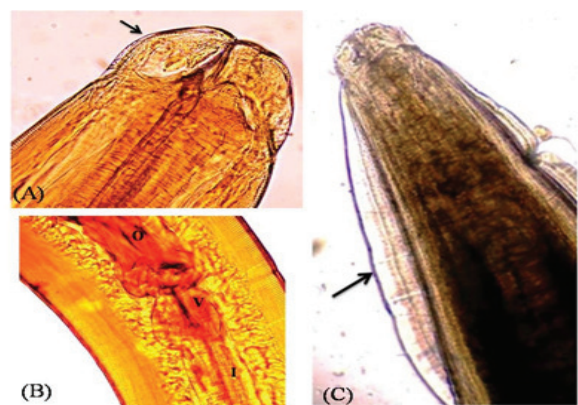


Fig. 4. Anterior end of *Toxocara canis* adults showing: (A) Three large lips, (B) oesophagus [(oesophagus (o), ventriculus (v), intestines (i)], (C) cervical alae.

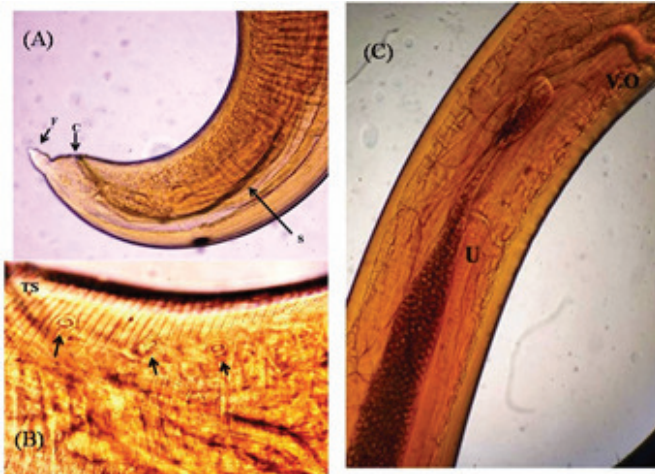


Fig. 5. Posterior ends of male and female worms showing: (A) Finger like digitiform appendage [apandages (f), cloacal opening (c) and spicules (s)], (B) papillae (arrows), transversely striated cuticle (ts); (C) vulvar opening at the anterior 1/3rd region (v.o), uterus filled with eggs (u).

Hence, keeping in view the endemic nature of the disease in India and the low detection of occult infection in adults, the current strategy should be aimed at clearing the infection in bitch and young pups. The gold standard protocol for deworming pups starts 2 weeks postpartum, is repeated every 14 days up to 3 months of age followed by monthly deworming for up to 6 months, and finally ends in the twice-yearly schedule [30]. This strict and exhaustive deworming schedule warrants protection against parasites, namely *Toxocara* and *Ancylostoma* that are vertically transmitted. Additionally, owners' awareness regarding the zoonotic potential of canine diseases should be brushed up by ushering in disease awareness programs. Pet parents should be vigilant to rule out any cause of illness and mortality in pets at an early stage to deal with the economic crisis.

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