Retro-bulbar cyst of *Coenurus gaigeri* in Barbari goats

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Abstract Two adult Barbari goats were presented to the Division of Animal Health of the Institute with the history of unilateral protrusion of the left eye ball, blepharitis and congestion of the conjunctival membrane. Physical and ultrasonographical examination revealed large fluctuating fluid filled bladder with distinct dimensions. The cysts were successfully removed along with its membrane and parasitological examination revealed it as a *Coenurus gaigeri*, the intermediate stage of *T. multiceps gaigeri*. The present report describes the retro-bulbar cyst of *Coenurus gaigeri* in two Barbari goats. This is the first report of retro-bulbar cyst of *Coenurus gaigeri* in goats.

Keywords *Coenurus gaigeri* · Goat · Retro-bulbar cyst · Coenurosis

Introduction

Coenurus gaigeri is the larval stage of *Taenia multiceps gaigeri*, intestinal cestode of wild and domestic canids (Shastri et al. 1985; Dey et al. 1988; Patro et al. 1997; Sharma and Chauhan 2006). Coenurosis caused by

Coenurus gaigeri is commonly reported in shoulder, thigh (Varma and Malviya 1989; Madhu et al. 2014), neck, diaphragm, heart, kidney, uterus, rectum, spleen, urinary bladder, lumbar region (Oge et al. 2012) and lower eyelid (Raidurg and Reddy 2009). Coenurosis is a major parasitic disease in small ruminants throughout the world (Sadarnashipur and Lalgola 1991; Oryan et al. 2010). Ultrasonographical and radiological diagnosis along with surgical management of coenurosis has been described (Ahmed et al. 1974; Ahmed and Haque 1975; Biswas 2013). The article describes the retro-bulbar cyst of *Coenurus gaigeri* in two Barbari goats.

Materials and methods

Two adult Barbari goats were referred to the Division of Animal Health, CIRG with the history of unilateral protrusion of the left eye ball, blepharitis and congestion of the conjunctival membrane (Fig. 1). Clinical examination of the animal revealed normal body temperature (101 °F), pink conjunctival mucus membrane and good body condition. Heart rate (81 per minute) and respiratory rate (30 per minute) were found within the normal limits. Physical and ultrasonographical examination revealed a large fluctuating fluid filled bladder with distinct dimension. Ultrasonographic examination was performed on well restrained goats using a 6–8 MHz convex transducer. The probe was applied gently over the swelling after application of sterile coupling gel. Ultrasonography of the affected eye confirmed the presence of a fluid filled structure distinct from its ambiances in the retro-bulbar muscles. The cyst was removed surgically from the retro-bulbar muscles and examined. The cyst contained huge numbers of white clusters of scolices.

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Fig. 1 Unilateral protrusion of the left eye ball

Results and discussion

Post-operatively the unilateral protrusion receded and the animal resumed normal posture and eye function. The cyst measured 2.4 cm × 3.2 cm and contained large amount of fluid with numerous invaginated scolices (Fig. 2). The fresh and unstained scolices of the cyst were examined under microscope after applying sufficient cover-slip pressure to force the hooks to lie flat. Microscopic view of a single scolex revealed the characteristic rose- thorn taenid hooks (Figs. 3, 4) (Edwards and Herbert 1981). The scolices had four suckers (Fig. 3) and a rostellum with a double crown containing 28–32 pairs of hooks (Fig. 4) (Hall 1916). On the basis of clinical signs, physical examination, ultrasonographical imaging and parasitic examination the retro-bulbar cyst which was indistinguishable from *Coenurus gaigeri* was diagnosed.

Fig. 2 Coenurus cyst containing scolices in clusters

Fig. 3 Microscopic view of coenurus cyst showing suckers

Fig. 4 Microscopic view of rostellar hooks

The metacestode stage of *Taenia multiceps* is associated with coenurosis. The cerebral form of coenurosis, also known as Gid or sturdy is a fatal disease of goat and sheep (Aiello and Mays 1998). The cystic larvae develop in the brain and spinal cord of the parasitized host and thereby affect the normal functioning of the central nervous system (Sharma and Chauhan 2006; Haridy et al. 2013). While, in non-cerebral coenurosis, the larval form of the taenid worms are found in the various organs like heart (Bhalla and Negi 1962), liver, kidney (Paliwal et al. 1971), lymph node (Singh and Singh 1972) and subcutaneous tissue

(Sudhan and Shahardar 1999; Kumar et al. 2003). As the function of the vital organs is affected in non-cerebral form of coenurosis, it often results in stunted growth and wasting in small ruminants (Ramadan et al. 1973). Heavy tape-worm infestation in animals younger than 6 months results in poor growth though their role in the development of weight loss is not clear (Smith and Sherman 2009). Occasionally, aberrant sites of metacestodal predilection have been reported (Bhalla and Negi 1962; Singh and Singh 1972; Sharma et al. 1995; Sudhan and Shahardar 1999; Gahlod et al. 1999; El-Sinnary et al. 1999; Kumar et al. 2003; Sharma and Chauhan 2006; Raidurg and Reddy 2009; Madhu et al. 2014).

The reasons of exophthalmia include retro-bulbar abscess, cellulitis, haematoma, glaucoma, tumors and cyst (Wilcock 2007; Haridy et al. 2014). Eosinophilic myositis, lacrimal gland affections, foreign body granuloma, trauma can also lead to exophthalmoses (Boydell 1991). Exophthalmic goitre also causes bilateral protrusion of eye balls. Proptosis or exorbitism has also been reported due to enzootic nasal adenocarcinoma (De las Heras et al. 2003) and conidiobolomycosis (Silva et al. 2007) in sheep. Parasitic cysts in and around the eye balls are rare and have been attributed to hydatidosis in horse (Barnett et al. 1988), cysticercosis in pigs (Cardenas-Ramirez et al. 1984), *Taenia serialis* in rabbits (O'Reilly et al. 2002; Holmberg et al. 2007), *Coenurus cerebralis* in ewe (Haridy et al. 2014) and coenurosis in man (Williams and Templeton 1971; Manschot 1976; Ibechukwu and Onwukeme 1991). In this investigation orbital coenurosis was diagnosed in the goat as the cause of unilateral exophthalmia.

Coenurus gaigeri is the larval stage of *Taenia multiceps gaigeri*, which belongs to the class Cestoda, order Cyclophyllidae, family Taenidae and genus Multiceps. These parasitic infections result in asymptomatic focal lesions which often persist throughout the life span of the host (Sharma and Chauhan 2006). Chronic parasitic infections are more commonly seen in adult animals, as documented herein. These animals are the source of infection for other animals and human beings. Sheep and goat are the usual intermediate host of *Taenia multiceps* but other domestic (Ozkan et al. 2011) and wild herbivores (Varma et al. 1994; Singh et al. 1999; Jones and Pybus 2008), rabbits (Wills 2001), human and non-human primates can also be infected (Ing et al. 1998). Adult goats are slaughtered for human consumption. In developing and under-developed countries where incinerators are not installed for proper disposal of contaminated carcasses coenurosis has emerged as a major parasitic disease of zoonotic importance (Kheirandish et al. 2012). The feeding of sheep and goat carcasses and offal to the dogs should be restricted and regulated (Smith and Sherman 2009). The carcass and offal must be

hygienically disposed off either by burning or deep burial especially in the endemic areas. The intermediate host sheep and goat get the infection from the stool of the final host canids. Therefore, the entry of stray dogs or wild canids should be prohibited into the animal farms and pastures. The dogs in and around the animal farms should be treated with anthelmintics to prevent the spread of infection to the farm animals. The shepherd dogs kept with the sheep and goat herds must be regularly treated for the control of mature tape worms. Prophylactic anti-helminthic therapy can be given to the small ruminants but the economic feasibility must also be considered. Surgical removal and management of cyst from various sites has been reported by a number of authors but it is not a feasible and practical method in endemic regions (Singh et al. 1999; Nandi and Pal 2001; Gahlod and Purohit 2005).

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