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Surgical management of *Coenurus gaigeri* cyst in Goats: A review of five cases

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Abstract
Five female goats, age group of 8 months to 2years old were presented to referral veterinary polyclinic, Indian Veterinary Research Institute, Izatnagar during a month of January to August 2017 with history of soft fluctuating swelling over the body and no pain on palpation. On clinical examination, soft uniform fluctuating, non-inflammatory swelling was noticed and further clear watery fluid was aspirated on fine needle aspiration technique. The cases were tentatively diagnosed as cyst and decided for surgical removal. The location of cyst in different goats were left eye ball and lower eyelid margin, left thigh region, Thoraco- lumbar region in two cases. Under local infiltration of 2% lignocaine, the swollen mass was operated and the entire fluid containing cyst was surgically exteriorized without damaging the cyst wall. The fluid was sent for further parasitological examination and confirmed as a case of *Coenurus gaigeri*. Post operatively animal was administered antibiotic, anti-inflammatory and a combination of fenbendazole–Praziquantel. The animals were recovered completely by 12th postoperative day without any complications.

Keywords: Goats, non-cerebral coenurosis, surgery, coenurus gaigeri, cyst

1. Introduction
Coenurosis is caused by the metacestodes of *Taenia multiceps* in various livestock species. This is an economically important disease as it causes serious problem especially in sheep and goat industry. Among the parasitic diseases, Coenurosis is one of the most important zoonotic diseases. Caprine are intermediate host which mainly infected by after ingestion of *Taenia multiceps* contaminated eggs present on the vegetation. Once entered in to the stomach the oncosphere escape from the eggs, penetrate the gut wall to reach the brain via circulation and form as fluid filled mass in brain and various tissues called as coenurosis [1]. Dog being a definitive host, this plays the major role in spreading of Taenia multiceps to various domestic animals [2]. The intramuscular and subcutaneous tissue of *Taenia multiceps* in goats have been referred as *Taenia gaigeri*. Larval stage may also sheaths in the thigh [3], Shoulder [4], Diaphragm, heart, kidney, uterus, rectum and urinary bladder of domestic goats [5]. This paper describes about the occurrence of non-cerebral coenurosis in goats and surgical removal of coenurosis gaigeri from subcutaneous and intramuscular tissues in goats.

2. Materials and Methods
The cases included in this report were clinical cases referred to Polyclinic during the period of January to August 2017, Indian Veterinary Research Institute; Izatnagar with soft non painful swelling over the body since two weeks, the size of the swelling was gradually increased over a period of time. The cases were recorded in five female goats within the age groups of 8 months to 2 years of old. All the animals were exhibited same clinical sign having normal appetite with good healthy condition. All the Physical parameters were within the normal range. There were no proper history of vaccination and deworming.
On clinical examinations, the swelling were located over the different body surfaces such as left eye, left facial region, thigh region and thoraco- lumbar region in two cases (Fig.1).

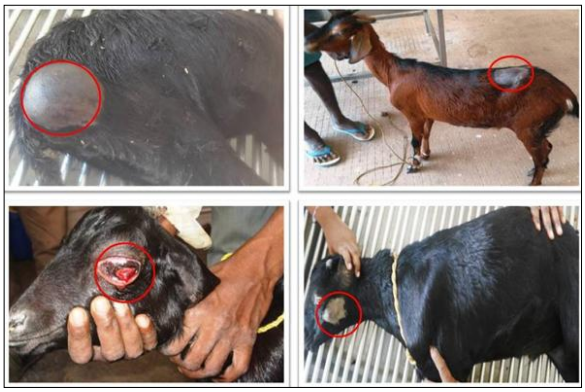

Fig 1: Different location of Coenurus cyst in goats

On palpation, the size of the swelling may vary from small to medium in range, non painful, soft uniformly fluctuating mass were noticed under the skin which was confirmed as cyst. Further fine needle aspiration technique and direct microscopic examination of aspirated fluid confirmed as case of coenurosis (Fig. 2).

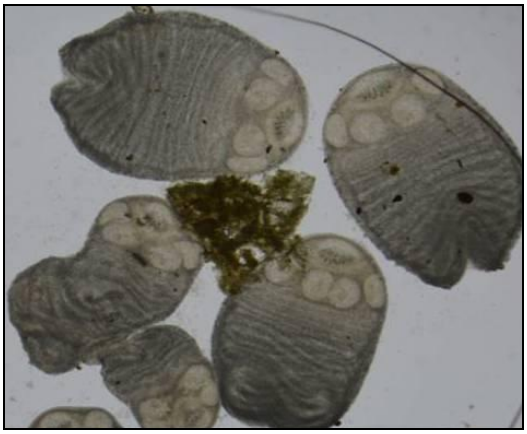

Fig 2: Microscopic examination showed multiple larvae of Coenurus gaigeri cyst

Surgical removal of cyst was warranted to prevent the spread of disease to other body surface and other species.

After getting owner concern the surgical site was prepared aseptically and draped. Under local infiltration of 2% lignocaine at the site, the incision was made over the mass and subcutaneous tissue and muscles were separated bluntly. The fluid filled cyst was carefully removed without rupturing the sac (Fig. 3).

Fig 3: Intra operatively cyst was isolated from attachments

After removal of cyst the muscles were sutured with simple continuous suture using 1-0 polyglycolic acid (PGA) absorbable suture material and skin was sutured with simple interrupted pattern using silk 1-0. As part of Post operative care, antibiotic (Enrofloxacin 5mg/kg) and antinflamatory (Meloxicam 0.5mg/kg) drugs were administered for 6 days followed by regular dressing with antiseptic agent and topical ointment application were advised to prevent the infection. All the animals were recovered uneventfully without any complications except in one case where the left portion of eye ball was completely removed.

3. Results and Discussion

Clinical findings and history confirmed that goats were affected with cysticercosis. All the cysts were present in the subcutaneous tissue and muscles except in one case where the cyst was present in the eye ball. Animals were recovered uneventfully after surgical removal of cysts without any reoccurrence after two months. The cyst size was ranged from 2 cm to 4 cm in length. The outer layer of the cyst wall was thicker and grayish in color whereas the inner wall was thin, translucent with clusters of invaginated scoleces attached to the inner germinal layer of the cyst (Fig. 4).

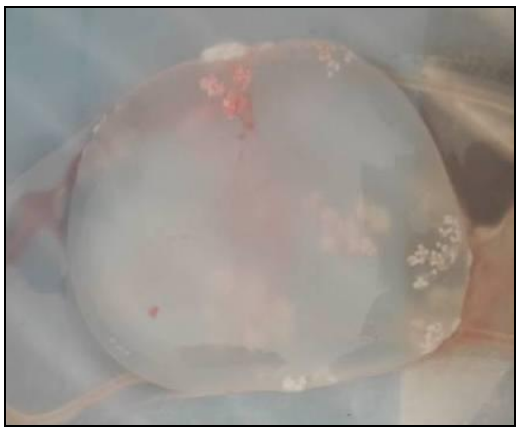

Fig 4: Protoscolex attached to the inner germinal layer of cyst

Microscopic examination protoscoleces revealed each scolex contain four suckers and one rostellum arranged (Fig. 5).

Fig 5: Cyst containing four suckers, rostellum and hooks

The present study results were similar to the previous study according to the shape and number of rostellar hooks in the cyst [6]. It was found that, there were no difference between T. multiceps and *T. gaigeri* in cyst morphology features and shape of the rostellar hook but immunological and molecular method should be developed to differentiate the coenurosis.

Coenurosis (Kid or sturdy) highly fatal disease for sheep and human are caused by *Taenia multiceps*. The Cyst larvae predominantly develops in brain and spinal cord which affect

the normal functioning of central nervous system (CNS) of coenurosis affected sheep and man [7]. Sometimes cyst may develop aberrant location in the subcutaneous tissue and muscles in goats. Previously they thought that different species involved in the pathogenesis of coenursis affection in CNS and subcutaneous tissue [8]. But later on they confirmed that both cysticercus coenurosis and cysticercus gaigeri having same morphological features [9]. However, the differences in habitat of the larval stage present in the species of the host not the parasite. This is most likely due to host difference. Similar results were found in the present study, where the cyst was present in the subcutaneous tissue and muscles and it confirmed as a case of cysticercosis caused by *Taenia gaigeri*. Presence of cyst in subcutaneous tissue and muscles reduces the meat and hide value of the animals. This was concurrent with study of Radfar *et al.* [10] where the Coenurosis cause severe muscle damage, reduction in production and significant economic losses due to condemnation of infected organ of the herbivores and even death of the heavily infected animals. In a study, non cerebral coenurus cysts were located in the different body parts of black Bengal goats in lateral neck region in two animals and 3 at thoraco- lumbar region [11]. Similar finding were noticed on the present study. In majority of the cases, the cyst was developed slowly and causes asymptomatic focal lesion on the unusual locations. This was concurrent with study of Sharma and Chauhan [7] where the Cyst may be permanently present the whole life span of the host without producing any clinical symptoms until it was removed surgically. Animal may exhibit the clinical symptoms depend upon the host - parasitic relationship, number of the egg ingested, age and immune response of the goat etc. Chronic infestation is more common in goats aged between one and two year old. The disease is more zoonotic importance since one to two year old goats were preferred for human consumption. These animals were important source of disease. From the history it has been confirmed that shepherd dogs have never received medication against Taenia spp. and have been fed with raw offal's and uncooked meat. Dogs being the definitive host of *T. gaigeri* play an important role in spreading of disease. Goat are getting infection from dog excreta therefore prevent the entry of dog in and around farm and grazing area [12].

4. Conclusion

It is concluded that, *T. gaigeri* spread was controlled by regular deworming of dogs up to 6-8 weeks interval periodically with effective anthelmintic and fed the animal with cooked meat rather than giving raw meat of slaughtered sheep and goat. Treatment of the disease was not satisfactory except surgical removal of the cyst but that is not cost effective. Prevention of disease would be done by avoiding dog contact with pasture, creating community awareness to the people and followed by regular deworming of goats with broad spectrum anthelmintic like praziquantel and fenbendazole.

5. Acknowledgement

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6. Declaration of conflicting interest

The author(s) have no conflicting interest in respect of research, publication and authorship of this article.

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