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Case Report

Early Stage of Acute Coenurosis in Iranian Native Sheep- Case Report

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Abstract

Cerebral coenurosis is the intermediary larval stage of *Taenia multiceps*, which affects intermediate hosts, particularly sheep and goats. In this report, gross and microscopic features of three scarce natural coenurosis cases, a one-year-old ram and two lambs of 7 month old from a flock are explained. At necropsy, numerous small cysts measuring 5 to 10 mm in diameter were observed on both cerebrum and cerebellum surfaces, likewise multiple deep parts of which. In histopathological examination of the neural tissue, severe tissue destruction, a distinct layer of Gitter cells formation around the cysts, neuronophagia, gliosis and perivascular infiltration of lymphocytes were observed. In this early stage of parasite life cycle, larval migration and destruction of tissue, also aggregation of glial cells around the cysts cause a loose connection between cysts and neural tissue.

Introduction

Coenurosis (Gid, Sturdy) is the disease caused by invasion of central nervous system by the intermediate stage of *Taenia multiceps* a tapeworm that lives in the small intestine of dogs and other canids (1, 2) and produce localized, space-occupying lesions of the tissue that is usually seen in sheep,

goats, cattle, horse and rarely man (3, 4). “Contamination of pastures grazed by sheep with dog faeces can result in larval invasion of the central nervous system and clinical disease” (5). “The life cycle is completed when the carnivorous definitive hosts ingest an infested sheep brain” (6).

In 80–90% of cases, the cyst exists in one cerebral hemisphere, whilst in 5–10% of cases, it is localized in the cerebellum (7). Two clinical forms of the disease have been described in sheep (8); the most common is the chronic form whilst its acute counterpart is more rare (9). There are several reports of coenurosis in goat (10-13), sheep (14-16) and wild sheep (17) from various countries and most are chronic form of the disease and arose by developed *Coenurus* cysts, moreover in all of previous works the cysts were detected on leptomeninges, but in the present study, numerous small cysts were observed in the brain parenchyma with loose connection to surrounding tissue.

Case history

On February 2013 a 1 year old ram and 2 lambs of seven month old were submitted to hospital of veterinary college of Urmia University because of recumbency and abnormal behavior. According to owner statement, these episodes started approximately 10 days ago and spread in the flock. Fourteen out of 50 sheep had shown these manifestations. Abnormal behaviors observed by owner included: stupor, separation from the flock, head pressing, circling, abnormal walking, lean to the wall and lateral recumbency. Careful clinical examination revealed severe depression, amnesia, dullness, rigidity of the neck and hind limbs, paddling movements of the forelimbs, incomplete mastication, head deviation, nystagmus and ophthalmic hyperemia in all three animals. Rectal temperature was 39.7 degrees Celsius. Blood and lumbar CSF specimens were taken and sent to the clinical pathology laboratory for investigation. Elevated protein concentration (76 mg/dL) was detected in cerebro-spinal fluid. The CSF culture had no bacterial growth; also, there was leukocytosis with lymphocytosis ($9.4 \times 10^9/L$) in the hemogram. Other clinical parameters were within normal limits. Thirty minutes after presenting to hospital, one of the lambs died before any treatment. The disease was diagnosed as meningitis; hence, Gentamycin (5 mg/kg),

Co-Trimoxazole®24% (24 mg/kg) and Dexamethasone 2% (0.1 mg/kg) were administered as an intravenous infusion within 5% Dextrose solution. Unfortunately, the ram did not respond to treatment and died. Another lamb was humanly euthanized due to severe depression and bad condition. Other 11 infected animals were sacrificed by the owner because of bad prognosis of disease and economic losses hence we could not follow up the patients. All three cases were sent to the pathology department for postmortem examination and further study.

Gross lesions and microscopic findings

Based on the history, the brain was examined in detail. At necropsy, congestive foci at various sites on the meningeal membrane were found. The membranes were thickened, hyperemic and opaque. A large blood clot was found on the cerebellar surface of lamb, which was died earlier (Fig. 1). Cross sections were made in different parts of the brain in order to scrupulous examination. Careful investigation disclosed numerous transparent, thin-wall cysts located in superficial and deep parts of the cerebral hemispheres and cerebellum, measuring 5 to 10 mm in diameter. Interestingly we found that the cysts had very loose connection to surrounding tissue, easily separated and left small hole sizes 7–12 mm (Fig. 2&3). No remarkable lesions were observed in the spinal cord and other parts of the carcasses. A few abscesses on both cerebrum and cerebellum leptomeninges were observed without any Bacterial growth on microbiological culture (Fig. 4).

Tissue samples were taken from all three cases and fixed in 10% neutral buffered formalin. After processing, samples were embedded in paraffin and were cut in 5µm thick, then stained with Hematoxylin and Eosin for microscopic examination.

Microscopic investigations showed severe destruction of the neural tissue around the cysts and a large number of microglia (Gitter cells) which, were gathered at these sites. Mild

lymphocytic encephalitis with infiltration of the cells in the tissue and in perivascular space, neuronophagia, and gliosis were observed. In some cyst sections, tiny parasite protoscolex (approximately 140µm) was seen (Fig 5).

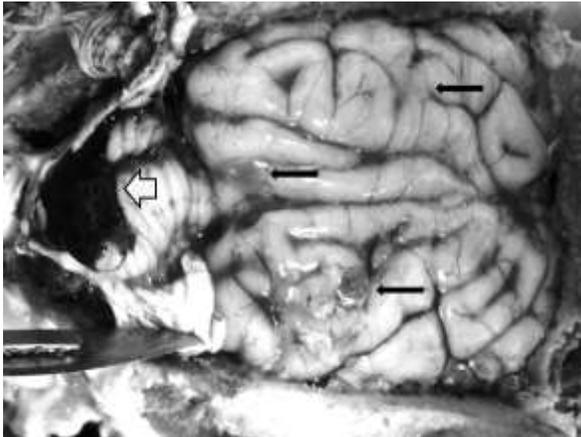


Fig. 1: A large blood clot on cerebellum (thick arrow) and three small cysts on cerebrum (thin arrows)

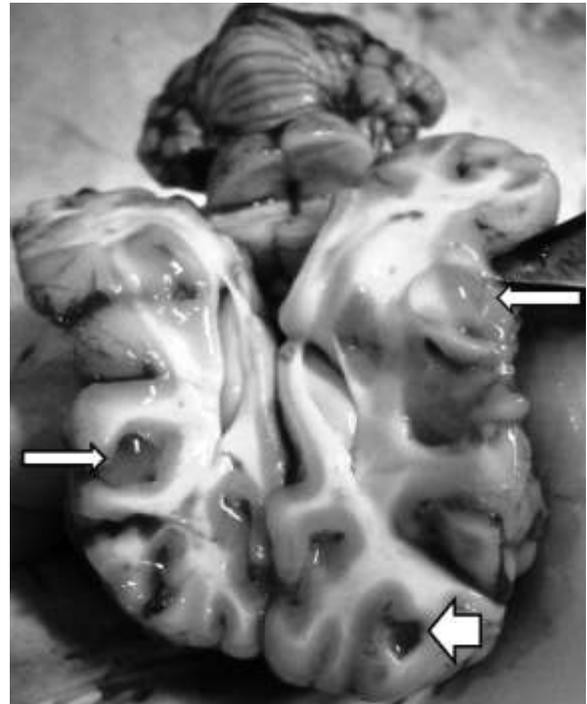


Fig. 2: Two transparent small cysts (thin arrows) and a Small hole after removing of the cyst (thick arrow) in the cerebrum

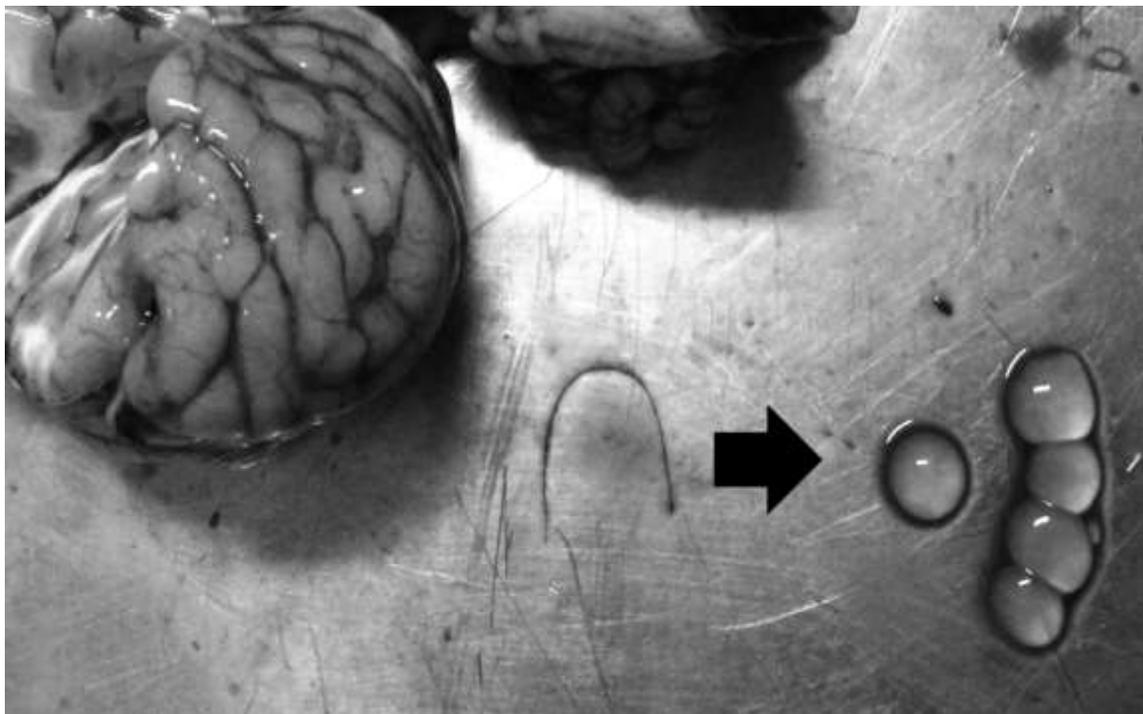


Fig. 3: A number of small cysts that easily separated from the brain on the Necropsy table (arrow)

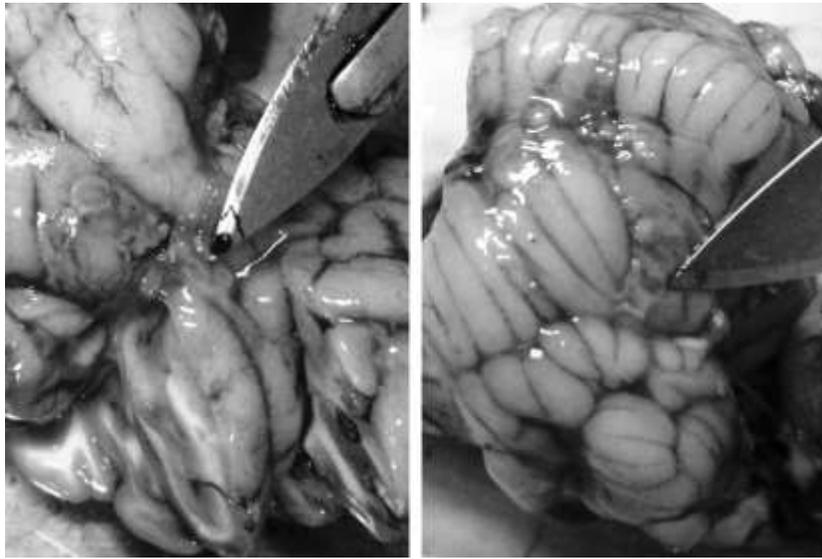


Fig. 4: Abscesses on cerebrum and cerebellum surface with yellow-greenish necrotic material

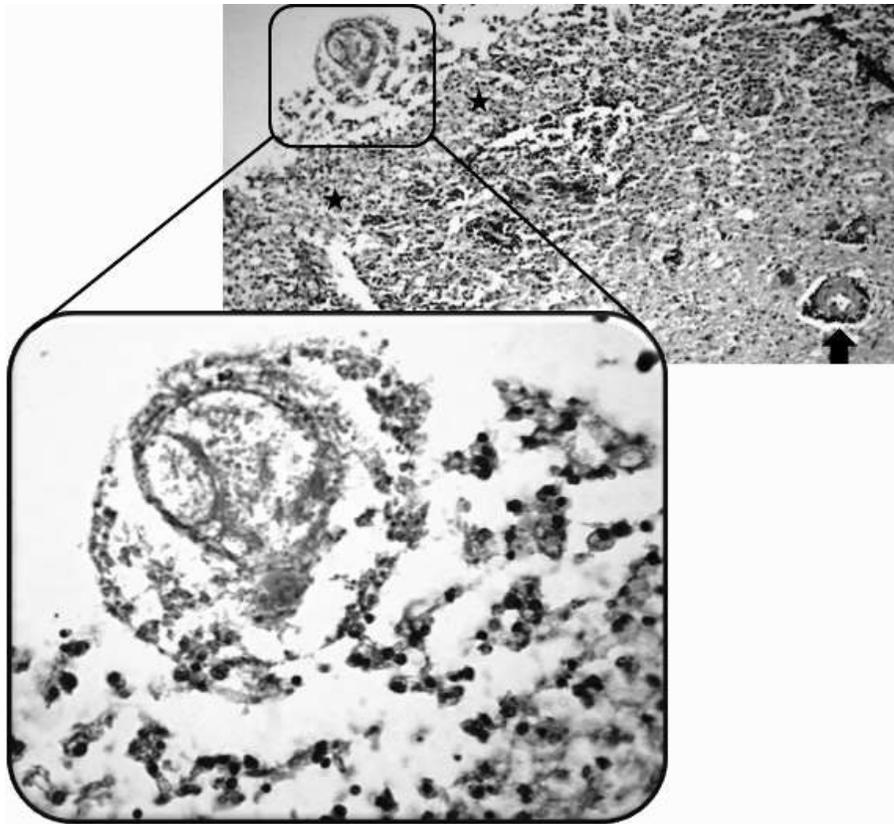


Fig. 5: ((a)) Micrograph section of brain; early developing coenurus cyst with protoscolex, damaged surrounding tissue, Gitter cells (stars) and perivascular aggregation of lymphocytes (black arrow) (H&E $\times 100$), ((b)) Early developing very small cyst with protoscolex. Note the damaged surrounding tissue and proliferation of microglia (Gitter cells) (H&E $\times 400$)

Discussion

In this manuscript, we reported unique clinical and pathological findings of acute sheep coenurosis. Interestingly we found a large number of small cysts in brain parenchyma with a loose connection to the tissue, which easily separated; According to Scott (7), in most cases, cysts are found in one cerebral hemisphere and its existence in various parts of brain are seldom. Moreover, in previous studies, the coenurus cysts have been shown on brain membranes but in this report, they were observed in the brain parenchyma. The presences of numerous small cysts in various sites of the brain indicate early stage of the parasite migration and distribution via brain capillaries.

In this stage, there is not a tight connection between newly forming cyst and the damaged tissue, while developed cysts (chronic form) tightly connect to adjacent tissues. As mentioned in the results the abscesses had no bacterial growth in culture, it is suggested that the recent antibiotherapy may be the reason of this sterility. The larva may carry bacteria to the brain or the injuries caused by larval migration may facilitate bacterial passage across the blood-brain barrier (18).

The presence of a large blood clot on the cerebellum surface represents various migration routes and entrance site of larva from vessels to the neural tissue and subsequent vessel laceration. As it was anticipated, such severe hemorrhage led to death. In previous studies eosinophilic infiltration was the most important microscopic finding (19, 20), but in this study, lymphocytes were prominent inflammatory cells that accumulated around the cysts. This observation suggests that the infiltration of eosinophils occurs after lymphocytes accumulation. To our knowledge, these observations of cerebral coenurosis are rarer, represent initial stage of the cyst developing in the tissue, and have less explained in previous studies.

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References

1. Soulsby E.J.L. Helminths, arthropods, & protozoa of domesticated animals [by] E. J. L. Soulsby. Monnig HOVh, entomology, editors. Baltimore: Williams and Wilkins Co; 1982.
2. Doherty ML, Bassett HF, Breathnach R, Monaghan ML, McLearn BA. Outbreak of acute coenurosis in adult sheep in Ireland. *Veterinary Record*. 1989;125:185-6.
3. Radostits OM, Gay CC, Hinchcliff KW, Constable PD. *VETERINARY MEDICINE*. In: Rodenhuis J, editor. A textbook of the diseases of cattle, horses, sheep, pigs and goats. 10th ed. Spain: ELSEVIER; 2007. p. 606-9.
4. Sharma DK, Chauhan PPS. Coenurosis status in Afro-Asian region: a review. *Small Ruminant Res*. 2006;64(197-202):197-202.
5. Aitken I. *Diseases of Sheep*. 1. Fourth ed. Singapore: Wiley; 2008. p. 266.
6. National animal disease information service nadis. Nervous Disease in Sheep, Listeriosis <http://www.nadis.org.uk/bulletins/nervous-disease-in-sheep.aspx> 2014 [cited 2014. 8.22].
7. Scott PR. Diagnosis and treatment of coenurosis in sheep. *Vet Parasitol*. 2012;189:75–8.
8. Komnenou A, Argyroudou S, Giadinis N, Dessiris A. Surgical treatment of coenurosis (gid) in sheep. *Vet Rec*. 2000; 147:242–4.
9. Scott P. Coenurosis. In: Aitken ID (ed), *Diseases of Sheep*. 4th ed. London, UK: Blackwell Publishing; 2007.
10. Gharagozlou MJ, Mobedi I, Akhavan P. A pathological and parasitological study of *Coenurus Gaigeri* infestation of Goats from Iran. *Indian J Vet Pathol*. 2003;27:95-7.
11. Nourani H, Pirali Kheirabadi k. Cerebral coenurosis in a goat: pathological findings and literature review. *Comp Clin Pathol*. 2009;18:85-7.

12. Nooruddin M, Dey A, Ali M. Coenuriasis in Bengal goats of Bangladesh. *Small Ruminant Res.* 1996;19:77-81.
13. Oge H, Oge S, Gonenc B, Ozbakis G, Asti C. Coenurosis in the lumbar region of a goat: a case report. *Vet Med.* 2012;57(6):308-13.
14. Batista F, Pizzigatti D, Martins C, Nunes M, Megda T, Ribeiro O, et al. First report of coenurosis in sheep in the State of Mato Grosso do Sul, Brazil. *Rev Bras Parasitol Vet, Jaboticabal.* 2010;19(4):265-7.
15. Abo-Shehada MN, Jebreen E, Arab B, Mukbel R, Torgerson R. Prevalence of *Taenia multiceps* in sheep in northern Jordan. *Preven Vet Med.* 2002;55:201-7.
16. Ghazaei C. Evaluation therapeutic effects of antihelminthic agents albendazole, fenbendazole and praziquantel against coenurosis in sheep. *Small Ruminant Res.* 2007;71:48-51.
17. Toofanian F, Ivoghli B. Cerebral coenurosis in a wild sheep (*Ovis ammon*). *J Wildl Dis.* 1976;12:550-1.
18. Christodoulopoulos G. Two rare clinical manifestations of coenurosis in sheep. *Vet Parasitol.* 2007;143:368-70.
19. Giadinis N, Psychas V, Polizopoulou Z, Papadopoulos E, Papaioannou N, Komnenou A, et al. Acute coenurosis of dairy sheep from 11 flocks in Greece. *New Zealand Vet J.* 2012;60(4):247-53.
20. Farjani Kish G, Khodakaram-Tafti A, Hajimohammadi A, Ahmadi N. Clinical and morphopathological characteristics of an enzootic occurrence of acute coenurosis (*Coenurus cerebralis*) in a sheep herd. *J Parasit Dis.* 2013.