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Case Report

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Severe subcutaneous, muscular and visceral coenurosis in a goat

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ABSTRACT

Coenurosis (gid or sturdy) is a zoonotic disease that is caused by Taenia multiceps metacestode. It is common in small ruminants. The cysts in sheep are more cerebral, while are noncerebral in goats. Coenurosis decreases production, and results in the death of the affected animals and in the disposal of the organs or even carcasses in severe infection. The present study describes severe subcutaneous coenuri associated with contamination in other tissues including the skeletal muscles and visceral organs. A remarkable clinical observation was the aggregation of cysts in variable sizes in the subcutaneous tissue of whole body. Subcutaneous tissue is not a common site for cyst formation. Coenurosis was confirmed based on the morphological characteristics of the cysts including the clusters of protoscolices and rostellar hooks.

Keywords

Coenurosis, Taenia multiceps, Coenurus cerebralis, goat

Abbreviations

C. gaigeri: Coenurus gaigeri
T. multiceps: Taenia multiceps
C. cerebralis: Coenurus cerebralis

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Introduction

Coenurosis (gid or sturdy) is a zoonotic disease that is caused by *Coenurus cerebralis* (*Taenia multiceps metacestode*). *Taenia multiceps* lives in the small intestines of carnivores as definitive hosts. Intermediate hosts are infected via ingestion of contaminated grass by spread eggs from the carnivores feces that lead to cyst formation in different organs [1]. Coenurosis is usual in small ruminants [2, 3], but rare in horses [4] and cattle [5]. The common predilection site for coenuri is cerebrum in sheep and extracerebral tissues in goats [1]. However, presence of cysts in the brain of goats [6] and other tissues apart from the brain of sheep [7] have been confirmed, recently. The parasite responsible for non-cerebral coenurosis was named *Coenurus gaigeri* in goats, and *Coenurus skrjabini* in sheep [1]. However, the later literature described *C. gaigeri* as the same species with *T. multiceps* [8].

Coenurosis causes high economic losses in the small ruminants industry and breeding [9]. Coenurosis decreases production, and in cases with severe infection leads to the death of the affected animals and disposal of organs or even carcasses [1, 10]. Human acts as incidental intermediate host and may be infected by ingestion of eggs in result of poor personal hygiene. In the literature, several reports of human coenurosis have been presented from different countries including Austria [11], Nigeria [12] and North America [13].

In the present study, we observed a lot of coenurus cysts in the subcutaneous, muscules and visceral organs of a goat.

Case presentation

A 11-month old female goat was referred to the veterinary hospital with a history of weight loss and multiple subcutaneous swellings on the face and around the eyes (Fig. 1a), neck, prescapular areas, flank and limbs (Fig. 1b). The case had not responded to any antibiotics or other treatments. On clinical examination, rectal temperature (38.5 °C), heart rate (75 per min) and respiratory rate (32 per min) were in the normal range. The subcutaneous palpable swellings were soft and fluctuating in different size from 2.1×3.4 to 8.5×10.2 cm. Clear watery fluid was aspirated by a steril syrige from the subcutaneous masses.

Collected cystic fluid had large number of small size, white colour plaques. The plaques were put on the clean glass slide, covered by a coverslip and examined under a light microscope. On microscopic examination, multiple protoscolices were observed. Based on the morphological features including the clusters of protoscolices and rostellar hooks (Fig. 2a), coenurosis was confirmed. Due to severe contaminataion, the goat was euthanized. In the postmortem investigation, Coenurus cysts were found under the skin (Fig. 2b), between fasciae of the skeletal muscles, in the thorasic cavity (Fig. 2c) and on the mesentery (Fig. 2d). The sizes of the coenuri cysts were different and had a thin and transparent wall. They were filled with clear fluid, and clusters of scolices were visible in their inner membrane (Fig. 2e).

Histopathologically, each coenurus was lined by a thin hyaline layer. Some cysts were surrounded by a demarcation line including lymphocytes, eosinophils, macrophages and giant cells. Several scoleces were visible within the cysts (Fig. 2f).

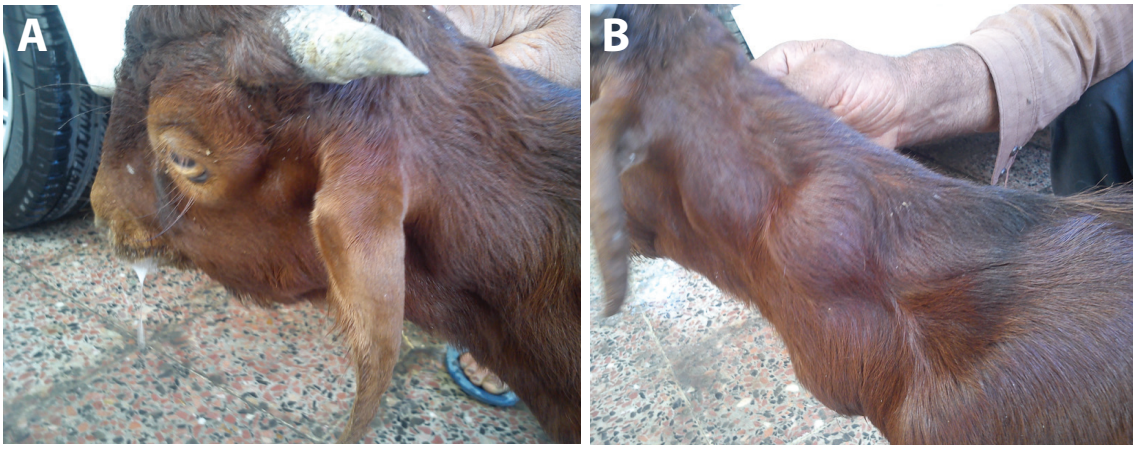

Figure 1
A: Goat affected to coenurosis. Different swellings on the face and periorbital region.
B: Coenurus cysts are located under the skin.

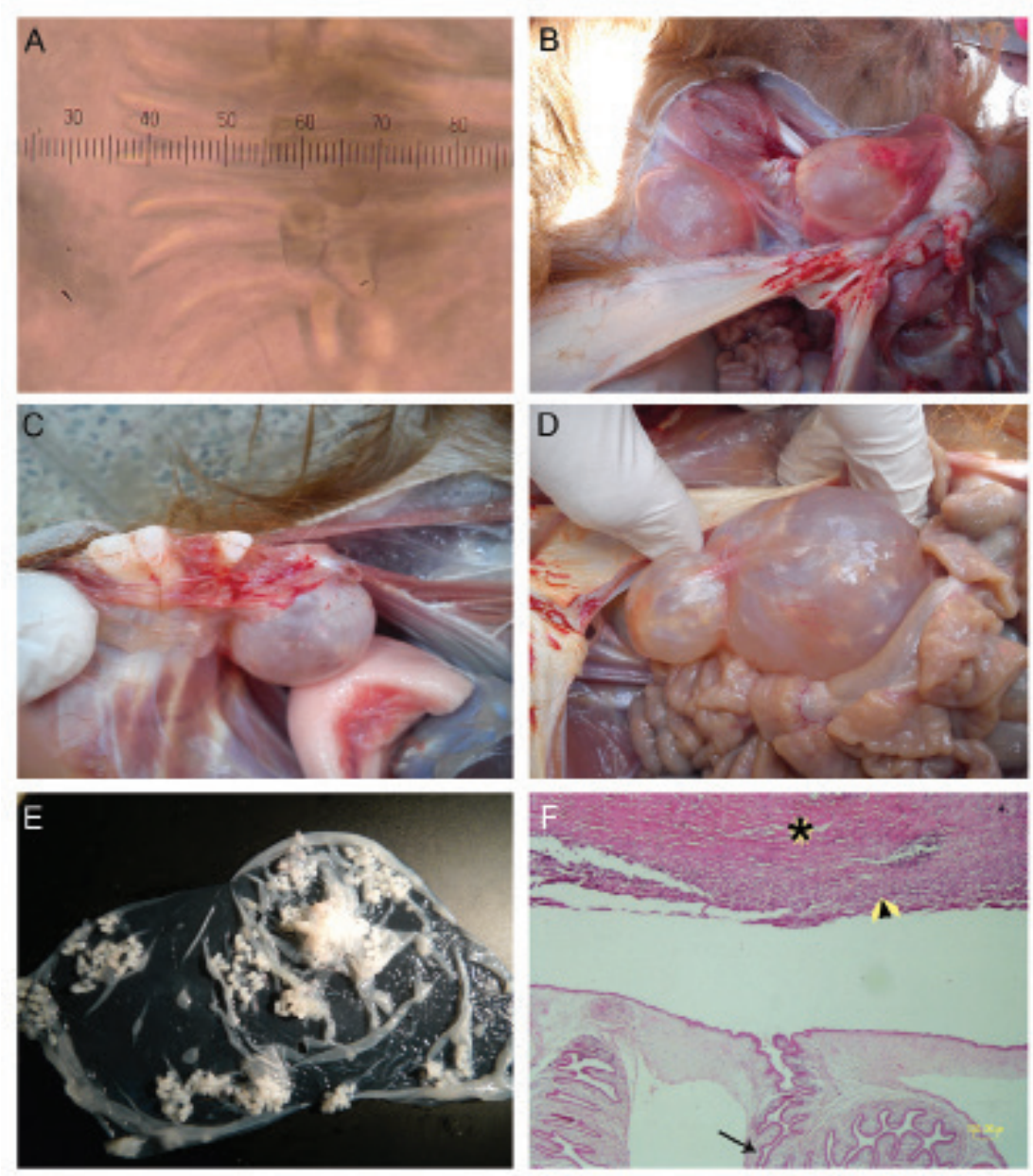

Figure 2
A) Large and small rostellar hooks, B) coenurus cysts are located under the skin, C) coenurus cyst attached to the costal muscles in the thoracic cavity, D) large coenuri on the intestinal mesentery, E) Isolated coenurus with seven clusters of protoscolices), F) photomicrograph shows a *Coenurus gaigeri* cyst in the skeletal muscles (asterisk). Capsule of cyst is composed of a dense outer hyaline layer and a disorganized inner layer. Multiple protoscolices (arrow) are observed within the cyst. Inflammatory cells (arrowhead) are infiltrated around the cyst.

All animals received human care in compliance with the Guide for Care and Use of Laboratory Animals published by the National Institutes of Health, and the study was approved by the Ethical Committee of Shahid Bahonar Veterinary School (IR.UK.REC.1395.001).

Discussion

The occurrence of coenurosis in tissues other than CNS had been reported mainly from the Asian countries and are characterized to be *C. gaigeri* in goats [14, 15]. *C. cerebralis* and *T. multiceps* are considered the same species with only intraspecific variations.

Varcasia et al. (2012) investigated morphological and molecular characteristics of non-cerebral coenurosis in goats. They showed the same reported morphologic features with *C. cerebralis* reported by other authors [16]. The cysts outside of the CNS offer that a different strain or genetic variants of *T. multiceps* may be responsible. Phylogenetic trees based on genetic markers of mitochondrial DNA (ND1 and COI) demonstrated that non-cerebral cysts could belong to

different genotypes or strains of *T. multiceps*. Oryan et al (2010) evaluateted biochemical and pathological findings of *C. gaigeri* in Iranian native goats. They used CO1 and ND1 for phylogenetic analysis and identification of species. These researchers suggested that the larval stages of *T. multiceps gaigeri* and *C. cerebralis*, are monophyletic species [3]. According to the study of Hüttner et al. (2008), genetic analysis and phylogenetic investigation are the best diagnostic ways for identification of different species of metacestodes [17].

Clinical signs of coenurosis depend on the location and size of cysts [1]. Presence of cysts in the cerebrum is associated with the nervous symptoms including ataxia, paralysis, hypermetria, blindness, head deviation, incoordination, head pressing, and circling. Coenurosis may take for several months, and the mortality rate realted to that may reach to 100% [18, 19]. Non-cerebral coenurosis is not clinically diagnosable in mild form and the cysts may be observed in the slaughterhouse. In severe infection, the mainly clinical signs are lameness, paresis, paralysis and large skin lumps due to the subcutaneous cysts [20]. Muscular cysts cause pain and functional weakeness of involved organs [15]. Orbital coenurosis is rare and is associated with proptosis, blepharitis, the conjunctiva congestion, chemosis, swelling around the orbit, and enlargement and protrusion of the eye ball [20]. Treatment of coenurosis in sheep and goats with albendazole, niclosamide and praziquintal has little or no effect [1]. Surgical treatment for removing the cysts is not economical in cases with multiple large cysts.

In the present study, extra-cranial coenururi cysts affected the skeletal muscles, and subcutaneous and visceral organs. A remarkable clinical observation was aggregation of variable sizes cysts in the subcutaneous tissue of whole body. Our report described coenurosis in a 11-month female goat. It is stated that the disease happens often in 1-2 year-old female animals, particularly in the pregnancy course due to the pregnancy stress and reduction of immunity level. Previous studies show that clinical coenurosis is common in young animals [18, 22]. In the literature, there are reports similar to our report in goat [15]. Afonso et al. (2011) observed *C. cerebralis* in 149 abattoir-slaughtered and 47 experimentally infected goats. They showed that in the experimentally infected goats, a large percentage of *T. multiceps* cysts are found in the muscles and the subcutaneous tissues[23]. Shivapraksh and Reddy (2009) found multiple subcutaneous coenuri in the neck, prescapular region, abdomen and limbs in a herd of goats and characterized them as *C. gaigeri* due to their extra-cranial sites [2].

Coenurosis is a zoonotic pasitic disease and is important in public health. Human cysts are usually found in CNS, eye, subcutaneous or muscular tissues [24, 25, 26]. Control programs are regular anthelmintic treatment of dogs by effective taenicidal drugs, and correct disposal of contaminated carcasses to prevent access of dogs to them [27].

The present study reveals various predilection sites of coenurosis including the subcutaneous, skeletal muscles and other organs. Further studies are necessary to clarify the tendency of coenuri to occur in the subcutaneous tissues, skeletal muscles and visceral organs of goats. Public health importance should be considered in such cases. The awareness must be given to the farmers about the correct disposal of contaminated carcass. Regular antiparasitic drug should be used in dog for prevention of this parasitic infestation.

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Author Contributions

S.A. and R.Kh. performed post-mortem examinations. S.A. wrote the manuscript. M.A. referred the case and did the clinical examinations. SR.N. participated in the laboratory diagnosis of the cysts. All authors read and approved the final manuscript.

Conflict of Interest

All the authors declare that there is no conflict of interest.

References

1. Sharma DK, Chauhan PPS. Coenurosis status in Afro-Asian region: a review. Small Rum Res. 2006;64:197–202.
2. Shivapraksh BV, Thimma Reddy PM. An outbreak of multiple subcutaneous coenurus cysts in goats. J Vet Parasitol. 2009;23:199-200.
3. Oryan A, Nazifi S, Sharifiyazdi H, Ahmadnia S. Pathological, molecular, and biochemical characterization of Coenurus gaigeri in Iranian native goats. J Parasitol. 2010;96:961-967.
4. Fraser GM. The Merck Veterinary Manual. Handbook of diagnosis, therapy, and disease prevention and control for veterinarians, Merck, Rahway, NJ. 1991.
5. Avcioglu H, Yildirim A, Duzlu O, Inci A, Terim KA, Balkaya I. Prevalence and molecular characterization of bovine coenurosis from Eastern Anatolian region of Turkey. Vet Parasitol. 2011;176:59- 64.
6. Kheirandish R, Sami M, Azizi S, Mirzaei M. Prevalence, predilection sites and pathological findings of Taenia multiceps cysts in slaughtered goats from south-east Iran. Onderst J Vet Res. 2012;79: Art. #436, 5 pages.
7. Christodoulopoulos G, Kassab A, Theodoropoulos G. Occurrence of non-cerebral coenurosis in sheep. J Helminthol 2013;87:125–127.
8. Smith, M.C., Sherman, D.M. (Eds.), 2009, 2nd ed. Wiley-Blackwell, Ames, IA, pp. 85–256.

9. Desouky EA, Badawy AI, Refaat RA. Survey on coenurosis in sheep and goats in Egypt. Vet Italiana. 2011;47:333-340.

10. Adane P, Kumsa B, Hiko A, Afera B. Prevalence of Coenuruscerebralis in Small Ruminants Slaughtered at Hashim Export Abattoir, Debre Zeit, Central Oromia. Eur J Appl Sci. 2015;7:56-63.

11. Haitchi G, Buchroithner J, Sonnberger M, Weis S, Fellner FA. Human coenurosis (Taenia Larva). RadioGraphics 2012;32:517–521.

12. Ibechukwu BI, Onwukeme KE. Intraocular coenurosis: a case report. Br J Ophthalmol. 1991;75:430-431.

13. Ing MB, Schantz PM, Turner JA. Human coenuro¬sis in North America: case reports and review. Clin Infect Dis. 1998;27:519–523.

14. Madhu DN, Mahan T, Sudhakar NR, Maurya PS, Banerjee PS, Sahu S, Pawde AM. Coenurus gaigeri cyst in the thigh of a goat and its successful Management. J Parasitol Dis. 2014;38:286-288

15. Oryan A, Akbari M, Moazeni M, Amrabadi OR. Cerebral and non-cerebral coenurosis in small ruminants. Trop Biomed. 2014;31:1-16.

16. Varcasia A, Jia WZ, Yan HB, Manunta ML, Pipia AP, Garippa G, Scala A, Schuster RK. Molecular characterization of subcutaneous and muscular coenurosis of goats in United Arab Emirates. Vet Parasitol. 2012;190: 604– 607

17. Hüttner M, Nakao M, Wassermann T, Siefert L, Boomker JD, Dinkel A, Sako Y, Mackenstedt U, Romig T, Ito A. Genetic characterization and phylogenetic position of Echinococcus felidis (Cestoda: Taeniidae) from the African lion. Int J Parasitol. 2008;38:861-868.

18. Abo-Shehada M.N, Eyad Jebreen, Arab B., Mukbe R, Torgersonb PR. Prevalence of Taenia multiceps in sheep in northern Jordan. Prev Vet Med. 2002;55:201-207.

19. Ozmen O, Sahinduran S, Haligur M, Sezer K. Clinicopathologic observations on Coenurus cerebralis in naturally infected sheep. Schweiz Arch Tierheilkd. 2005;147:129-134.

20. Akbari M, Moazeni M, Oryan A, Sharifiyazdi H, Amrabadi OR. Experimental cerebral and non-cerebral coenurosis in goats: A comparative study on the morphological and molecular characteristics of the parasite. Vet Parasitol. 2015;211:201–207.

21. Haridy M, Sadan M, Omar M, Sakai H, Yanai T. Coenurus cerebralis cyst in the orbit of a ewe. Onderst J Vet Res. 2014;81, Art. #707, 4 pages

22. Scala A, Cancedda GM, Varcasia A, Ligios C, Garippa G, Genchi C. A survey of Taenia multiceps coenurosis in Sardinian sheep. Vet Parasitol. 2007;143:294–298.

23. Afonso SMS, Mukaratirwa S, Hajovska K, Capece BPS, Cristofol C, Arboix M, Neves L. Prevalence and morphological characteristics of Taenia multiceps cysts (Coenurus cerebralis) from abattoir-slaughtered and experimentally infected goats. J Neuroparasitol. 2011;2, 5 pages.

24. Orihel TC, Gonzalez F, Beaver PC. Coenurus from neck of Texas woman. Am J Trop Med Hyg. 1970;19:255-257

25. Templeton AC. Anatomical and geographical location of human coenurus infection. Trop Geogr Med. 1971;23:105-108.

2. Schellhas KP, Norris GA. Disseminated human subarachnoid coenurosis: computed tomographic appearance. Am J Neuroradiol. 1985;6:638-640.

27. Scott PR. Diagnosis and treatment of coenurosis in sheep, University of Edinburgh, Easter Bush Veterinary Centre, Roslin, Midlothian, Scotland, United Kingdom. Vet Parasitol. 2012;189:75-78.

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سنروزیس شدید زیرجلدی، عضلانی و احشایی در یک بز

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چکیده

سنروزیس نوعی بیماری زئونوز است که توسط مرحله لاروی تنیا مولتی سپس ایجاد می شود. در نشخوارکنندگان کوچک رایج است. در گوسفند، کیست ها بیشتر در مغز و در بز در بافت های دیگر تشکیل می شود. سنروزیس سبب کاهش تولید، مرگ، دفع اندام ها و یا حتی لاشه در عفونت های شدید می شود. مطالعه حاضر، آلودگی شدید بافت های زیرپوست، عضلات اسکلتی و احشاء را به کیست های سنروس در بز توضیح می دهد. مهمترین نشانه بالینی قابل توجه وجود کیست های فراوان در اندازه های متغیر در زیر پوست است. مورفولوژیکی از جمله گروه های متعدد پروتواسکولکس در دیواره کیست و قلاب های حلقوی کیست سونوروزیس را تایید می کند. اگرچه بافت های زیر جلدی یکی از مکان های تشکیل کیست این انگل است با این وجود آلودگی های شدید مشابه گزارش مورد نظر رایج نیست. با این وجود، بافت زیر جلدی، محل تشکیل کیست است که معمول نیست.

واژگان کلیدی

لتی سپس، تنیام، زیس، سنر