

A Rare Case of Non-cerebral Coenurus Cyst on the Heart of a Ewe

Nadir Bir Olgu Olarak Koyun Kalbinde Saptanan Non-serebral Coenurus Kisti

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ABSTRACT

During the routine postmortem inspection from carcasses and offal of slaughtered ewes in an abattoir in Isfahan (Iran), an ovine heart was discovered with a firm nodule in the myocard on palpation. In closer examination, a liquid containing cyst (1x1 cm) was recognized on left part of the heart. The cyst had thick fibrotic capsule in outer surface and a thin inner layer containing few white clusters of scolices. White clusters contained scolices that adhered to the inner transparent layer, like white beads. Based on the gross and microscopical characteristics, the cyst was diagnosed as non-cerebral coenurus cyst. This is a rare report of heart coenurosis in a sheep.

Keywords: Non-cerebral, coenurus cyst, heart, ewe

ÖZ

İsfahan'da (İran) bir mezbahada kesilen koyunların parçalarında ve sakatatlarında yapılan rutin ölüm sonrası muayene sırasında, palpasyon ile miyokardında bir nodül saptanan bir koyun kalbi keşfedildi. Daha ayrıntılı incelendiğinde, kalbin sol kısmında 1x1 cm boyutlarında içi sıvı dolu bir kist olduğu görüldü. Kistin dış yüzeyinde kalın fibrotik kapsül vardı ve kistin birkaç beyaz skoleks kümesi içeren ince bir iç tabakası vardı. Beyaz kümeler, beyaz boncuklar gibi iç şeffaf tabakaya yapışan skoleksler içeriyordu. Kistin makroskopik ve mikroskopik özelliklerine dayanarak, non-serebral coenurus kisti olduğu teşhis edildi. Bu, koyun kalp coenurosisinin nadir bir örneğidir.

Anahtar Kelimeler: Non-serebral, coenurus kisti, kalp, koyun

INTRODUCTION

Coenurosis is an important zoonotic disease that causes serious economic losses in small ruminants and severe disease in human (1,2). Infection is common in worldwide especially in the Middle East countries where the small ruminants are the most resource of meat and milk (1).

Coenurus cysts are the metacestode of *Taenia (multiceps)* species and specially affect herbivores such as sheep and goats. In appearance, the cysts are generally round and have a semitransparent outer wall with several protoscoleces connected to the inner layer. The scolex same as typical taeniid has a double row of hooks. On average, there is 85 scoleces in each coenurus cyst. The highest and lowest number of

scoleces in each cyst is 40 and 550, respectively (3). The diameter of the cysts is between 0.8 and 6.5 cm and is full of fluid. Furthermore, cysts contain several scolices that are easily visible. In microscopic examination the scolices have a rostellum with two rows hooks and four suckers (4).

Coenurus cerebralis or metacestode of *Multiceps* causes cerebral coenurosis in sheep and goats (5). Benkovskij (1899) (4) and Gaiger (1907) (6) for the first time reported the non-cerebral coenurosis in sheep and goat, respectively (6,7).

The causative agents of the non-cerebral cysts were originally called as *Multiceps gigeri* in goats and *Multiceps skrjabini* in sheep by Hall (1916) (7) and Popov (1937) respectively (8,9).



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Verster (1969) revised the genus *Taenia*; he considered *Taenia multiceps* (*T. multiceps*) as alternative word of *Taenia skrjabini* (*T. skrjabini*) and *Taenia gaigeri* (*T. gaigeri*) (10). In recent studies based on Verster's views, *T. skrjabini* was neglected and *T. multiceps* was chosen instead of *T. gaigeri* (11).

Molecular studies on non-cerebral cysts in goats reinforced the viewpoint that *T. gaigeri* was a synonym of *T. multiceps*, and intraspecific sequence variation was only significant difference between strains of *T. multiceps* (1,12). A study in a geographical region of Iran showed that protoscolices of coenurus cysts collected from both the brains of sheep and the muscles of goats produced the similar adult worms in dog intestine (13). This result confirmed former Iranian researcher's opinion that cerebral coenurosis could also affect the other tissues to produce non-cerebral coenurosis (14). Furthermore, molecular study based on two mitochondrial (*cox1* and *nad1*) markers and an exonic region of the enolase (*ENO*) gene confirmed that both cerebral cysts from Iranian sheep and non-cerebral cysts from Iranian goats have 100% genetic identity (15). The goal of the recent study was to description a rare case of non-cerebral coenurus cyst on the myocard of a ewe heart and to characterize its macroscopic and microscopic features.

CASE REPORT

Collection and Examination of Sheep Carcasses

On May 14, 2018, during the routine post mortem inspection from carcasses and offal of slaughtered ewes in Isfahan (Iran), an ovine heart was discovered with a firm nodule in the left ventricle on palpation. At necropsy, a liquid containing cyst (1×1 cm) was recognized on the myocardial wall. The cyst had thick fibrotic capsule in outer surface and a thin inner layer containing few white scolices cluster. White clusters contained scolices that adhered to the inner transparent layer, like white beads (Figure 1). There were not internal or external daughter cysts in depth observation. The invaginated scolices were dispersed to the inner surface (Figure 2). Ethics Committee approval was received for this study from the Animal Ethics Committee of Agricultural Research, Education and Extension Organization (AREEO) (2016/48445/1).

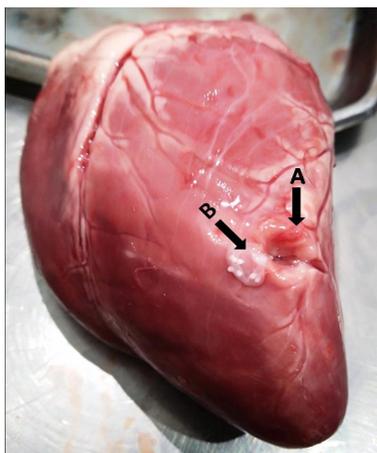


Figure 1. A) Dilatation of the left ventricle with pressure atrophy of the surrounding myocardial tissue
B) A small cyst measuring 1×1×1 cm in diameter was connected and left a cavity in the myocardial tissue

Microscopical Examination

Microscopically each scolex had one rostellum, with a double crown of 32 taeniid hooks and four suckers (Figure 3). The hooks and the hooklets were approximately 150 and 137 μm, respectively (Figure 4). Typical taeniid hooks were characteristic of those of coenurus (Figure 5), the cyst were identified as non-cerebral coenurus, the intermediate stage of *T. multiceps*.

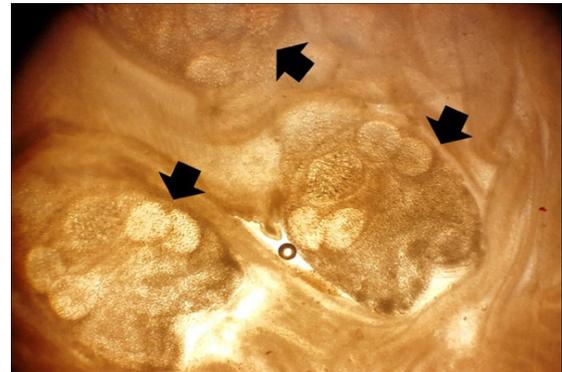


Figure 2. Fresh isolated coenurus cyst with protoscolices (arrow)

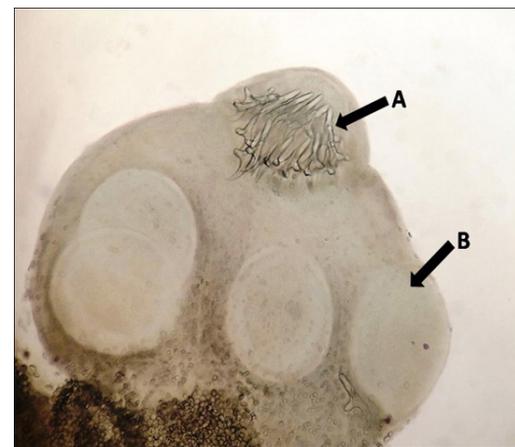


Figure 3. Fresh unstained typical *Taenia multiceps* protoscolex
A) rostellar hooks, B) sucker



Figure 4. Large (L) and small (S) rostellar hooks (lateral view)

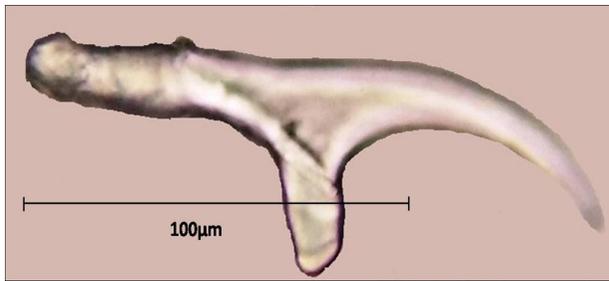


Figure 5. The size estimation of large rostellar hook

DISCUSSION

Every year several carcasses are locally confiscated due to cerebral and non-cerebral coenurosis by meat hygiene inspectors in the world (4). The disease can cause economic losses for the sheep and goat industry in Middle East, where cases are relatively frequent (1).

Sheep are the ordinary hosts of *T. multiceps* larval stage. Localised cysts are often detected in the central nervous system such as brain and spinal cord of infected animals (16). In Asia, cerebral coenurosis has been reported in sheep in India, Jordan, Iraq, Turkey and Iran with a wide range of infection from 2.9% to 28.5% (1). The non-cerebral form of coenurosis is more commonly found in goats and is less frequent in sheep (4). In the most Asian and African countries, unlike European or American countries, there are several descriptions of non-cerebral coenurus cysts in muscles, kidneys, liver and omentum in slaughtered goats (17,18). The incidence of the disease in the goat is between 0.09% and 18.65% at different areas of Iran (1,14). Despite non-cerebral coenurosis in sheep is rare it has been reported in muscles, diaphragm, abdomen, omentum and subcutaneous tissue (1,17).

It has been shown that most non-cerebral cysts in sheep are found intramuscularly (1). According to available information the present study is the first report of non-cerebral coenurus on the myocard.

In this study, the sheep examined had the upper than 3 years old. The coenurosis has rarely been reported in sheep over than 3 years old. Previous studies show that coenurosis in sheep is an age-related disease, and it is common in young animals aged 6 to 18 months (19). Tavassoli et al. (2011) (18) also reported that the highest prevalence of coenurosis in sheep was in animals aged 6 to 24 months (20).

In this study, the size of the cyst was 1 cm³ with eight scolices. Schuster et al. (2010) (20) reported that non-cerebral cysts size change between 1 and 40 cm³ and the number of scolices per cyst change between 46 and 474 (21). In other study in Iran the cerebral cyst sizes were between 1 and 4.5 cm (20). In this study the size of the cyst was similar to later finding but the number of scolices per cyst was less than the ones reported in other studies.

In this case, the number of hooks was 32 and the large hooks were approximately 150 µm and the small hooks were 137 µm in length. According to the reports, the number of hooks in each scolex varies from 28 to 32 (1,4). Oryan et al. (2014) (11) reported that the length of the hooks was 128-169 µm and 106-122 µm for large and small hooks, respectively (1). Morphologically, the

hooks examined in our results were in consistent with previous reports.

CONCLUSION

The present study described a unique case of coenurosis in heart of a sheep. Though non-cerebral coenurosis has been reported in various muscles, this is the first document of heart coenurosis. Effective control measures in endemic regions include: public notification of the epidemiology of the coenurosis, hygienic discarding of offal, deworming of dogs by regular taenicide treatment and control of stray dog population.

* Ethics

Ethics Committee Approval: Ethics Committee approval was received for this study from the Animal Ethics Committee of Agricultural Research, Education and Extension Organization (AREEO) (2016/48445/1).

Informed Consent: Patient was not informed.

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