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Research Note

Spontaneous primary intrathoracic, extrapulmonary hydatid cyst in a broiler rabbit

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Summary

Echinococcus granulosus, a zoonotic tapeworm with a dog-herbivore life cycle, is known to use ruminants, horses, pigs, etc., as intermediate hosts. Natural infections of hydatid cysts have not been documented in small animals like rabbits in India. This paper records spontaneous intrathoracic, extrapulmonary hydatid cysts of *E. granulosus* in a cage reared rabbit. The presence of non-invasive unilocular cyst with typical protoscolices containing rostellar hooks favoured the diagnosis of *E. granulosus* over *E. multilocularis*, the only other *Echinococcus* species found in India. The presence of fertile hydatid cyst points to the fact that rabbits can also act as natural intermediate hosts for *E. granulosus*. The significance of the findings in relation to public health importance is discussed.

Keywords: Rabbit; *Echinococcus granulosus*; hydatid cyst; spontaneous

Introduction

Cyclophyllidian tapeworms of the genus *Echinococcus* are parasites of the gastro intestinal tracts of carnivores. The larval stage, the hydatid cyst, is found in a wide range of herbivores, which act as intermediate hosts. Man can also be accidentally infected, causing hydatidosis, a zoonotic condition. Currently, about seven species of *Echinococcus* are recognized of which only two, *E. granulosus* and *E. multilocularis*, have been recorded in India. *Echinococcus granulosus* is distributed throughout India and *E. multilocularis* has also been recorded as a sporadic pathogen in humans (Aikat *et al.*, 1978). While the intermediate hosts of *E. multilocularis* are currently unknown in India, for *E. granulosus*, a wide variety of herbivores

including cattle, sheep, goats, horse and pigs have been recorded. However, natural infections of small mammals with hydatid cysts have not been documented in India. This paper reports the first case of spontaneous, intrathoracic, extrapulmonary hydatid cyst in a cage reared rabbit.

Materials and methods

The broiler rabbit unit of Sheep Breeding Research Station, Sandynallah maintains New Zealand White and Soviet Chinchilla rabbits and acts as a nodal centre for dissemination of information on rabbit breeding practices and distribution of breeding stock of rabbits to farmers. The rabbits are intensively maintained in cages and fed on 100 g concentrates per day as well as grass *ad-libitum* brought from the pastures.

A Soviet Chinchilla buck (4 years old), maintained in this unit died after a brief illness. The animal had been anorectic and shown signs of respiratory distress. Necropsy of the carcass revealed the presence of an irregularly shaped cyst juxtaposed and loosely adherent with the apical lobes of the lung, in the mediastinum (Fig.1A). There were areas of generalized consolidation in both the lungs, with the lesions being more prominent in the right lung. The apical lobes of both lungs appeared emphysematous. Mild enteritis was also noticed. The cyst was examined microscopically.

Results and discussion

Detailed examination of the cyst revealed it to be roughly conical and about 3 cm at its widest region.

Numerous, tiny whitish bodies were discernible through the transparent outer membrane, some floating free in the clear cyst fluid and others adherent to the wall of the cyst (Fig 1B). The cyst wall was carefully cut open and the contents were drained into a petri dish. Some of the whitish bodies were transferred on to a glass slide, cover slipped and examined under a microscope. The presence of a characteristic, armed rostellum containing two rows of hooks (Fig.1C-E) in each of the bodies confirmed that they were protoscolices of *Echinococcus*. Refractile calcareous bodies were found in all the protoscolices (Fig 1D). The outer row of the rostellum contained small hooks while the inner row had large hooks. The hooks had the typical ‘knife’ shape, complete with a blade, handle and guard (Fig 1 F). Based on the findings, it was concluded that the cyst was the metacestode stage (fertile hydatid) of *Echinococcus granulosus*.

Among the seven species of *Echinococcus*, *E. granulosus* has been most commonly reported from India, while *E. multilocularis* has also been found sporadically (Aikat *et al.*, 1978). *Echinococcus granulosus* is found in canids and employs a wide range of animals, including man, as its intermediate hosts. Numerous herbivores including cattle, sheep, goats, pigs and horse have been found to be naturally infected with hydatid cysts. The metacestode stages of the other species have been naturally found in smaller animals.

Thus, *E. vogeli* has been identified from the rodent paca, *Cuniculus paca* (Meneghelli *et al.*, 1990) and *E. shiquicus* has been found in the plateau pika, *Ochotona curzonae* (Xiao *et al.*, 2006). Wild rodents like agoutis (*Dasyprocta leporina*) are considered to be the intermediate hosts for *E. oligarhtus* (Zimmerman *et al.*, 2009), while *E. multilocularis* uses the Tibetan hare, *Lepus oiostolus* as their natural intermediate hosts (Xiao *et al.*, 2004). The natural intermediate host of *E. multilocularis* in India is not known, though gerbils have been used as experimental hosts (Mohanty & Ravindran, 2002).

Hydatid cysts of *E. granulosus* have been experimentally grown in smaller animals like mice and rabbits. Jenkins and Thomson (1995) studied the course of experimental hydatidosis in rabbits. Hokelek *et al.* (2003) devised a surgical implantation technique to develop unilocular hydatid cysts in rabbit livers. Yang *et al.* (2009) reported the presence of hydatid cysts of *E. granulosus* in the ground squirrels. However, there are no published reports of *E. granulosus* using lagomorphs as intermediate hosts. This is the first documented instance of spontaneous occurrence of (fertile) hydatid cyst in an intensive bred rabbit. It is quite likely that the rabbit acquired infection from contaminated grass collected from the pasture, which is frequented by both dogs and wild canines like jackals and red jungle dogs. This highlights the risk of

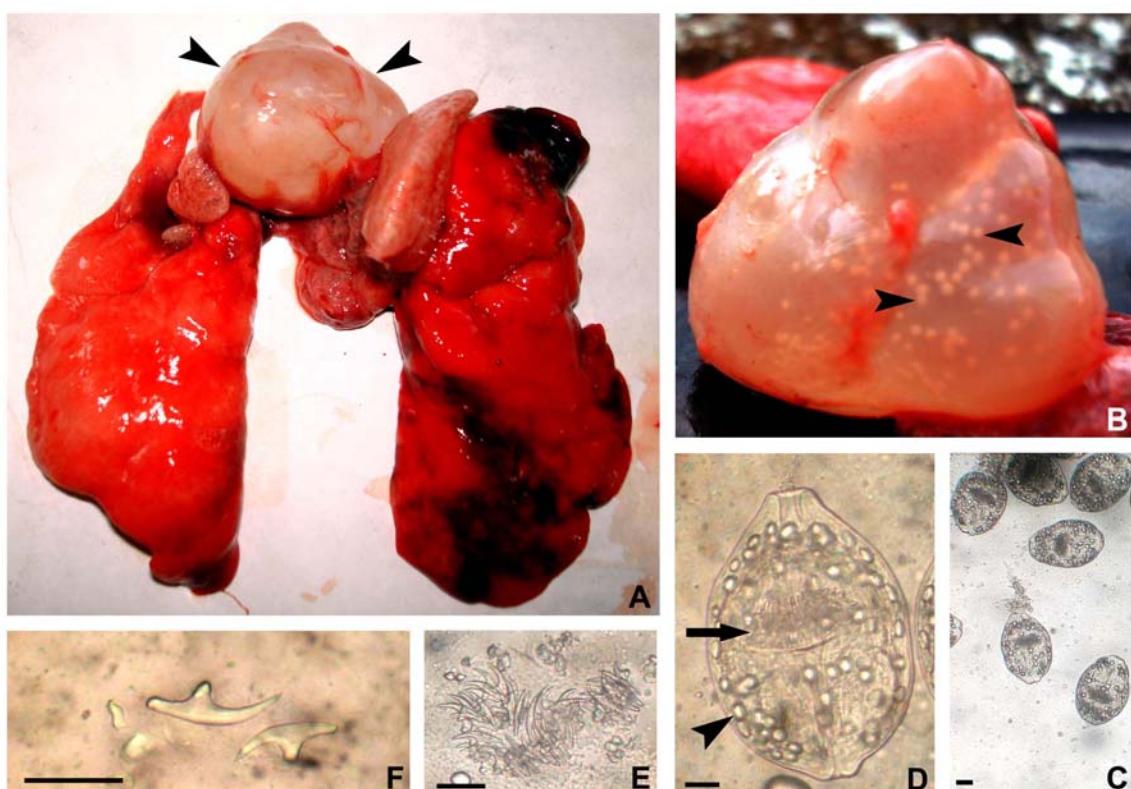


Fig.1 (A) Intrathoracic, extrapulmonary hydatid cyst (arrowheads) in the mediastinal region of the lungs of a rabbit. Diffuse consolidation of the right lung and emphysematous changes of the apical lobes of both lungs are visible. (B) The roughly conical hydatid cyst with clear contents and whitish ‘sand’ (arrowheads). (C) Protoscolices (D) showing the calcareous corpuscles (arrowhead) and the rostellum (arrow). (E) Rostellar hooks (F) consisting of the small and large hooks with the characteristic handle, guard and blade. (Bars in C, D, E and F = 20 μ).

the disease being transmitted to shepherds and especially grass cutters.

Hydatid cysts are normally spherical and are usually found embedded in the parenchymatous tissues of the organ which is parasitized. In rare cases, the shapes of the cysts are often determined by the organ. In the present case, the cyst was found in the mediastinal region of the thoracic cavity, located between the apical lobes of the lungs. The cyst had acquired a roughly triangular shape consistent with the space available. The cyst was unilocular, and was only loosely adherent to the lung tissue and could be easily removed intact. This ruled out the involvement of *E. multilocularis*, which produces branching, multilocular cysts that invade adjacent tissues with exogenous proliferation, making it difficult to remove from the tissue (Czermak *et al.*, 2008). There was no evidence of any ruptured cyst in the lung parenchyma, indicating that it was a primary infection of the thoracic cavity. Primary extrapulmonary, intrathoracic cysts such as this are considered rare (Gursoy *et al.*, 2009) and in humans present unique complications both in diagnosis and surgical correction. In the present case, though the size of the cyst (~3 cm wide) was significant considering the thoracic space of the rabbit, it is uncertain whether the death was a sequel to its presence. It is highly probable that the emphysema noticed in the apical lobes of the lung was a consequence to the presence of this space occupying lesion in the thoracic cavity. The presence of generalized pulmonary consolidation and enteritis suggest that the animal succumbed to unrelated infectious condition and the cyst was just a casual bystander.

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