



HOKKAIDO UNIVERSITY

Title	STUDIES ON ECHINOCOCCOSIS I. : ON TWO NATURAL CASES IN SHEEP
Author(s)	YAMASHITA, Jiro; OHBAYASHI, Masashi; KONNO, Seiji
Citation	Japanese Journal of Veterinary Research, 4(1), 1-4
Issue Date	1956-03-26
DOI	https://doi.org/10.14943/jjvr.4.1.1
Doc URL	https://hdl.handle.net/2115/1682
Type	departmental bulletin paper
File Information	KJ00002372982.pdf



STUDIES ON ECHINOCOCCOSIS I. ON TWO NATURAL CASES IN SHEEP

Jiro YAMASHITA, Masashi OHBAYASHI
and Seiji KONNO

*Laboratory of Parasitology, Faculty of Veterinary Medicine,
Hokkaido University, Sapporo, Japan*

(Received for publication, December 23, 1955)

INTRODUCTION

The occurrence of echinococcosis of domestic animals is very rare in Japan*.

A description made by JANSON in 1893 is the first report concerning the disease in Japan. The following facts were stressed:

1) He had investigated a preparation of echinococcal vesicle with characteristic scolices in 1886.

2) Japanese cattle suffering from the disease could be found in slaughter houses, but very rarely.

3) The patient animals were limited almost entirely to those raised in Kyushu Island and the occurrence of the disease could have originated in an animal brought from China.

From that time several reports have been published chiefly concerning cases detected in slaughter houses, but detailed examinations and discussions have not been made; especially there has been no echinococcal (hydatid) case reported in Hokkaido.

In reference to human cases, considerably many cases, more than 70, have been detected in Japan. In Hokkaido, the alveolar echinococcosis has recently been found as an endemic disease in Rebun, the northernmost small island off Hokkaido, and the adult worm of *Echinococcus granulosus* was detected from dogs in the island by YAMASHITA et al. in 1954. On the other hand, SATO and KITABATAKE confirmed the infestation of an adult *Echinococcus* in a dog at the time of investigation in connection with a human alveolar echinococcosis in Aomori Prefecture, northern Honshu.

From the above facts, it is considered that more exhaustive investigation and solution of problems concerning the disease are desirable in this country. The present authors, under such circumstances, could fortunately find 2 natural cases of echinococcosis in sheep in Hokkaido and some experimental investigations are being made. Contained in this report are the descriptions given to these cases by the authors. One of the two, a case of the pulmonary echinococcosis, and its results have already been published. That case was born and raised in Hokkaido so it is the first case of echinococcosis in domestic animals experienced in this

* A detailed survey of the epidemiology of the disease will be presented in the next report.

district. So-called hydatid sand obtained from the other hepatic echinococcal case has been used for the studies such as experimental transmission to the dog, experiments on the intermediate host animals and others; the results will be described in the succeeding reports.

DESCRIPTION

Case No. 1

Historical Seven sheep collected in the towns of Chitose and Yuni, 3 to 9 years old, were autopsied at the slaughter house in the vicinity of Sapporo City on August 7, 1954. The patient animal, a Corriedale ram, was slaughtered together with the other 6 sheep. The animal was born and raised in the above-named district. Inspecting the case at the slaughter house, the lesions were detected only in the lungs. The lungs were fixed with 10% formalin solution and were subjected to pathological and parasitological examination later.

Macroscopical changes The lungs showed normal shape with smooth surface, voluminous and emphysematous. Right underneath the pleura and deep in the parenchyma, 9 cystic foci with transparent fluid were found—they were enveloped with thick connective tissue layer; the focus was indurative to the touch and the pleural surface was slightly convexed at the portion of subpleural focus. The foci were distributed in the median or posterior lobes and 6 of them were found in the right side. The connective tissue layer was approximately 1 mm in thickness, grayish white in color, very compact, and frequently showed calcification. The focus was clearly demarcated, its shape was nearly botryoidal and complicated, but the lumen was not divided. Within the capsule, there existed a vesicle of which the wall was semitransparent, soft and gelatinous in character. On the inner surface of vesicle wall, many grayish-white fine granular structures were found sporadically or densely; this structure was the brood capsule. The sizes of foci ranged from $0.7 \times 1 \times 1.5$ to $5 \times 2 \times 2$ (cm).

Histopathological changes The histopathological structure of the focus was characteristic. The wall of focus was composed of the connective tissue layer, cuticular and germinal membranes. On the inner surface of the vesicle wall, many brood capsules which contained scolices were found. The connective tissue layer itself, the outermost layer of the focus, was divided into two parts; the outer layer with the cell accumulation of lymphocytes and histiocytes and the inner one densely composed of collagenous fibers which were poor in nuclei. The connective tissue layer frequently showed calcification. The cuticular membrane was faintly stainable with eosin, laminated and enucleate. The germinal membrane, the innermost layer, was very thin and rich in nuclei. The typical daughter cyst formation was unrecognizable. Regressive changes were observed in some foci.

Parasitological findings Together with the section preparation examined by routine histological methods the vesicle wall was also examined on the slide glass by the following methods:

- 1) Mounting with water or glycerin without staining
- 2) Dehydration with alcohol, clearing with xylene and mounting with balsam without staining

3) Hematoxylin staining and glycerin-gelatine mounting

The wall of brood capsule was in the form of a thin membrane like the germinal membrane, attached to the latter by a short peduncle; it contained 3~19 (average 12) scolices. The scolex was usually invaginated and showed a pear-shape; the head was withdrawn in the center making a narrow tube, 4 suckers surrounded the tube and 2 rows made of large and small hooks occupied the bottom of tube showing rosetteform or radiate arrangement. At the end opposite to the opening of the invagination, the scolex was attached to the wall of brood capsule by a peduncle. The size of scolex was 148~173 μ (average 161 μ) \times 99~125 μ (107 μ). The large hook was 21~25 μ (24 μ) in size and the small hook 15~21 μ (20 μ); the hook consisted of the blade, handle and guard. The number of hooks did not show remarkable individual fluctuations and was 34~41 (average 38). As for the histological structure, the scolex was covered with an outer thin cuticular layer; small deep-stained nuclei were scattered in the parenchyma; especially the nuclei were accumulated near by the suckers and hooks, and the calcareous corpuscles were recognizable.

Case No. 2

Historical A Corriedale ewe, born in 1951, imported from Australia to Hokkaido in April, 1953. On October 25, 1954, the animal manifested nervous symptoms; she was sacrificed for pathological examination and was diagnosed as encephalomalacia. An echinococcal focus was found in the liver at the time of autopsy.

Macroscopical changes The changes other than those of the liver are omitted.

A cystic focus, size 10 cm \times 4 cm \times 4 cm, was localized right underneath the gall bladder and the half of the focus was embedded in the hepatic parenchyma. The cyst was encapsuled by thick connective tissue layer in which a vesicle with gelatinous yellowish white wall was found. The vesicle contained a large amount of light yellow colored fluid and numerous white granular structures of the size of a poppy seed were found on the inner surface of the vesicular wall and in the fluid (so-called hydatid sand).

Histopathological changes The focus showed a typical structure of hydatid cyst; especially the development of the brood capsules and scolices were remarkably active. However no daughter cyst was found.

Parasitological findings Among the scolices examined on the fresh material, some showed evagination and revealed activities, expansion and contraction. Sometimes the scolices were gathered together at their caudal ends and showed a radiate arrangement. The details of structure of the scolex were the same as those in the case No. 1. The hydatid sand of this case has been used for further experimental studies.

DISCUSSION

There is no doubt but that the foci of the above 2 cases are caused by the tapeworm of genus *Echinococcus* RUDOLPHI, 1801. The distribution of the foci, structure of the cyst or vesicle, brood capsule formation, morphology of scolex, etc. are identical to the description in the literature.

The taxonomical identification of the species of worm will be established in a succeeding report after examination is made on the adult tapeworm obtained

by experimental transmission to the dog. The authors, however, would like to diagnose the foci in the present report as "*echinococcus unilocularis sive polymorphus fertilis*".

CONCLUSION

The occurrence of echinococcosis is very rare in Japan. In this report, the descriptions of 2 naturally infected ovine cases were presented. One of them is the first case of echinococcosis in domestic animals found in Hokkaido.

The authors wish to express their gratitude to Prof. S. YAMAGIWA, the chief of the Laboratory of Veterinary Pathology of this Faculty for his helpful advice. They also wish to record their thanks to the persons concerned of the Health Department, Hokkaido Prefectural Office for their cooperation.

REFERENCES

- 1) AMBO, H., K. ICHIKAWA, H. IIDA & N. ABE (1954): *Rep. Hokkaido Inst. Publ. Hlth*, Suppl. No. 4, 1~19 (in Japanese).
- 2) FAIRLEY, N. H. & R. J. WRIGHT-SMITH (1929): *J. Path. Bact.*, **33**, 309.
- 3) IDA, T., T. UEMURA, M. YAMADA, T. TSUCHIGANE, M. OHBAYASHI & J. YAMASHITA (1955): *J. Jap. vet. med. Ass.*, **8**, 195 (in Japanese).
- 4) JANSON (1893): *Arch. wiss. prakt. Tierheilk.*, **19**, 241.
- 5) SATO, K. & E. KITABATAKE (1954): *Nihon Iji Shinpô (Jap. med. Wshr.)* No. 1536, 3849 (in Japanese).
- 6) YAMASHITA, J., Z. ONO, H. TAKAHASHI & K. HATTORI (1955): *Mem. Fac. Agric. Hokkaido*, **2**, 147 (in Japanese with English abstract).

EXPLANATION OF PLATES

Figs. 1~10: Case No. 1. Figs. 11~17: Case No. 2.

PLATE I.

- Figs. 1~3. Macroscopical view of foci. Magnifications: $\times 2/3$, 3 and $2\ 1/2$ respectively. In fig. 2, brood capsules show fine granular structure.
- Fig. 4. Scolices. Unstained and mounted with water. $\times 84$.
- Fig. 5. Brood capsule with scolices. Some evaginated scolices. Hematoxylin staining and glycerin-gelatine mounting. $\times 138$.
- Figs. 6 & 7. Scolex. Unstained and mounted with water. $\times 350$.
- Fig. 8. Hooks showing radiate arrangement. Unstained, dehydrated, cleared and balsam-mounted. $\times 980$.

PLATE II.

- Fig. 9. Histological view of the focus. Hematoxylin-eosin. $\times 34$.
- Fig. 10. Part of fig. 9 showing scolices. $\times 220$.
- Fig. 11. Hepatic focus. $\times 2/3$.
- Fig. 12. Magnification of the inner surface of vesicle showing numerous scolices. $\times 25$.
- Figs. 13 & 14. Scolices. Some scolices evaginated. Untreated fresh material. $\times 56$.
- Fig. 15. Scolex. Remarkable peduncle, cuticular layer, hooks and calcareous corpuscles. Untreated fresh material. $\times 360$.
- Fig. 16. Histological view of the focus showing brood capsules with scolices, germinal and cuticular membranes. $\times 58$.
- Fig. 17. Part of fig. 16 showing scolices. $\times 185$.



