

Studies on Intestinal Trematodes in Korea

VIII. A Human Case of *Echinostoma hortense* Infection

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INTRODUCTION

The echinostomatid flukes are known to be widely prevalent among the mammalian and avian hosts in Korea. For echinostomes from mammals, Kawamura (1915) firstly recorded *Echinostoma* sp. infection in dogs and Park (1938) described *Echinostoma hortense* from house rats in Seoul. After then, Seo *et al.* (1964) reported infection of rodents with *E. hortense*, *E. cinetorchis* and *Euparyphium murium* in several areas. Recent fluke surveys also show the prevalence of *E. hortense* and *E. cinetorchis* among house rats (Seo *et al.*, 1981) and stray dogs (Cho *et al.*, 1981). From avian hosts, 4 kinds of echinostomes have been reported, *i.e.*, *E. revolutum*, *E. gotoi*, *E. miyagawai* and *Echinoparyphium koizumi* (Isshiki, 1934; Chu *et al.*, 1973; Eom *et al.*, 1983).

In case of human, the echinostomatid eggs have sometimes been detected during fecal examinations by many workers in Korea. However, only one case of *E. cinetorchis* infection was proven by collection and identification of 8 worms (Seo *et al.*, 1980). In other countries, 14 kinds of echinostomes are known to infect man and 6 species among them belong to the genus *Echinostoma*; *E. hortense*, *E. cinetorchis* and *E. macrorchis* (Japan), *E. revolutum* (Formosa and Indonesia), *E. lindoensis* (Celebes), and *E. paraulum* (U.S.S.R.) (Yamashita, 1964; Arizono *et al.*, 1976).

The authors collected one echinostomatid fluke from a man after praziquantel treatment and the worm was identified as *E. hortense*. So this paper describes the first human case of *E. hortense* infection in Korea.

CASE RECORD

Several echinostomatid eggs, measuring 128~139 μm , were found from a 21-year old man concomitantly with *Clonorchis sinensis* eggs during mass fecal examination in October 1983 in Taegu City. The same eggs were detected again in the second examination done one week later. The EPG counts of both flukes were zero by Stoll's egg counting technique.

The case was treated with praziquantel (Disticide[®]) 20 mg/kg in single dose. One hour later, magnesium salt was given for purgation. About 4 hours after praziquantel treatment, an adult echinostomatid fluke was collected from the 2nd diarrheal stool. And 4 adult worms of *C. sinensis* were obtained from the 4th watery stool 6 hours after the treatment.

The man had lived in Munkyōng-gun, Kyōngsangnam-do and at present is a seaman recruit of Korean Navy. He has been quite healthy without any gastrointestinal or other subjective symptoms. The eosinophil was 6% among leucocytes in peripheral blood smear. He said that he used to eat many kinds of raw fresh water fish in his native village, but not the loaches, tadpoles or frogs which are known as the second

intermediate hosts of *E. hortense*.

WORM AND EGG DESCRIPTION

The fluke was fixed with 10% formalin under pressure, and stained with Semichon's acetocarmine. It measured 10.4 mm long and 1.8 mm wide (Fig. 1). Oral sucker subterminal. Ventral sucker large and protruded ventrally and 1.1mm posteriorly from anterior end. Head crown not distinctively seen and overlapped with oral sucker. Many collar spines detached and only 9 in number were observed; 4 in right end group, 4 in left end group and 1 in left body margin (Fig. 2). Pharynx well developed. Pre-pharynx

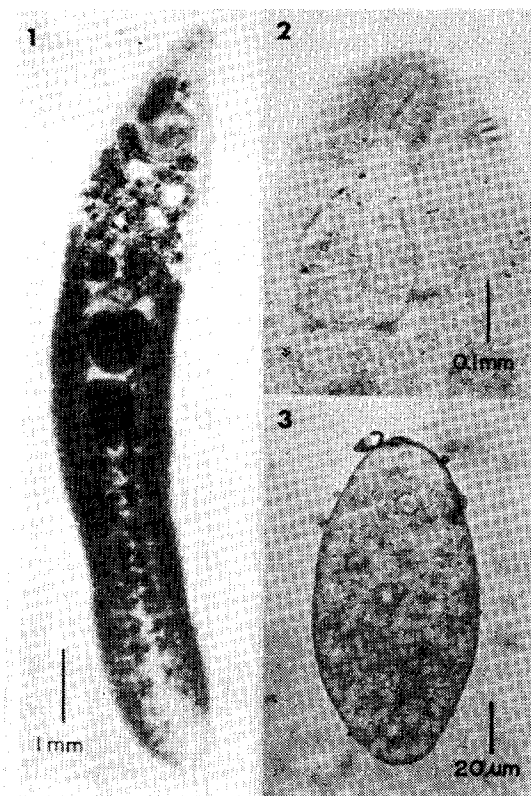


Fig. 1-3. 1. Whole worm of *E. hortense* from the present case.
2. Magnification of anterior end of *E. hortense* showing 4 right end group spines and 4 (2 are not seen in this figure) left end group ones. Head crown is not distinct.
3. Egg of *E. hortense* from stool of the present case.

and esophagus present. Cirrus pouch well developed, well demarcated, and overlapped with the right anterior margin of dorsal side of ventral sucker. Coiled uterus long, filled with numerous eggs down to anterior one third portion. The globular ovary at right lateral portion of anterior one third of the body. Mehlis' gland on midline just anterior to anterior testis. Two testes distinct, globular to rectangular and slightly lobated, tandem at equatorial portion. Thick vitelline follicles scattered all over the lateral fields, not confluent ventrally, from anterior one third to posterior end of the body. Excretory pore opened at posterior end. The measurements of worm are shown in Table 1.

The egg was golden yellow and elliptical (Fig. 3). The egg shell was too thin to measure. The length of 3 eggs from stool was 0.127~0.139 mm (mean 0.131 mm) and the width 0.071~0.081 mm (mean 0.076 mm). Opercular width 0.017~0.024 mm (mean 0.020 mm) and opercular depth 0.003 mm.

Table 1. Measurements of adult **E. hortense* from the present human case

Organ	Size(mm)
Body length	10.4
width, maximum	1.8
Oral sucker, width	0.186
length	0.180
Pre-pharynx, length	0.073
Pharynx, width	0.146
length	0.226
Esophagus, length	0.219
Ventral sucker, width	0.795
length	0.777
Cirrus pouch, width	0.303
length	0.739
Ovary, width	0.392
length	0.366
Mehliss' gland, width	0.612
length	0.346
Anterior testis, width	0.890
length	0.890
Posterior testis, width	0.720
length	0.947

* One worm

DISCUSSION

The echinostomatid fluke obtained from the present human case falls in the genus *Echinostoma* Rud., 1869, considering its morphological characters such as vitellaria extending anterior to ovary, long uterus with numerous eggs, presence of head crown with collar spines and not-serrated lateral margins of hindbody (Yamaguti, 1958).

A few differential points among the species of *Echinostoma* are shown in Table 2 and 3. The number of collar spine is regarded one of the major clues for speciation. However, except for 4 end group spines which are identical with *E. hortense*, the spines of the present specimen are incomplete, so not appropriate for the definite clue. Therefore, other morphological characters were observed and compared with the reported species. First of all, the length of eggs is 0.128~0.139mm in the present case. This

figure is apparently not compatible with *E. macrorchis*, *E. revolutum* or *E. cinetorchis* but overlapped with those of *E. hortense* (Table 2). And, the possibility of *E. cinetorchis* can easily be ruled out by distinct location and number of testes as well as the laterally deviated location of ovary in the present specimen. The lateral location of ovary is also incompatible with *E. revolutum*, and the size and equatorial location of testes are different from *E. macrorchis* (Table 3). All of the above figures such as 4 end group spines, length of eggs, laterally deviated ovary and two distinct testes at equatorial portion, agree well to the descriptions of *E. hortense* (Asada, 1926; Park, 1938; Seo *et al.*, 1980).

According to the fauna studies on the intestinal flukes of rats (Seo *et al.*, 1964 & 1981), *E. hortense* and *E. cinetorchis* are the commonest species of *Echinostoma* in Korea. Seo *et al.* (1980) found a human case of *E. cinetorchis* infection, and they detected several metacercariae of *E. hortense* from the loach, *Misgurnus anguillicau-*

Table 2. Measurements of eggs and body of 4 *Echinostoma* species from human

Species	Reporter	Egg length(mm)	Body length(mm)
<i>E. macrorchis</i>	Majima(1927)*	0.097	5.0~7.0
	Okabe <i>et al.</i> (1972)*	0.095~0.098	3.6~7.9
<i>E. revolutum</i>	Anasawa(1929)	0.089~0.111	7.2~11.4
<i>E. cinetorchis</i>	Takahashi <i>et al.</i> (1930)*	—	9.5~14.5
	Kawahara <i>et Yamamoto</i> (1933)*	0.100~0.103	17.0~20.0
	Seo <i>et al.</i> (1980)	0.099~0.116	10.8~12.6
<i>E. hortense</i>	Tani (1976)	0.112~0.140	7.2~9.3**
	Arizono <i>et al.</i> (1976)	0.112~0.143	6.2~9.8***
	Makino <i>et al.</i> (1982)	0.120~0.137	7.4~9.5
Present specimen		0.127~0.139	10.4

* Cited from Tani *et al.* (1974)

** The worms were obtained from natural infection in rats.

*** The worms were obtained from experimental infection to dogs.

Table 3. The location of ovary and testes, and the number of collar spines of *Echinostoma* spp. from man

Species	Ovary location	Testes location	No. collar spines (end group ones)
<i>E. macrorchis</i>	slightly lateral	post-equatorial	43~47(4~5)
<i>E. revolutum</i>	median	post-equatorial	37(5)
<i>E. cinetorchis</i>	median	equatorial	36~37(6)
<i>E. hortense</i>	lateral	equatorial	27~28(4)
Present worm	lateral	equatorial	incomplete(4)

* These informations were reviewed by Rim (1982).

*datu*s, in the locality where the human case was found. Recently, Seo *et al.* (1983) discovered again many metacercariae of *E. hortense* from the mesentery of loaches and tail of tadpoles of *Rana nigromaculata*.

The present human case had the history of eating many kinds of fresh water fish but not the loaches. So the infection source is not certain. However, in Japan, it was reported that other than loaches the Japanese bitter melons, *Acheilognathus moriokae*, also serve as the second intermediate host of *E. hortense* (Tani, 1976). Therefore, the possible role of other fresh water fish as the source of human infection should be further investigated in Korea.

The present echinostomiasis case had no clinical complaint at all. This is explained by the lowest worm burden, only one worm. In the follow-up examination 2 weeks after the treatment the eggs were not found. So it seems true that the case had only one worm and praziquantel is effective in treatment of echinostomiasis. Using praziquantel, human cases of *E. hortense* infection are expected to be discovered continuously in Korea, if it is pursued to obtain worms from the cases who reveal large operculate trematode eggs, 0.120~0.140mm in length.

SUMMARY

Echinostomatid eggs were found from a 21-year old man, whose native village is Munkyong-gun, Kyongsangnam-do during fecal examination in October 1983. The eggs were detected again one week later concomitantly with the eggs of *Clonorchis sinensis*. He had no subjective symptoms related with these fluke infections. He was treated with praziquantel (Distocide®) 20 mg/kg in single dose and purgated with magnesium salt.

One echinostomatid fluke and 4 adults of *C. sinensis* were collected from the diarrheal stools. After morphological observation, the echinostomatid fluke was identified as *Echinostoma hortense* Asada, 1926. This is the first record on human *E. hortense* infection in Korea.

REFERENCES

- Anazawa, K. (1929) On a human case of *Echinostoma revolutum* and its infection route. *Taiwan Igakkai Zasshi*, (288):221-241 (in Japanese)
- Arizono, N., Uemoto, K., Kondo, K., Matsuno, K., Yoshida, Y., Maeda, T., Yoshida, H., Muto, K., Inoue, Z. and Takahashi, K. (1976) Studies on *Echinostoma hortense* Asada, 1926 with special reference to its human infection. *Jap. J. Parasit.*, 25(1):36-45 (in Japanese)
- Asada, J. (1926) On a new echinostomatid trematode and its life history. *Trans. Japan. Path. Soc.*, 16: 293-294 (in Japanese)
- Cho, S.Y., Kang, S.Y. and Ryang, Y.S. (1981) Helminthes infections in the small intestine of stray dogs in Eujungbu City, Kyonggi Do, Korea. *Korean J. Parasit.*, 19(2):55-59 (in Korean)
- Chu, J.K., Cho, Y.J., Chung S.B., Won, B.C. and Yoon, M.B. (1973) Study on the trematode parasites of the birds in Korea. *Korean J. Parasit.*, 11(2): 70-75 (in Korean)
- Eom, K.S., Rim, H.J. and Jang D.H. (1983) A study on the intestinal helminths of duck. *Program and Abstracts of the 25th annual meeting of the Korean Soc. for Parasit.*: 28 (in Korean abstract)
- Isshiki, O. (1934) On a trematode parasite (*Echinostoma revolutum* Froelich, 1802) from the Korean wild duck. *Chuo Juigakai Zasshi*, 47:639-647 (in Japanese)
- Kawamura, R. (1915) Survey on the parasites of domestic animal in South Korea {Cited from Isshiki, O. (1934) *J. Chosen Natural History Soc.*, (18): 77-90 (in Japanese)}
- Makino, Y., Nakagawa, A., Yamane, Y. and Gonda, N. (1982) A human case of echinostomiasis in Shimane prefecture and experimental infection in rats. *Jap. J. Parasit.*, 31(5):385-390 (in Japanese)
- Park, J.T. (1938) A rat trematode, *Echinostoma hortense* Asada, from Korea. *Keijo J. Med.*, 9(4): 283-286
- Rim, H.J. (1982) Echinostomiasis. CRC Handbook Series in Zoonosis, Section C: Parasitic Zoonoses, Vol. III (Trematode Zoonoses): 53-69, CRC Press, Inc. Boca Raton, Florida.
- Seo, B.S., Cho, S.Y. and Chai, J.Y. (1980) Studies on intestinal trematodes in Korea I. A human case of *Echinostoma cinetorchis* infection with an epidemiological investigation. *Seoul J. Med.*, 21(1):

- 21-29
- Seo, B.S., Cho, S.Y., Hong, S.T., Hong, S.J. and Lee, S.H. (1981) Studies on parasitic helminths of Korea V. Survey on intestinal trematodes of house rats. *Korean J. Parasit.*, 19(2):131-136
- Seo, B.S., Lee, S.H., Chai, J.Y., Hong, S.T. and Hong, S.J. (1983) Infection status of loaches and tadpoles with metacercariae of *Echinostoma hortense*. *Program and Abstracts of the 25th annual meeting of the Korean Soc. for Parasit.*, 10-11 (Korean abstract)
- Seo, B.S., Rim, H.J. and Lee, C.W. (1964) Studies on the parasitic helminths of Korea I. Trematodes of rodents. *Korean J. Parasit.*, 2(1):20-26
- Tani, S., Yoshimura, H., Ohmori, Y., Kamiya, H. and Yamakawa, H. (1974) A case of human echinostomiasis found in Akita Prefecture, Japan. *Jap. J. Parasit.*, 23(6):404-408 (in Japanese)
- Tani, S. (1976) Studies on *Echinostoma hortense* (Asada, 1926) (1) Species identification of human echinostomiasis and its infection source. *Jap. J. Parasit.*, 25(4):262-273 (in Japanese)
- Yamaguti, S. (1958) Systema helminthum. Vol. I. Digenetic trematodes of vertebrates, Interscience Publishers, New York.
- Yamashita, J. (1964) Echinostome. *Progress of Med. Parasit. in Japan*, 1:288-313

＝國文抄錄＝

韓國의 腸吸蟲에 관한 研究

VIII. 호르텐스 棘口吸蟲(*Echinostoma hortense*)의 人體感染 1例

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경상북도 문경군에 주소를 둔 21세 한국인 남자에서, 1983년 10월에 실시한 집단 검변 도중 크기가 0.127~0.139mm인 吸蟲卵을 발견하였다. 이를 棘口吸蟲類 蟲卵으로 생각하고, 국산 프라지판텔(디스토시드) 20mg/kg을 1회 투여하고 염류하제를 1시간 후에 복용시켜 설사변을 4회 수집 조사한 결과, 棘口吸蟲의 성충 1마리와 肝吸蟲 4마리가 수집되었다. 이 흡충은 성충과 충란의 계측치, 난소와 고환의 위치 등을 근거로 하여 호르텐스棘口吸蟲(*Echinostoma hortense*)으로 同定되었고 국내 최초의 人體感染임이 확인되었다.

이 患者는 고향에서 많은 種類의 민물고기를 날로 먹은 경험이 있다고 하나 미꾸리 등 알려진 中間宿主는 生食한 기억이 없다 하므로 정확한 感染源을 파악할 수는 없었다. 臨床의 문제나 증후는 전혀 관찰되지 않았으며 말초 혈액중의 好酸球는 6%이었다.