FIRST RECORD OF STROBILOCERCUS FASCIOLARIS (TAENIIDAE-LARVAE) IN MAN

J. ŠTĚRBA and V. BARUŠ

Institute of Parasitology, Czechoslovak Academy of Sciences, Prague

Abstract. A spherical cyst containing a coiled cestode larva was found in the liver of a 77-year-old man at post-mortem examination. The parasite was determined as Strobilocercus fasciolaris, i.e., the larval stage of Hydatigera taenioformis. This is the first record of a larvocest of this species in man. Characteristics of the morphology and measurements are given. Records of adult forms in definitive hosts and of larvocests in intermediate hosts are discussed.

The occurrence and detection of parasites or their remainders in human liver from dissection and biopsy material have been studied for many years and interesting results have been published (Štěrba and Šlais 1972, 1974). The present paper deals with the finding of a larval form of cestode of strobilocercus type belonging to the genus Hydatigera Lamareck, 1816. On the basis of published data it may be stated that the occurrence of this larval stage (strobilocercus) in man has not yet been reported. This study complements the present knowledge of the occurrence of larval cestodes in man.

MATERIAL

L. P., a man aged 77 years, pensioner, was hospitalised at the Clinic of Neurology of the Faculty Hospital in Plzeñ in 1974. He was treated for senile encephalopathy and hypertension. During the stay in the hospital the patient developed a bronchopneumonia, but the treatment was unsuccessful and the patient died. The post-mortem examination (Šikl’s Institute of Pathology and Anatomy, Faculty Hospital, Plzeñ, No. of autopsy record 443/74, No. of histological examination 11-2002) confirmed the clinical diagnosis. Numerous serous cysts of various size were found in the liver. The largest one situated near the anterior margin of the right liver lobe measured 12 cm in diameter. Some of the cysts scarred. A small cyst located in the right lobe near its anterior margin and slightly projecting above the surrounding parenchyma was separated with a portion of liver parenchyma and fixed in 10 % formol. The cyst was spherical, with markedly thickened whitish wall formed by a 0.1—0.2 mm thick layer of hyaline tissue. The diameter of the cyst was 7 mm. Inside the cyst was a coiled strobilocercus. Specific determination of the strobilocercus was carried out after morphological and metrical studies.

RESULTS

Description of larva (Fig. 1): Body of strobilocercus measures 48.30 mm in length and 4.12 mm in maximum width. Maximum thickness of the body (dorso-ventral) is 2.30 mm. Scolex is fully developed; neck is not markedly developed. Strobila slightly tapers in posterior half and at the end has a small bladder filled with a liquid. Rostellum is armed with 30 hooks arranged in two circles of 15 hooks each. Rostellum measures 0.74 mm in width. Diameter of scolex is 1.71 mm at the level of suckers. Hooks in the first circle measure 0.420—0.429 mm in total length and 0.118—0.125 mm in maximum width at
the level of guard. Their bladder measures 0.147—0.150 mm, handle 0.227—0.230 mm and guard 0.074—0.081 mm in length. The guard is shoe-shaped in ventral view. Hooks in the second circle measure 0.255—0.260 mm in total length and 0.094—0.097 mm in maximum width at the level of guard. Their blade measures 0.116—0.119 mm, handle 0.109—0.111 mm and guard 0.058—0.060 mm in length. Guard is divided into two lobules in ventral view. A pith-like structure is visible inside the blade of hooks in both circles. Scolex bears 4 muscular spherical suckers measuring 0.54—0.60 mm in diameter.

Fig. 1. A, B, C, E — Strobilocercus fasciolaris from liver of man. A — scolex (general view); B — blade and shape of guard of hooks (ventral view); C — hook from the first circle; E — hook from the second circle; D, F — hooks of Hydatigera taeniaformis from small intestine of Felis silvestris. Original.

We have compared the morphology and measurements of the strobilocercus from the cyst in liver of man with the larval stage named Strobilocercus fasciolaris from Ondatra zibethica and Phasianus colchicus and also with adult specimens of Hydatigera taeniaformis (Batsch, 1786) from Felis silvestris, with a special reference to the number, size and shape of hooks and other characters. Having regard to the data on the variability of S. fasciolaris given in the monograph by Abuladze (1964) and in other papers, we arrived at the conclusion that the strobilocercus from human liver is identical with S. fasciolaris and represents therefore a larval form of H. taeniaformis. The specimen of S. fasciolaris which we removed from the liver of man is morphologically and metrically fully developed larval stage. All characters correspond with the diagnosis of this stage of H. taeniaformis obtained from other intermediate hosts (Table 1). Our finding
Table 1. Comparison of main metrical characters of *Strobilocercus fasciolaris* from various hosts (according to different authors; measurements in mm)

<table>
<thead>
<tr>
<th>Measurements</th>
<th><em>Homo sapiens</em></th>
<th><em>Hylabates leuciscus</em></th>
<th><em>Apodemus flavicollis, A. sylvaticus</em></th>
<th><em>Ondatra zibethica</em></th>
<th><em>Phasianus colchicus</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter of cyst</td>
<td>7</td>
<td>4–6x</td>
<td>6–10</td>
<td>5–23</td>
<td>6–9</td>
</tr>
<tr>
<td>Length of strobilocercus</td>
<td>48.3</td>
<td>12</td>
<td>30–100</td>
<td>16–380</td>
<td>40–70</td>
</tr>
<tr>
<td>Maximum width</td>
<td>4.12</td>
<td></td>
<td>1–3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width of rostellum</td>
<td>0.74</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of hooks</td>
<td>30</td>
<td>34–36</td>
<td>32–36</td>
<td></td>
<td>28–30</td>
</tr>
<tr>
<td>Length of hooks of 1st circle</td>
<td>0.420–0.429</td>
<td>0.460</td>
<td>0.420–0.465</td>
<td>0.380–0.448</td>
<td>0.440–0.462</td>
</tr>
<tr>
<td>Length of hooks of 2nd circle</td>
<td>0.255–0.290</td>
<td>0.300</td>
<td>0.240–0.280</td>
<td>0.251–0.288</td>
<td>0.280–0.292</td>
</tr>
<tr>
<td>Diameter of scolex</td>
<td>1.71</td>
<td></td>
<td></td>
<td></td>
<td>1.5–1.8</td>
</tr>
<tr>
<td>Diameter of suckers</td>
<td>0.54–0.60</td>
<td>0.5–0.6</td>
<td></td>
<td></td>
<td>0.42–0.46</td>
</tr>
</tbody>
</table>

confirms that a complete larval development of *H. taeniaeformis* may take place in the organism (liver) of man if eggs of this parasite are ingested. Man is thus a new, hitherto unknown intermediate host of the cestode *H. taeniaeformis*, although obviously only a facultative one.

**DISCUSSION**

The cestode *H. taeniaeformis* has a cosmopolitan distribution and its obligate hosts are Carnivora. The parasite is located in the small intestine of the host. Abuladze (1964) reported 30 species and subspecies of the families Felidae, Canidae and Mustelidae in the list of definitive hosts of this cestode. In addition to these hosts, only two records of man infection with adult specimens of *H. taeniaeformis* have been published by Bacigalupo (1922) ex Abuladze (1964). The author obtained 1 cestode specimen from a 5-year-old boy in Buenos Aires, which he erroneously determined as a new
species, *Taenia infantis* Bacigalupo, 1922. In the monographs by Faust (1940), Yamaguti (1959) and Abuladze (1964) this form is regarded as a synonym of *H. taeniaeformis*. Other records were published by Morishita and Sawada (1966) from Japan. During the treatment with anthelmintic drugs, 8 cestode specimens were obtained from 3 children (at pre-school age) and 1 woman (aged 55 years). The authors determined the parasites as a new species *Multiceps longihamatus* Morishita et Sawada, 1966 belonging to the genus *Multiceps* Goezé, 1782. Another cestode specimen obtained from a girl (aged 4 years) from Okinawa was determined as *Multiceps* sp.,. Soviet authors, Spasskij et al. (1968), revised the above-mentioned records from Japan and proved the identity and synonymy of *M. longihamatus* with *H. taeniaeformis*. In their opinion further studies would be necessary for determination of *Multiceps* sp. As it follows from this survey, man may also serve as a definitive host of *H. taeniaeformis*.

Larval stages (*S. fasciolaris*) of *H. taeniaeformis* are most frequently encountered in Rodentia and less in other orders of animals. Abuladze (1964) recorded in the list of intermediate hosts 36 species (or subspecies) of Rodentia, but only 2 species of Lagomorpha and 1 species of Insectivora and Carnivora. With regard to our finding of *S. fasciolaris* in man, it is interesting to note the paper by Sambon (1924) ex Abuladze (1964) describing a cyst with coiled taeniid larvae (according to the description evidently strobilocerci) recovered from the oment and serous surface of intestine of gibbon (*Hylobates leuciscus*). The author assigned these specimens to a new genus *Rediaena* (as a new species *R. borelli* Sambon, 1924). Abuladze (1964) considered this form to be identical with *S. fasciolaris* and, consequently, a synonym of *H. taeniaeformis*. Sambon's (1924) finding and our results confirm that the larval development of this cestode species may be completed in mammals of the order Primates.

The probability of infection with larval stages of *H. taeniaeformis* in man is related to the incidence of this cestode in the definitive hosts and the possibility of the contact with cestode eggs. The incidence and intensity of *H. taeniaeformis* infection in five species of Carnivora in Czechoslovakia have been reported by several authors (Prokopie 1958, 1965, Baruš 1961, Šaněk 1963, Svatoš 1963, Mituch 1964, Prokopie et al. 1969, 1973). According to these authors, the highest incidence of *H. taeniaeformis* was observed in the hosts of the family Felidae, namely *Felis silvestris* (57—100 %), *F. catus dom.* (49—64 %) and *Lynx lynx* (13—50 %). In Vulpes vulpes (fam. Canidae) it was about 25 % and in Martes foina (fam. Mustelidae) about 12 %. These results suggest that *F. catus dom.* which lives in the closest contact with man, is of greatest importance for the possible infection of man with the eggs of the parasite. Other species of the above definitive hosts may play a role in the circulation of *H. taeniaeformis* only in the biotopes in free nature. Although *Canis familiaris* has not been reported to serve as a definitive host of *H. taeniaeformis* in Czechoslovakia, it should be pointed out that this animal is sensible to infection (Vogelsang 1925, Kozlov 1963).

*S. fasciolaris* infection in vertebrates as intermediate hosts proves that this parasite occurs in all biotopes of Czechoslovakia. The papers by Erhardová and Ryšavý (1955), Tenora and Baruš (1955 a), Erhardová (1956, 1958), Tenora (1963, 1964, 1965, 1967), Tenora and Tománek (1963), Tenora and Zajda (1974), Prokopie (1970 a, b), Prokopie et al. (1972), Prokopie and Genov (1974) and other authors report *S. fasciolaris* infection in 16 species of Rodentia (*Sciurus vulgaris*, *Citellus citellus*, *Mus musculus*, *Apodemus agrarius*, *A. flavicollis*, *A. sylvaticus*, *A. microps*, *Rattus norvegicus*, *Cricetus cricetus*, *Clethrionomys glareolus*, *Onatra zibethica*, *Arvicola terrestris*, *Microtus arvalis*, *M. agrestis*, *Pitymys subterraneus* and *P. taticris*). The incidence of infection usually ranges between 0.5—18 % at the intensity of 1—4 strobilocerci per host. However, there occurred also occasional massive infections, e.g., 88 strobilocerci in *Mus musculus* (Holíšová and Kočiš 1955) or 315 strobilocerci in *Onatra zibethica*.
The latter species seems to be most frequently infected with *S. fasciolaris* in Czechoslovakia. According to Madlen (1953) and Vaňatka (1969), the incidence of *S. fasciolaris* in *O. zibethica* is 8–90%. Only one member of Insectivora, *Talpa europaea*, has been reported by Prokopič and Genov (1974) to serve as an intermediate host of *S. fasciolaris* (incidence of infection 1.2%). Ryšavý (1973) found strobilocerci in the liver of *Phasianus colchicus*, which gives evidence of the high adaptability of this parasite.

According to Rosicky (1959), *H. taeniaeformis* (or its larval stage *S. fasciolaris*) has wide ecological valency without a marked specialization to any intermediate host. This phenomenon is manifested in a wide distribution of *S. fasciolaris* in various biotopes of Czechoslovakia without any distinct relation to eusynanthropic, hemisyntropic or exoanthropic animal groups (Rosicky and Kratochvíl 1953). It may be supposed that the wide dispersion and incidence of *S. fasciolaris* is caused primarily by migrations of definitive hosts of *H. taeniaeformis* in their widespread food areas. Of greatest epidemiological importance to man is the circulation of *H. taeniaeformis* in the so-called synanthropic or mixed foci involving *Felis catus dom.* and eusynanthropic or hemisyntropic vertebrates serving as intermediate hosts. Also *Felis silvestris*, *Lynx lynx*, *Vulpes vulpes* and other carnivores as definitive hosts and hemisyntropic and exoanthropic vertebrates (rodents and *Talpa europaea*) as intermediate hosts participate in continuous circulation of *H. taeniaeformis* in natural foci.

Acknowledgements. Our thanks are due to Prof. J. Vaněk, M.D., D.Sc., Head of Šikl’s Institute of Pathology and Anatomy, Medical Faculty of the Charles University, Praga for providing the material.

**REFERENCES**


225


-. KROTOCHVÍL J., Synanthropity of mammals and the role of synanthropic and exoanthropic rodents in natural foci of diseases. Čs. biologie 2: 283–295, 1953. (In Russian.)


-. KROTOCHVÍL J., Synanthropity of mammals and the role of synanthropic and exoanthropic rodents in natural foci of diseases. Čs. biologie 2: 283–295, 1953. (In Russian.)


Received 26 January 1976.