CONTRIBUTION TO THE QUESTION OF RELATIONSHIPS BETWEEN ENTEROBIUS VERMICULARIS (L.) AND INFLAMMATORY PROCESSES IN THE APPENDIX

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Abstract. We evaluated a biopptic material of appendices from the hospital in České Budějovice, obtained from 1977–1981. Of these, 2173 appendices were removed as cases of a clinical appendicitis, 788 for preventive reasons. In the cases of a clinical appendicitis with the incidence of pin worms in the appendix, the histological picture displayed significantly more chronic, inflammatory changes than in acute cases (test χ²), while in cases of a clinical appendicitis without the presence of pin worms, we found more acute than chronic forms of inflammations. Our results are supported also by an analysis of preventively removed appendices, where again more chronic, inflammatory changes were found in appendices with pin worms.

An infection with the pin worm, Enterobius vermicularis (L., 1758) seems as ancient as mankind itself as confirmed by the finding of eggs of this parasite more than 10,000 years ago (Fry and Moor 1969). The pin worm is cosmopolitan in distribution, it affects populations of all age groups and races, and occurs under any climatic and social conditions. The presence of the pin worm in the appendix is not infrequent. It was first reported by Fabricius in 1634 (ex Kalitevsky 1970).

Its importance in the pathogenesis of appendicitis has been discussed in the literature for more than 100 years. Also, our present study is an attempt to contribute to a better understanding of this problem. Having examined biopptic materials from almost 22,000 appendices removed by surgery in the Medical School Hospital in Plzeň from 1955–1974, we suggest that pin worms parasitic in the appendix, are responsible for an increased incidence of granulomas and apparently also for other pathological changes in the appendix. The results of our study suggest mainly the possibility of a correlation between the proportion of diagnoses of a chronic appendicitis and the number of appendices infested with E. vermicularis (Štěba and Vílek 1984), and other authors cited in this paper.

In this present study, we examined a further similar material from the Hospital in České Budějovice, complemented with an analysis of a set of pin worm-free appendices for a statistical evaluation of the differences.

MATERIAL AND METHODS

Retrospectively, we examined and evaluated a standard, biopptic material of appendectomies (from 1977–1981) deposited in the Department of Pathology, KÚZN-Xp III in České Budějovice. Using standard methods commonly used in our pathologico-anatomical department (Štěba and Vílek 1984), the appendices were cut in three blocks.

The material consisted of 2,173 cases of a clinically diagnosed appendicitis, and of 788 appendices removed preventively. Our main point of interest was the frequency of an incidence of pin worms in the appendices in relation to inflammatory processes. We divided histological changes into acute and chronic, adding to it a group without pathological changes. In addition to common, acute forms of inflammations, we included in the acute group also cases of acutely exacerbated, chronic appendicitides. All data were tested statistically with the χ² test.
RESULTS

Most of our biotopic material were appendices removed on the diagnosis of a clinical appendicitis. A separate evaluation was made of a set of appendices removed preventively during another operation in the abdominal cavity. In all cases, we examined the frequency of the incidence of *E. vermicularis* in relation to the histological diagnoses. The results are shown in Tables 1 and 2. The presence of *E. vermicularis* occurred in 82 appendices (3.14%) out of a total of 2,925 appendectomies.

The pin worm was found in 73 appendices with the clinical diagnosis of appendicitis. In order to evaluate relationships between *E. vermicularis* and inflammatory processes, we compared the frequency of histological diagnoses in a set of 73 appendices with pin worms with frequencies of histological diagnoses of a large set of 2,064 appendices without pin worms using this group for an comparative study.

Table 1. Survey of histological findings in appendices removed by surgery on the basis of a clinical diagnosis of appendicitis

<table>
<thead>
<tr>
<th>Presence of E. v. in the appendix</th>
<th>Chronic inflammation</th>
<th>Without pathological changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of E. v. in the appendix</td>
<td>Acute inflammation</td>
<td>Year</td>
</tr>
<tr>
<td>Male</td>
<td>203</td>
<td>0</td>
</tr>
<tr>
<td>1977</td>
<td>2</td>
<td>203</td>
</tr>
<tr>
<td>1978</td>
<td>1</td>
<td>210</td>
</tr>
<tr>
<td>1979</td>
<td>1.1</td>
<td>181</td>
</tr>
<tr>
<td>1980</td>
<td>0.9</td>
<td>171</td>
</tr>
<tr>
<td>1981</td>
<td>0</td>
<td>174</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>939</td>
</tr>
<tr>
<td>Females</td>
<td>2</td>
<td>103</td>
</tr>
<tr>
<td>1977</td>
<td>2</td>
<td>103</td>
</tr>
<tr>
<td>1978</td>
<td>1</td>
<td>95</td>
</tr>
<tr>
<td>1979</td>
<td>2</td>
<td>94</td>
</tr>
<tr>
<td>1980</td>
<td>0</td>
<td>79</td>
</tr>
<tr>
<td>1981</td>
<td>0</td>
<td>77</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>448</td>
</tr>
</tbody>
</table>

E. v. = Enterobius vermicularis

*E. vermicularis* was present relatively most frequently in appendices without pathological changes (38 cases = 52.1%), less in those with a chronic inflammation (26 cases = 35.6%), least in acute appendicitis (9 cases = 12.3%). Differences in the proportions of histological diagnoses are statistically significant ($\chi^2 = 8.26$; $P < 0.01$). An almost reverse situation occurs in the group of appendices without *E. vermicularis*. Of these, 94, i.e., 4.6% are without pathological changes, 583 appendices (28.2%) with a chronic inflammation, and 1,287 appendices (67.2%) with an acute inflammation. Also here, differences are statistically significant ($\chi^2 = 32.13$; $P < 0.01$). It is evident from this analysis, that in the set of appendices with *E. vermicularis* is a marked shift in frequency of chronic inflammations in the histological diagnoses. The difference is statistically significant.

(E2 Table 2. Survey of histological findings in appendices removed preventively during other operations in the abdominal cavity)

<table>
<thead>
<tr>
<th>Presence of E. v. in the appendix</th>
<th>+</th>
<th>-</th>
<th>+</th>
<th>-</th>
<th>+</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1977</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1978</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1979</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1980</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1981</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

E. v. = Enterobius vermicularis

Of the group of preventively removed appendices, 769 are without pin worms, 19 with pin worms in their lumina. The results of an evaluation of histological diagnoses of the set of appendices with pin worms are these: 13 cases (68.4%) without pathological changes, 6 cases (31.6%) with signs of a chronic appendicitis, no cases of an acute appendicitis. Differences in the proportions of histological diagnoses are statistically significant ($\chi^2 = 3.64$; $P < 0.05$).

The 769 preventively removed pin worm-free appendices, the majority of histological diagnoses (730 cases = 94.9%) are those of a chronic appendicitis, 22 cases (2.9%) are an acute appendicitis, 17 cases (2.2%) are appendices without histological changes. Differences in the proportions of histological diagnoses are statistically significant ($\chi^2 = 66.58$; $P < 0.01$).

DISCUSSION

Most authors concerned with relationships between enterobiosis and appendicitis maintain that the incidence of *E. vermicularis* is substantially higher in cases of chronic appendicitis than in acute inflammations (Gordon 1933, Warwick 1935, Ashburn 1941, Wax and Cooper 1956, Pazdruza and Bur 1973). Similar results have been obtained from an analysis of a material consisting of almost 22,000 appendectomies from the Hospital in Příbram (Štěrba and Vlček 1984). We succeeded in confirming in the latter paper that the pin worms may cause pathological changes, and produce granulomas, in the appendix.

In the present study, we have treated mainly appendices removed by surgery on the basis of a clinically diagnosed appendicitis. A statistical comparison of the frequencies
of basic diagnoses in sets of appendices with and without pin worms has shown that
the number of chronic appendicitis in the set of appendices with pin worms surpasses
that of acute appendicitis. The situation is reverse in the control group (pin worm-free
appendices), in which acute appendicitis are in the majority.

Our assumption of a pathogenic effect of the pin worm is confirmed also by an
increased frequency of chronic inflammations in pin worm-infested appendices remo-
ved for preventive reasons.

We found a considerably high proportion of appendices with pin worms in their
lumina without pathological changes (51 of the 92 examined cases) in comparison with
the group of pin worm-free appendices (111 out of 2833 cases) compare data + and −
in Tables I and 2. We have good reason to assume that, in the first case, the presence
of pin worms might cause an appendiceal syndrome, but no reliable evidence is
available from the remaining 111 cases that pathological changes are actually absent
in the entire appendix. Although an appendectomy is clinically justified in these
cases, histological changes could not be disclosed with standard biopitic methods
(Goldburt 1967, Šterba and Vitek 1984). The only means of disclosing their
incidence may be an examination of complete series of histological sections throughout
the entire appendix. However, these inaccuracies are not pertinent to a statistical
evaluation of the material.

The increased incidence of chronic appendicitis (see Table 2), may be ascribed to
repeatedly occurring either right—or both-sided inflations of certain parts
of their internal genitalia, particularly in the younger age groups. In our opinion,
these inflammations may result in an induced appendicitis bringing forth morpho-
logical changes in the appendix during the healing process, which the pathologist
may evaluate either as a chronic inflammation or as changes caused by former
inflammations.

Of importance in the final solution of the pin worm in the genesis of appen-
dicitis (Šterba and Vitek 1984), is a determination of the original histological state
of the appendix which, however, meets with exceptional difficulties owing to its
origin, structure and function. We regard this fact as the basic reason for not having
found a solution to this problem.

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choslovak Academy of Sciences, for his statistical evaluation of the results.

K ПРОБЛЕМЕ ВЗАИМОСВЯЗИ МЕЖДУ ПРИЯСТВИЕМ
В АППЕНДИКСЕ ПАРАЗИТА ENTEROBIBUS VERMICULARIS I.
И ВОСПАЛИТЕЛЬНЫМ ПРОЦЕССОМ

П. Штерба, М. Влэк, И. Нолл и Ф. Ворех

Резюме. Изучение биотических материалов апPENDикс, полученных в больнице и в г. Ческе БУДЖЕОВИЧЕ ИЗ 1973-1981 гг. 2173 апPENDикс были удалены из клинического апPENDи-
циса и 788 из профилактическим причинам. Гистологическим методам было обнару-
жено, что в случаях клинического апPENDициса, апPENDиксах, зараженных паразитами
проявились более хронические, чем острые формы изменений (тест х2), тогда как в ап-
PENDиксах без паразитов, изменения были более острее, чем хронические. Результаты
подтверждены также анализом апPENDикс, удаленных по профилактическим причинам,
в которых также встречалось большее количество хронических воспалительных измене-
ний в апPENDиксах с паразитами.