

# Retrospective analysis of appendix vermiformis specimens for intestinal helminths

## *Appendiks vermiformis materyallerinin intestinal helmintler yönünden yeniden incelenmesi*

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**Summary:** The specimens of the appendix vermiformis between 1985 and 1990 at the Department of Pathology of the Medical School of Cumhuriyet University were re-examined for intestinal helminths and histopathological findings. Depending upon eating habit of the people *Taenia saginata* sections and eggs were the most common helminth and mature forms and eggs of *Enterobius vermicularis* were the second. The percentage of cases with any helminths (approximately 40 %) were found in the acute appendicitis. A total of 847 appendix one helminth, 38 (45.8 %) had sections and eggs of *T. saginata*, 25 (30.2 %) had sections of *E. vermicularis*, 8 (9.6 %) had eggs of *A. lumbricoides*, 5 (6 %) had eggs of *T. trichiura* and 7 (8.4 %) had section of an undiagnosed nematode. In 5 of the cases, there was two helminthic sections or eggs that could be seen. The parasites and their eggs seemed to be related with inflammation.

**Key Words:** Appendix vermiformis, intestinal helminths

\* Presented in 8th International Congress of Parasitology (10-14 October 1994, İzmir).

**Özet:** Cumhuriyet Üniversitesi Tıp Fakültesi Patoloji Anabilim Dalında 1985-1990 yılları arasında appendiks vermiformis materyalleri intestinal helmintler ve histopatolojik bulgular yönünden yeniden incelendi. Beslenme alışkanlığına bağlı olarak en sık görülen *Taenia saginata* kesitleri ve yumurtaları, ikinci olarak matür *Enterobius vermicularis* ve yumurtaları görüldü. Akut apandisit de herhangi bir helmint varlığı yaklaşık % 40 olarak saptandı. 847 appendiks vermiformis materyali incelendi. 83 olguda tek helmint saptandı. Bunların dağılımı; *T. saginata* 38 (45.8 %), *E. vermicularis* 25 (30.2 %), *A. lumbricoides* 8 (9.6 %), *T. trichiura* 5 (6 %) ve nematode 7 (8.4 %) idi. Olguların 5 tanesinde iki helmint birlikte görüldü. Parazit ve yumurtalarının yangı ile ilişkili olduğu düşünüldü.

**Anahtar Sözcükler:** Apendiks vermiformis, intestinal helmintler

\* Bu çalışma 8. Uluslararası Parazitoloji Kongresinde (10-14 Ekim 1994, İzmir) poster olarak sunulmuştur.



**A**cute appendicitis is predominantly a disease of the western world (1). The most important factor of pathogenesis is obstruction of the lumen by fecalith, foreign body, a tumor of cecum or appendix external bands, adhesions and rarely masses of parasites (especially *Enterobius vermicularis*). A bacterial infection which was systemic disease can be caused appendicitis (1, 2). In children diffuse lymphoid hyperplasia is another cause of obstruction (1-3).

From previous studies it is clear that intestinal parasites are prevalent in almost every socio-economic classes of our country (4-6). The same fact is true for the population in Sivas too (7-9). Many investigators have reported the presence of parasites in histopathological sections of appendices (6, 10-12). The frequency of intestinal helminths with appendicitis in appendectomy specimens from the patients has been reported to be 7.5 %, 16.5%, 36.9 (6, 10, 11).

In this study, we reported our findings in appendix sections which were reexamined from the point of intestinal helminths and histopathological features.

### Materials and methods

Between 1985 and 1990 a total of 847 appendectomy materials were sent to Pathology Department of Medical School, Cumhuriyet University. Hematoxylen-Eosin (H-E)stained histopathological sections of these materials were reexamined for the presence of intestinal helminths eggs or sections of the worms and the feature of the reaction if there was any. But these materials were not examine for protozoa. The findings were analyzed according to the parasitological findings, age and sex of the patients and the type of the histopathological reactions. In only few cases we had to obtain new sections from paraffin blocks in order to establish correct diagnosis.

### Results

A total of 847 appendix specimens were reexamined. From each specimen usually two HE stained preparations were present. In a total of 847 acute, subacute or chronic appendicitis cases 43 were previously reported as positive for intestinal helminths. Whereas this figure raised to 88 (10.3 %) as a result of reexamination of the same preparations. In 83 of the cases, there was one; In 5 of the cases, there was two helminthic sections or eggs that could be seen. Of the 83 cases with one helminth, 38 (45.8 %) had sections and eggs of *T. saginata* (Figures 1, 2), 25 (30.2 %) had

sections of *E. vermicularis* (Figures 3), 8 (9.6 %) had eggs of *A. lumbricoides* (Figure 4), 5 (6 %) had eggs of *T. trichiura* (Figure 5) and 7 (8.4 %) had section of a undiagnosed nematode. Two of helminths were consisted of as follows: 3 *A. lumbricoides* and *T. trichiura*, (Figure 6) 1 *A. lumbricoides* and *E. vermicularis* and 1 *T. trichiura* and nematode. Distribution of the 83 cases are summarized in Table I.

Table I. Distribution of the helminths (83 cases).

Types of Helminths	n	%
<i>T. saginata</i>	38	45.8
<i>E. vermicularis</i>	25	30.2
<i>A. lumbricoides</i>	8	9.6
<i>T. trichiura</i>	5	6.0
Undiagnosed Nematode	7	8.4

Of these cases, 42 were from females and 46 were from males. Median age was 21.5 years. The male to female ratio was 1:1. In this study, remaining patients age and sex were not known. Pathologic features of 38 patients with *T. saginata* revealed 14 appendix vermiformis (AV) 12 phlegmonous appendicitis (PA), 7 appendicitis vermiformis with lymphoid hyperplasia (AVLH), 5 acute appendicitis (AA), 25 patients with *E. vermicularis* 13 AVLH, 7 AA, 3 AV, 2 PA. Granulomas were found in one of the cases (Figures 6). 8 patients with *A. lumbricoides* revealed 5 AVLH, 1 PA, 1 AA and 1 AV. 5 patients with *T. trichiura* revealed 3 AV, 1 PA and 1 AA. Pathologic features of the cases is shown in Table II.

Table II. Pathologic features of appendices with helminths.

Helminths	PA	AA	AVLH	AV
<i>T. saginata</i>	12	5	7	14
<i>E. vermicularis</i>	2	7*	13	3
<i>A. lumbricoides</i>	1	1	5	1
<i>T. trichiura</i>	1	1	-	3
Nematode	-	1	4	2
	16	15	29	23

PA : Phlegmonous appendicitis

AA : Acute appendicitis

AVLH : Appendix vermiformis

\* One of the cases had granulomas

In our study, there was not any helminthic section or egg in 285 PA, 151 AA ad 323 AV.

### Discussion

Many parasites may be found in the appendix. In the United States, *E. Vermicularis* is most often encountered.



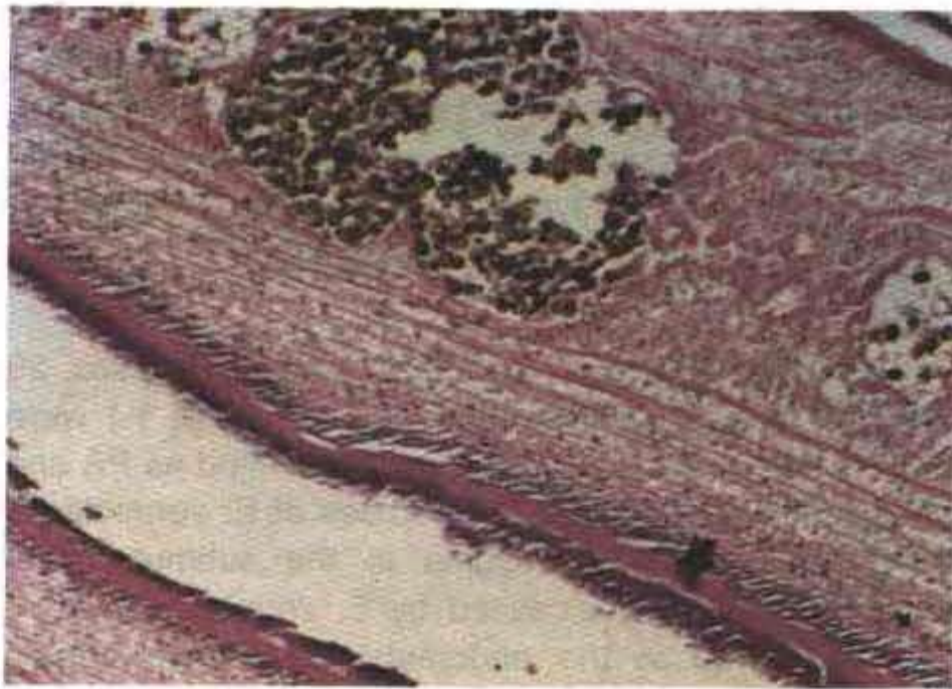


Figure 1. A section of two proglotids of *T. saginata* in a lumen of an appendix (2534/87 H+E x10).

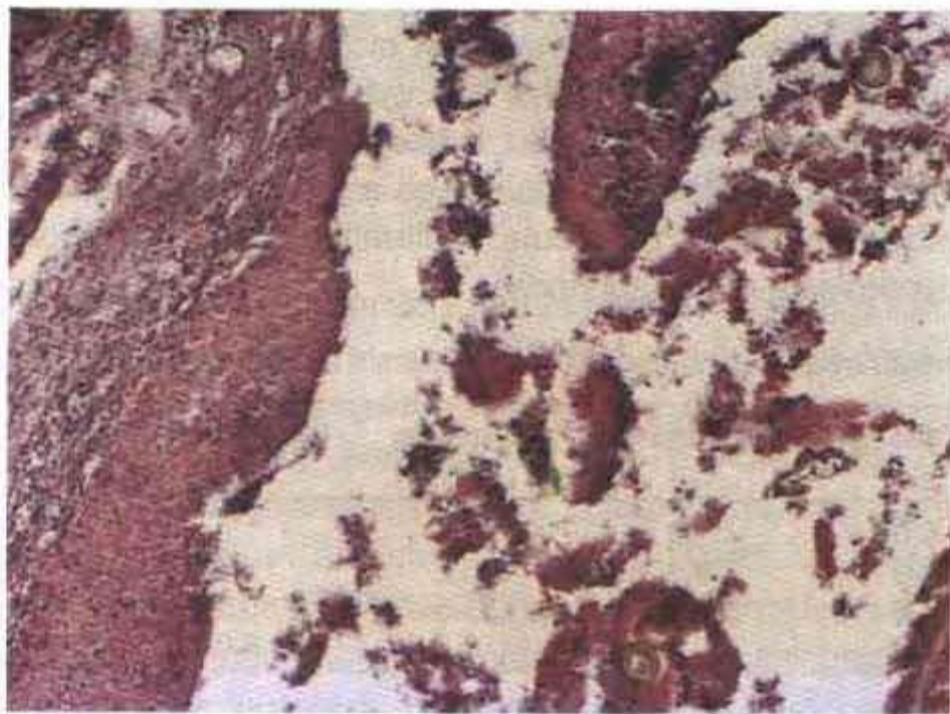


Figure 2. The eggs of *T. saginata* in the lumen of phlegmonous appendicitis (2258/90 H+E x 25).



Figure 3. *E. vermicularis* section in an appendix with lymphoid hyperplasia (2386/86 H+E x10).



Figure 4. Two eggs of *A. lumbricoides* in the lumen of an appendix (2301/87 H+E x50).



Figure 5. The eggs *T. trichiura* (4612/91 H+E x50).

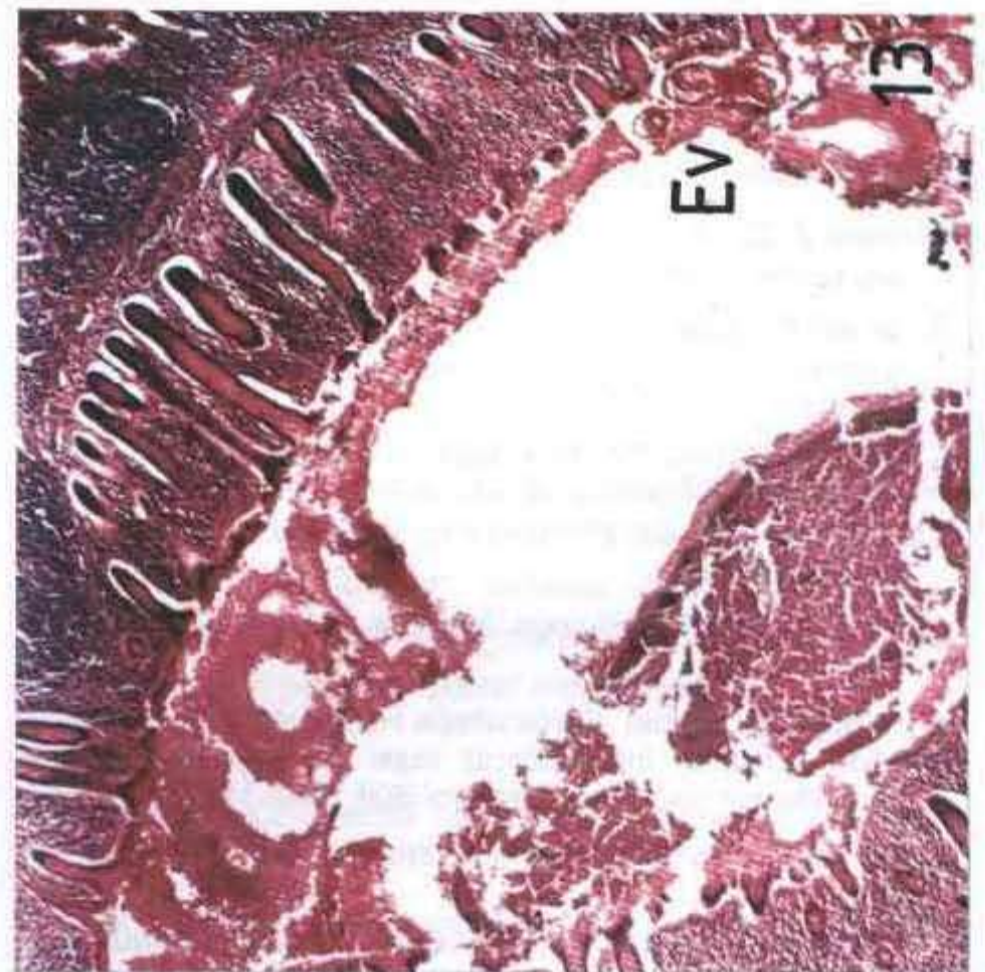


Figure 6. An acute appendicitis with *E. vermicularis* (Ev) showing granuloma (g) (1467/86 H+E x10).



Some of the authors believed that, the infection was not causal agent of appendicitis because it occurred with same frequency in normal appendices (1).

In our country, in a few studies reported the percentage of intestinal helminths with appendicitis was found to be between 7.5% and 36.9 % (6, 10, 11, 13). In two studies carried out in Sivas, the percentages were detected as 10% and 21.6 % (7, 12). The rate of appendices which contained helminths (either as the sections of worms, eggs or both) were rather close to those obtained in previous studies either in this region or in other parts of the country (10-12). Comparison of studies; that show the helminth frequency in appendix specimens were seen on Table III.

The major goal of this study was to find out whether there were any missing of parasitic structures during routine examination of the histopathologic sections of appendices. Finding of helminths in 45 cases which were reported as non parasitic previously showed that we were right in our suspicion. Also, the detection of *T. saginata* in the highest rate is in conformity with the previous findings and with eating habit of the local people (8, 9, 12).

In other studies more than 80% of the cases were young adults like our case (2, 3, 6, 11, 12).

The histological criteria for the diagnosis of acute appendicitis is PMNL infiltration of the muscularis (3). The criteria for the diagnosis of phlegmonous appendicitis is numerous neutrophilic exudation throughout the mucosa, submucosa, muscularis and serous membrane. Appendix vermiformis with lymphoid hyperplasia consisted of marked enlargement and prominence of germinal follicles (2, 3).

Pathological features of our study: Among 83 cases, 29 (34.9 %) were classified as AVLH, 23 (27.8 %) were classified as AV, 16 (19.3 %) were classified as PA and 15 (18.0 %) as AA. One of 25 cases of *E. vermicularis* were consisted of granuloma in the submucosa of appendix. Granuloma caused by *E. vermicularis*, have been observed in the endometrium, fallopian tubes, ovaries, mesentery and mesoappendix (1).

Some of the authors, reported that helminthic sections or eggs, which often seen in the lumen, could cause inflammation (3, 6, 10, 11).

In summary we found helminths in 37.3 % of the acute appendicitis cases and this rate was 72.2 % in appendix vermiformis with lymphoid hyperplasia. We concluded that the parasites and their eggs seemed to be related with formation of acute inflammation or lymphoid hyperplasia of the appendix.

Table III. Comparison of different studies; showing the helminth frequency in appendix vermiformis specimens.

Appendectomy sp.	Helminths	Inflammation	<i>T. saginata</i>	<i>E. vermicularis</i>	<i>A. lumbricoides</i>	<i>T. trichiura</i>	Nematod
n	n	%	%	%	%	%	%
Yenerman (11)	1433	529	39.9	6.0	44	42	86
Merdivenci (10)	768	127	16.5	7.0	79.5	10.2	89.7
Canda (6)	1020	76	7.5	23.6	21.0	35.5	13
Bu çalışma	847	83	37.3	45.8	30.2	9.6	8.4

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