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APPENDICITIS; APPENDECTOMY AND THE VALUE OF ENDEMIC PARASITIC INFESTATION

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Schistosomiasis, enterobiasis and amebiasis are endemic parasitic infestations in Egypt, that were condemned by many authors as having a role in the pathogenesis of appendicitis. In the present work 127 appendices removed from patients suffering from symptoms and signs of appendicitis in the emergency surgical unit in Theodore Bilharz Research Institute (TBRI), Egypt, during the period of time from 6/96 to 6/99. Gross and microscopic histopathological examinations were done for all cases in the pathology department (TBRI). Females were found to be more affected than males with most of patients were at the second decade of life. Parasites were detected in 14.8% of removed appendices. Enterobius vermicularis worms were detected in 10% of cases having no or mild histopathological changes, in 5.3% of cases with histopathological picture of acute appendicitis and in 14.3% of cases with histopathological features of chronic appendicitis. Schistosomiasis infestation was detected in 6.3% of removed appendectomy specimens and in 28.6% cases with histopathological features of chronic appendicitis. Amebiasis was not detected in any of the examined appendices. We concluded that infestations of the appendix by schistosomiasis and enterobiasis are important factors in the pathogenesis of appendicitis in Egypt, thus early and proper diagnosis as well as treatment of these infestations is indicated to avoid the development of appendicitis with subsequent appendectomy.

Keywords: appendecities-parasitic infestations-appendicectomy

INTRODUCTION

Appendectomy is the most common emergency operation in general surgery [1]. One persistent challenge for the general surgeon is to arrive at an early accurate diagnosis of acute appendicitis, not only to prevent perforation and peritonitis but also to prevent unnecessary surgery[2]. The role of parasitic infestation in the physiopathology of appendicitis is controversial[3]. Schistosomiasis, amebiasis and Enterobius vermicularis infestation were subjects for several studies to assess their role in appendicitis [4,5]. In a study on 1600 appendectomy specimens[4], It was found that 26 of them showed appendiceal schistosomiasis. They suggested also that there are two types of schistosomal appendicitis that may be called obstructive and granulomatous schistosomal appendicitis. Others [6] found that amoebic appendicitis is very rare, occurring in about 0.5 to 1% of cases with acute appendicitis in tropical countries. The role of enterobius vermicularis was studied and the identification of the infestations in 3.4% of cases of appendicitis [7]. They found also that E. vermicularis occurs more frequently in uninflamed appendices and they suggested that it might be a cause of symptoms resembling acute appendicitis.

In the present work we try to estimate the value of parasitic infestation in appendectomy specimen removed in a locality where these parasites are endemic.

MATERIAL AND METHODS

127 appendices specimens were examined in the present work. They were removed during appendectomy operations for patients admitted to the emergency surgical unit in Theodore Bilharz Research Institute (TBRI), during the period from 6/96 to 6/99.

The patient's presenting symptom, general and local

examination, per rectum examination (PR), per vaginal examination (PV), total leucocytic count (TLC) and urine analysis were done. Only surgical procedure, duration of hospital stay, histopathology of the appendectomy, early and late complications were analyzed during the present work.

All patients were operated upon within 12 hours of admission and discharged within less than 1 day, second day or within 14 days after operation. The operative details are shown in (Table 1).

Table (1): ***Details of the operations performed***:

Procedure	*Incision*		*	**
Appendectomy	Transverse<2cm	46	08	09
Formal appendectomy	McBurney's<3cm	23	11	15
Laparotomy	Mid-line	05		
Lap. Appendectomy		09		01
Total = 127		83	19	25

*Extended at the same line for proper access

**Extended at mid line for peritonitis ana proper laparotomy.

Histopathological Examination:

Appendectomy specimens were received in the pathology department preserved in 10% formalin solution. There, they were examined grossly for measurements, external signs for inflammation, any swellings, hemorrhage or perforation. Three cut-sections were made at the following sites: base, Tip and middle of the appendectomy specimens as well as from any other abnormal region. The lumen of the appendix is examined for obstruction and contents. Sections were then labeled and processed into paraffin sections (4-6 μm thick).

Sections stained with haematoxyline and eosin as well as Masson's trichrome stains were routinely examined by light microscopy for histopathological diagnosis.

Statistical Methods:

The results were evaluated by the X2 and the Student,s t tests, The differences were considered significant when $p < 0.05$.

RESULTS

127 appendectomy specimens were examined; of them 42 were appendices of male patients and 85 were of females (M : F = 1 : 2).

The mean age of all cases was 23.4 ± 5.56 years. The mean age of male patients was 20.7 ± 6.33 years, and that of female patients was 22.62 ± 4.34 years.

Surgical Results:

The hospital stay was one of our fundamental issues in this study, and it is shown in (Table 2).

Table (2): ***Hospital stay of patients operated upon***

Procedure	*1 day*	*2 days*	*<14 days (HDU) + (ITU)*		
Appendectomy	69	08	24	23	01
LaparotomyLap	0	11	05	0	05
. App	09		01	0	01
Total=127	78	19	30	23	07

*HDU:High dependency Unit
*ITU:Intensive Therapy Unit

78 straight forward uneventful appendectomy required no IV fluid post-operatively and allowed oral fluid after full recovery with PR 1 gm Metronidazole BD for three days. The suture materials used was Vicryl 2.0/3.0 with subcuticlar closure.

Intraoperative SC Marcain as a pain control post-operative were given routinely. They were discharged within 1 day of admission and allowed 1gm Paracetamol Bd at home for pain control.

The other 19 extended incisions for difficult access appendectomy were allowed home within 2 days with the same regimen with extraform of pain killers (NSAI 400 mg TDS).

From those who had parasitic infestations as proved histologically (18 patients), all were called earlier and given the proper treatment in the post-operative follow-up at the out patient department (OPD). Stool examinations samples were required in each follow-up visit and the rest of the family were tested and treated as well.

All those 97 patients were followed-up weekly for first month and then monthly for six months at least. We lost follow-up for 54 patients after the first three months.

The 5 patients presented by septic shock were admitted to ITU/HDU for resuscitation and allowed a pre-operative close invasive monitoring and intensive therapeutic support. Nasogastric tube (NG), urinary catheter, CVP line and cardiac, pulmonary and renal support were given.

Post-operative admission for 7 patients (ITU) and 23 patients (HDU) was done for complicated cases that require proper exploratory laparotomy with peritoneal lavage and drainage procedure. Most of them were allowed home within fourteen days from admission. All of

them were followed-up for at least 6 months and when presented with any complication, it was dealt with promptly.

The post-operative early and late complications were found in 36 patients (Table 3).

Table (3): ***Complications after surgery***

Complication	*Number (%)*	*Treatment*
Wound infection	24 (15.75)	10lavage+2rysuture,14 antibiotics
PE + DVT	1[ASD](0.79)	Referred to Heart Institute
DVT	3 (2.36)	3 Anticoagulant therapy
Collection	6 (4. 72)	3 U/S aspiration, 3 antibiotics
Chest infection	11 (8.66)	11 Antibiotics
Incisional hernia	4 (3.15)	2 Mesh repair in year 1999
SIO (adhesions)	8 (6.30)	6 Admission , 2 lap+adh

*ASD: Atrial septal defect, PE ; pulmonary embolism , DVT;deep venous thrombosis SIO; subacute intestinal obstruction.

Table (4): *Relation between the tyof incision and hospital stay*

Type of incision	*<2 days*	*< 14 days*
Small insions	97	0
Laparotomy	0	30
P value		< 0.001

Enterobius vermicularis worms were detected within the lumens of two appendices removed from patients having symptoms and signs identical of acute appendicitis but without detectable histopathological findings. E. vermicularis worms were present also in 4 cases out of 76 cases diagnosed as acute appendicitis (5.3%) and in 4 cases out of 28 cases diagnosed as chronic appendicitis (14.3%). The appendices infested with E. vermicularis worms showed 2-4 worms free within their lumens (Fig.1,2) or penetrating into the mucosa (Fig.3). The mucosa showed focal ulceration and infiltration with dense mononuclear cellular infiltrate including many eosinophils. There was also moderate degree of fibrosis especially at the tip region.

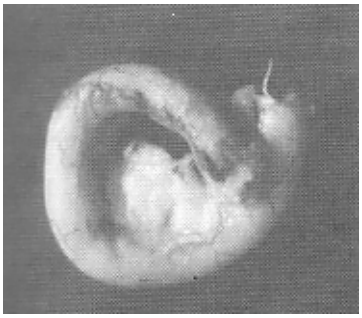

Fig. (1): An appendectomy specimen removed from a female patient having symptoms and signs of acute appendicitis, showing and Enterobius vermicularis worm coming out at the cut-edge of the appendiceal tip region.

Appendicitis associated with schistosomiasis was generally of the chronic type. Mucosal ulceration was mild, while lymphocytic proliferation and eosinophilic infiltration were remarkable. Schistosoma ova were present within the serosa and musculosa with some of them escaped into the mucosa and submucosa (Fig.4). These appendices showed mild degree of fibrosis and narrow lumens.

Entameba histolytica trophozoites could not be identified in the 127 appendices examined in this study.

Table (5): ***showed the histopathological diagnosis of cases***

Diagnosis	*Number (%)*
No detectable pathology	20 (15.7%)
Acute appendicitis	76 (59.8%)
**Phlegmo*	*53 (41.7 %)*
**Gangrenous*	*15 (11.8%)*
**Perforated*	*8 (6.2%)*
Chronic appendicitis	28 (22%)
Granulomatous appendicitis	1 (0.07%)
Mucinous	1 (0.07%)
Carcinoid	1 (0.07%)
Total	127 (100%)

Table (6): ***showed the distribution of parasitic infestation in appendectomy specimens***

Parasites	*NDP 20(100%)*	*Ac. App. 76(100%)*	*Ch. App. 28 (100%)*	*Total 127(100%)*
Schistosomiasis	0 (0%)	0 (0%)	8 (28.6%)	8 (6.3%)
E. vermicularis	2 (10%)	4 (5.3%)	4 (14.3%)	10 (7.9%)
Total	*2 (10%)*	*4 (5.3%)*	*12 (42.9%)*	*18 (14.2%)*

NDP: No Detectable Pathology
Ac. App.: Acute appendicitis
Ch. App.: Chronic appendicitis.

Fig. (2): Transverse section in an appendectomy specimen showing an Enterobius vermicularis worm in the appendiceal lumen.(Haematoxyline and eosin stain, x100).

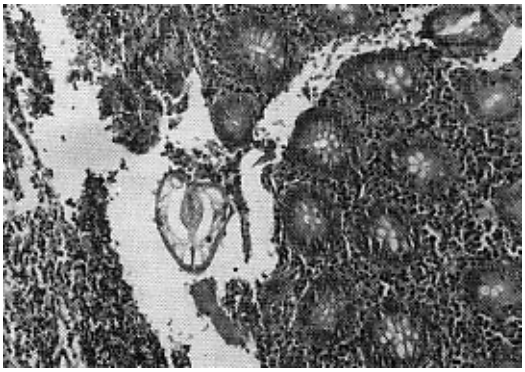

Fig. (3): Transverse section in an appendix showing an Enterobius vermicularis worm escaping into the appendiceal wall with the way of penetration appears extending from the lumen (lower left corner). (Haematoxyline aneosin stain, x100).

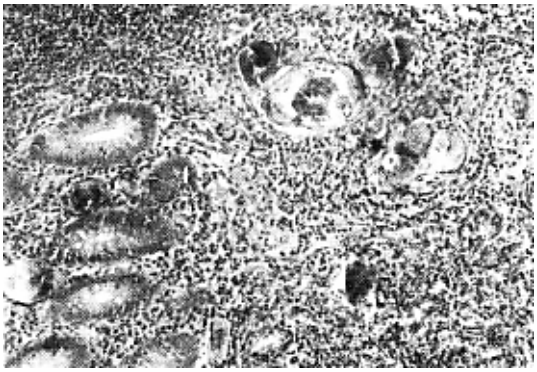

Fig. (4): Transverse section in appendectomy specimen showing part of mucosa and submucosa, with infiltration by many calcified and degenerated Schistosoma ova, surrounded by chronic inflammatory infiltrate with few giant cells and many eosinophils. (Haematoxyline and eosin stain, X200).

DISCUSSION

The role of parasitic infestation in inducing appendicitis was repeatedly discussed by many authors[3,4,5]. In the present work we try to evaluate the implication of parasitic infestations, namely schistosomiasis, enterobiasis and amebiasis on the pathology of appendicitis in appendectomy specimens.

Females were found to be twice infested than males, with most cases were represented in the second decade, in agreement with other studies [8].

Hospital stay was found to be significantly related to the method of access (type of incision). Surgical complications were found -in general- to be within the acceptable limits except for those who were presenting with septic shock and peritonitis.

More than 50% of the complications of appendectomy comprised infections [2], a percentage which is higher than our's, but with the total infection rate was 7.7%, which is a lower percentage than achieved in our work (15.75%).

No pathological findings -apart from mild interstitial edema- were detected in 15.7% of appendectomy specimens removed from patients having symptoms, signs and laboratory tests consistent with appendicitis. A similar finding was observed [9] stated that chronic lesions or a quasi-normality which do not explain the symptoms are sometimes observed. Enterobius vermicularis worms were detected in 10% of these cases. This suggested that infestation with this parasite may be responsible for the clinical picture of appendicitis without the typical histopathological picture. It was concluded that E. vermicularis occurs more frequently in uninflamed appendices and it may be a cause of symptoms resembling acute appendicitis [7].

Acute appendicitis was diagnosed histopathologically in 59.8% of appendectomy specimens. Parasites were seen in 14.8% of appendectomy specimens, a percentage which is higher than that was recorded[8] (3.4%), however, some authors[3] recorded parasitic involvement in appendectomy specimens up to 25%. The difference in percentages could be attributed to different geographical fields of study.

E. vermicularis worms were detected in 5.3% of cases of acute appendicitis with some of them showed wall penetration by the worm suggesting the implication of these worms in the process of appendicitis as well as there role in inducing obstruction of the appendiceal lumen. E. vermicularis do invade the wall of the vermiform appendix, and related to these are inflammatory reactions. This invasion causes the symptoms that lead to appendectomy[10].

On the other hand, chronic appendicitis was diagnosed in 22% of cases with E. vermicularis were present in 14.3% of these cases. The histopathological picture of these appendectomy specimens suggests the active role played by these worms in induction of chronic appendicitis. This may be due to the chronic irritation caused by these parasites inside the appendiceal lumens over a long period of time. These findings were in

coordination with the results obtained[11] that suggested that ova release from female pinworms may be a feature of appendiceal obstruction. These results were supported also by the results achieved[12] .

As regards schistosomiasis, there were no evidences of infestation by Schistosoma worms or eggs neither in cases of appendicitis with non-detectable pathologic changes nor in cases of acute appendicitis. However, Schistosoma eggs were detected in 28.6% cases of chronic appendicitis (6.3% of all appendectomies studied), a percentage which is much higher than found by others[4] (0.02%) or by [12] (0.95%). This showed the importance of schistosomiasis as an etiological role of chronic appendicitis necessitating surgical intervention in Egypt.

In our study the role of amebiasis in the pathogenesis of appendicitis appeared to be indistinct (0%). Amoebic appendicitis is very rare, occurring in about 0.5 to 1% of acute appendicitis in tropical countries[6].

We concluded that infestations of the appendix by schistosomiasis and enterobiasis are of considerable value and could be a causative factor in the pathogenesis of acute and chronic appendicitis in Egypt, necessitating appendectomy. Thus, diagnosis and proper medical treatment of those patients are indicated to avoid the development of appendicitis and accordingly undue surgery.

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