

Pathology of tropical appendicitis

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SUMMARY Over the past 25 years, 2921 appendicectomies were performed at this hospital. All were subjected to routine histopathological examination. In 95% of cases, histopathological examination did not add any further information but in 153 (5%) cases, clinically important pathological findings were detected for the first time. Seventy (2.3%) specimens showed typical evidence of tuberculosis. Parasitic infestation was detected in 75 (2.5%), including enterobiasis (1.4%), amoebiasis (0.5%), ascariasis (0.5%), ascariasis with trichuriasis (0.05%), and taeniasis (0.05%). Other lesions found were mucocele (0.1%) and carcinoid tumour (0.1%).

It is concluded that routine histopathological examination of all appendicectomy specimens should be performed to avoid missing any clinically important and treatable condition.

Appendicectomy as part of intra-abdominal or gynaecological surgery for other conditions is common practice,^{1,2} but whether the resected appendix should be sent for routine histopathological examination is debatable. Some workers feel that selective histopathology is required,³ while others are of the opinion that routine histopathological examination of the resected appendix is essential.³⁻¹¹

Material and methods

At this hospital all appendicectomy specimens are routinely subjected to histopathological examination. Over the past 25 years 2921 specimens have been received.

In each case after gross examination of the specimen two sections were taken, one from the middle and the other from the tip of the appendix. Paraffin wax sections were stained with haematoxylin and eosin and examined. Van Gieson, reticulin, and periodic acid Schiff (PAS) stains were used where necessary. Ziehl Neelsen staining was performed in all the 70 cases of granulomatous appendicitis. The surgeon's diagnosis,

Table 1 *Histological diagnosis*

Group	No (%)	Histological findings
I	309 (10.5)	Normal
II	2459 (84.2)	Non-specific inflammatory lesions (acute, healing, chronic and obliterative appendicitis)
III	70 (2.3)	Granulomatous with caseating necrosis
IV	75 (2.5)	Parasitic
V	8 (0.27)	Benign tumours and tumour-like lesions

clinical findings, pathologist's report and microscopic slides were reviewed to ascertain whether the clinical diagnosis correlated with the histopathological diagnosis or whether the latter provided new information. The final histopathological diagnosis was divided into the following five groups (table 1).

Results

The distribution of various appendicular lesions is shown in table 2.

In group III (70 cases), classic granulomas composed of epithelioid cells, Langhans' giant cells, and central caseating necrosis were seen on sections stained with haematoxylin and eosin (fig 1a). Ziehl Neelsen staining showed the presence of acid fast bacilli in 40 of the 70 cases (57%). A provisional

Table 2 *Distributions of various appendicular lesions*

Diagnosis	No of cases	Percentage
Normal	309	10.5
Non-specific inflammatory lesions	2459	84.2
Acute appendicitis	331	
Healing appendicitis	801	
Chronic appendicitis	1219	
Obliterative appendicitis	108	
Tubercular appendicitis	70	2.3
Parasitic infestations	75	2.5
Enterobiasis	41	1.4
Amoebiasis	17	0.5
Ascariasis	13	0.5
Ascariasis and trichuriasis	2	0.05
Taeniasis	2	0.05
Tumours and tumour-like conditions	8	0.27
Mucocele	4	0.1
Carcinoid	4	0.1

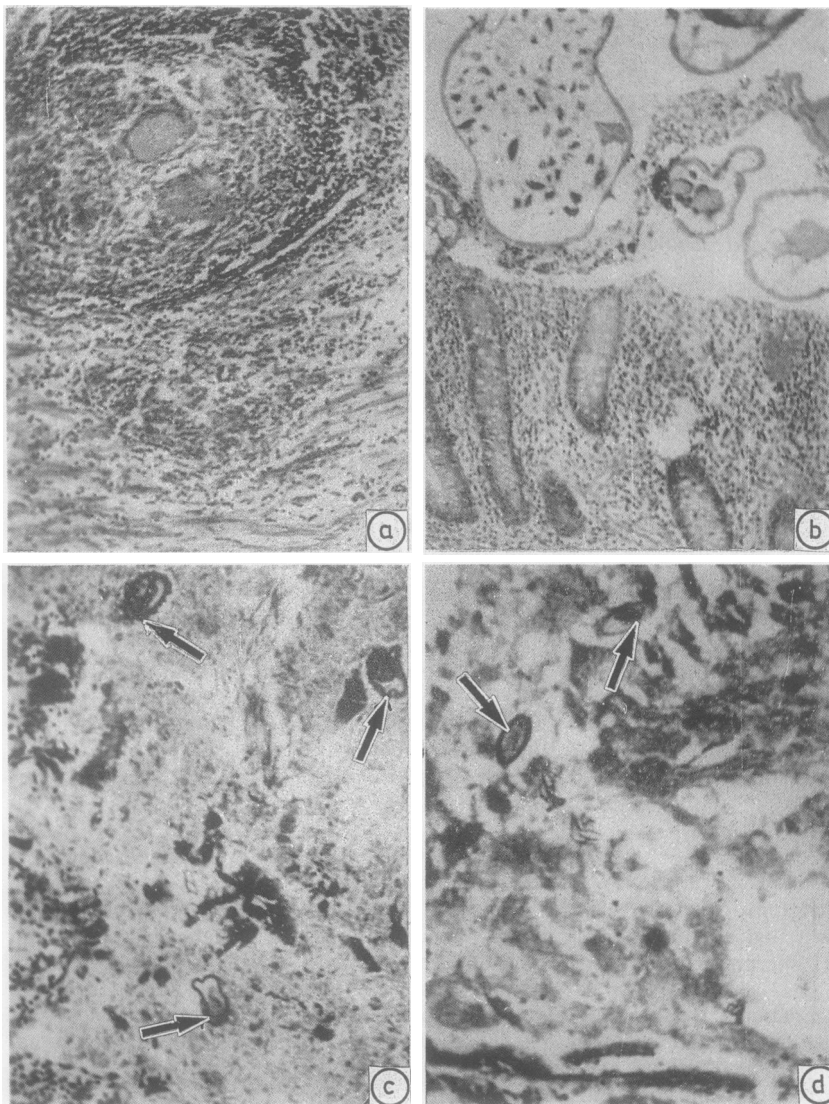


Fig 1a Classic tubercular granuloma in the wall of the appendix. (Haematoxylin and eosin).

Fig 1b *Enterobius vermicularis* in the lumen of the appendix. (Haematoxylin and eosin).

Fig 1c Ova of *A lumbricoides* (arrow) in the lumen. (Haematoxylin and eosin).

Fig 1d Ova of *T trichura* (arrow) in the lumen. (Haematoxylin and eosin).

diagnosis of tuberculosis was made by the surgeon in only three of the 70 cases (4.2%). In the remaining 67, tuberculosis was neither suspected by the operating surgeon nor by the pathologist on gross examination.

In group IV in only one case out of 75 of parasitic infestation was the diagnosis evident on gross examination. Transverse sections of adult *Enterobius vermicularis* or its ova were seen in 41 cases (55%) (fig 1b). *Ascaris lumbricoides* was found in 13 (17%) (fig 1c) and ascariasis with trichuriasis in two (3%) (fig 1d). *Taenia* was found in two (3%) (fig 2a) and amoebulae of *Entamoeba histolytica* in 17 specimens (23%) (fig 2b). One specimen showed granuloma formation

around an enterobius worm (fig 2c). Adult *Ascaris lumbricoides* was identified in one specimen on gross examination alone and no blocks were taken.

In tumours and tumour-like lesions four cases each of mucocele and carcinoid tumour were seen (fig 2d).

Discussion

In this study 309 normal appendices were resected as a prophylactic measure from patients who had undergone laparotomy for reasons other than appendicitis. As the appendix has come to be regarded as a functionless organ which can cause morbidity and

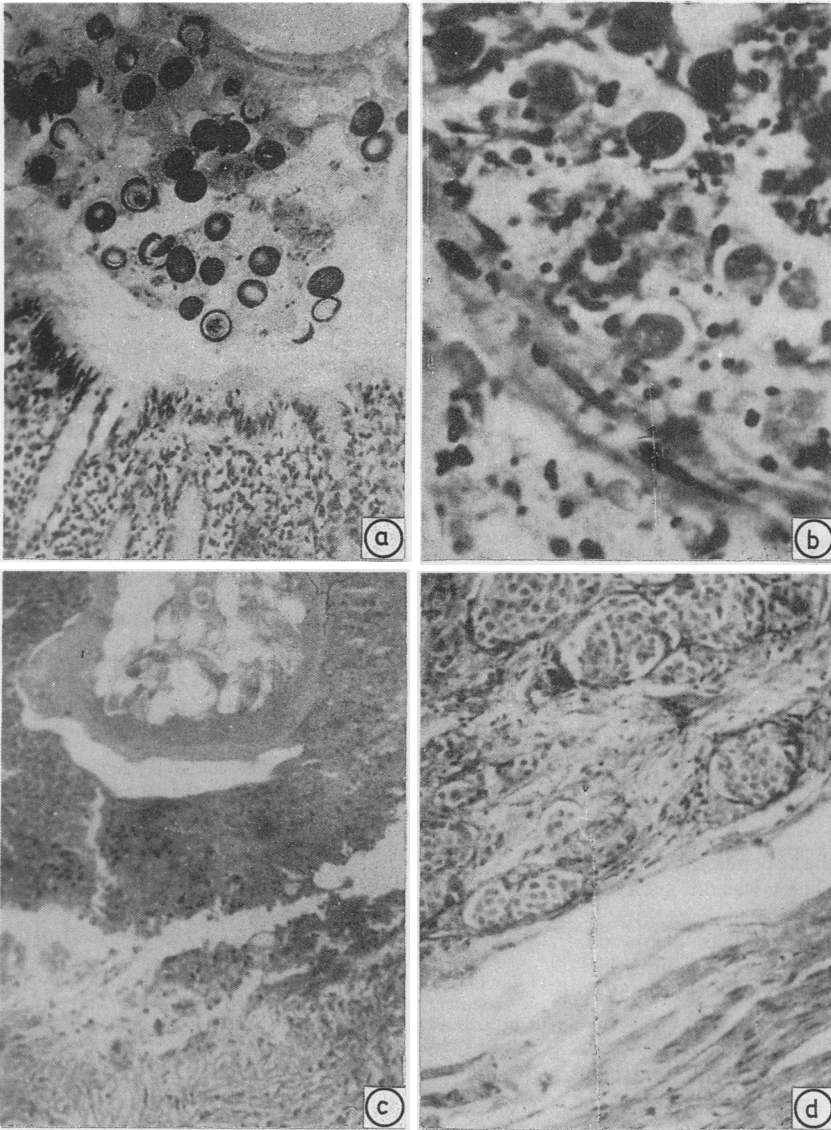


Fig 2a Ova of *T solium* or *saginata* in the lumen. (Haematoxylin and eosin).

Fig 2b Amoebulae of *E histolytica* in the submucosa. (Haematoxylin and eosin).

Fig 2c Granuloma formation around enterobius worm. (Haematoxylin and eosin).

Fig 2d Groups of carcinoid cells in submucosa and muscle layer. (Haematoxylin and eosin).

mortality, surgeons have tended to resect it at the first possible opportunity,¹² though recent evidence suggests that the appendix may have a role in the immunological functions of the body,¹³⁻¹⁵ especially in the maturation of B lymphocytes.¹⁶

When non-specific inflammatory lesions of the appendix were diagnosed, no subsequent change in the management of the patient was called for. Chronic or active appendicitis was found in 41.7% of cases. Though the existence of recurrent or chronic appendicitis is doubtful,¹⁷ there is some pathological evidence in support of this.¹⁸ Most cases histopathologically diagnosed as chronic appendicitis in this

study did not show evidence of an inflammatory cell infiltrate, but had fibrosis and thinning of the wall. Hence the term "healed appendicitis" would be more appropriate.

In the remaining groups (table) most of the diagnoses would have been missed if only grossly abnormal appendices at surgery had been examined histopathologically. The histopathological diagnosis was immensely important in the postoperative management of these patients, especially those with tuberculosis or parasitic infestation.

Tuberculosis was the most important incidental finding in 2.4% of cases, being much higher than the

0.06% reported by Chan in Hong Kong in a predominantly Chinese population.⁶ In the earlier part of this century about 0.1–3% of all appendices removed and 1.5–30% of those removed from patients with pulmonary tuberculosis had evidence of tuberculosis on histopathological examination.^{19,20} Isolated tuberculosis of the appendix alone is rare, and the ileum or caecum is nearly always affected.^{21,22} Patients with evidence of appendicular tuberculosis should therefore be treated with anti-tubercular drugs.

The importance of this high incidence of unsuspected tuberculosis, a curable disease but which can be dangerous if left untreated, in a developing nation like India cannot be overemphasised. Of the 70 cases studied, only three had the clinical features and operative findings highly characteristic of tuberculosis. The remaining 67 might have subsequently experienced long standing unrecognised disease if an appendicectomy had not been carried out in every case of laparotomy and sent for histopathological examination. We feel that more cases of tuberculosis would have been diagnosed if more than two sections had been taken from each appendix, because tuberculosis presented as a microscopic lesion is not visible by the naked eye.

In tropical countries like India, where intestinal parasitic infestation is quite common, appendiceal disease is not unusual. In the present study 75 (2.5%) cases were found to have parasitic infestation. Enterobiasis was the commonest. Other parasitic organisms found were amoebae, ascaris, ascaris with trichuris, and taeniae.

Enterobius granulomas in the appendiceal wall have occasionally been reported.²³ There was one such case in the present study.

Interestingly, out of 2921 appendices examined, only eight (0.3%) had a benign tumour or tumour-like lesion. Chan reported 50 cases out of 12 513 (0.4%).⁶

Carcinoid tumours were found in 0.1% cases, a figure lying between the 0.09% recorded by Chan⁶ and the 0.3% by Moertal *et al.*²⁴ Carcinoid syndrome secondary to appendicular carcinoid tumour is extremely rare,²⁶ and none of the four patients in this series had manifestations of this.

Mucocele of the appendix was diagnosed in 0.1% of all appendices examined in our study, which is less than the 0.2% reported by Chan.⁶ The term mucocele was used for a benign tumour-like lesion of the appendix showing excessive accumulation of mucin. It has been suggested, however, by Higa *et al.*,²⁵ that the term "mucocele of appendix" should only be used clinically, because it covers several pathological entities like mucosal hyperplasia, mucinous cystadenoma, and mucinous cystadenocarcinoma of the appendix.

Our study suggests that the probability of unsuspected tuberculosis of the intestine being shown by histological examination of the appendix is high. It is therefore recommended that all appendicectomy

specimens should be sent for histopathological examination, especially in those parts of the world where tuberculosis is endemic.

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