

Histopathological Study of Appendicectomy Specimens in a Tertiary Care Hospital of Hilly Region in South-Western India

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ABSTRACT

Introduction: Appendicitis is the most common emergency abdominal surgery done in the world. Incidence of appendicitis currently is 10 per 100000 population and the rate is increasing in India and other developing countries due to shift in eating habits towards western diet. Therefore, histopathological examination stays the gold standard method of choice for confirmation of appendicitis, hence this study was undertaken.

Aim: To analyse the histopathological diagnosis in all the patients who underwent appendicectomy in the hospital.

Materials and Methods: This is a cross-sectional hospital record based study of two years duration from January 2017 to December 2018, conducted in the Department of Pathology. All the patients who were treated by appendicectomy with clinical diagnosis of appendiceal diseases were included in the study. Patients admitted with the cause of acute abdomen other than appendicitis were excluded from the study. All the appendicectomy specimens were processed and histopathological diagnosis was reported by pathologist.

Results: A total of 348 specimens were undertaken for histopathological examination. There were 224 (64.36%) females and 124 (35.64%) male patients with female to male ratio of 1.8:1. All patients were clinically diagnosed as having appendicitis based on the physical and laboratory examination. Histopathological examination revealed that the maximum number of appendicectomies were done in the age group of 11 to 20 years. Histopathological examination done showed the following diagnosis in patients: acute appendicitis, chronic appendicitis, acute suppurative appendicitis with periappendicitis, acute suppurative appendicitis. The other histopathological diagnosis were eosinophilic appendicitis, gangrenous appendicitis, granulomatous appendicitis, appendiceal mucocele, acute or chronic appendicitis, enterobius vermicularis infestation, carcinoid and metastatic adenocarcinoma.

Conclusion: An accurate macroscopic assessment is difficult intraoperatively which emphasize the importance to send all appendicectomy specimens for routine histopathological examination. Final diagnosis of appendicectomy is made only after histopathology.

Keywords: Acute appendicitis, Carcinoid, Enterobius vermicularis

INTRODUCTION

Appendicitis is the most common abdominal emergency and appendicectomy is routinely performed surgery in the world [1]. Incidence of appendicitis currently is 10 cases per 100000 population and this rate is increasing in India and other developing countries, mainly in urban areas due to increased adaptation to western diet [2]. The lifetime risk of appendicitis to occur in children and young adults is 7% [3]. Even after all the recent advancements in surgical field, clinical diagnosis of acute appendicitis is accurate in 60-80% of cases only [4]. Appendicitis can be obstructive or non-obstructive type. Main factor in acute appendicitis is luminal obstruction and some other common obstructive lesions are faecolith, lymphoid hyperplasia and foreign bodies. However, some unusual factors could also be the cause which includes parasitic infestations like ascariasis, enterobiasis, bacterial infections such as tuberculosis or a neoplasm like carcinoid, lymphoma, primary or secondary adenocarcinoma, gastrointestinal stromal tumour [5]. The maximum incidence of acute appendicitis is seen in young age group which coincides with development of lymphoid system. The sex ratio in acute appendicitis is about 1:1 prior to puberty. At puberty, male to female ratio becomes 2:1 [6]. It has been observed that in about 15-30% of cases which are diagnosed as acute appendicitis, there is discrepancy between clinical diagnosis and histopathological diagnosis. The histopathological study confirms the diagnosis of acute appendicitis and reveals other important pathological findings that may go unnoticed intraoperatively during gross evaluation but may affect the clinical treatment of the patient in future [7]. In a study done by Matthyssens LE et al., the author suggests that routinely

appendix specimens should not be sent for histopathology and should be examined only if intraoperatively any gross abnormality seen [8].

The histopathological assessment of the specimens serves two purposes. Firstly, it provides a confirmatory diagnosis. Second, it may reveal additional pathological findings. Hence, the aim of present study is to evaluate the histopathological diagnosis of appendicectomy specimens, to establish the causes for appendicitis and compare them with other studies.

MATERIALS AND METHODS

This is a cross-sectional hospital record based study of two years duration from January 2017 to December 2018 which was conducted in the Department of Pathology. Institutional Ethics Committee approval was duly taken with reference number: KOIMS/IEC/34/2019-20.

Inclusion criteria: Hospital record based universal sampling was used as sampling technique to include 348 appendicectomy specimens. All the patients who were treated by appendicectomy with clinical diagnosis of appendiceal diseases were included in the study.

Exclusion criteria: Patients admitted with the cause of acute abdomen other than appendicitis were excluded from the study. Relevant demographic details, clinical data was obtained from the recorded proforma. All the appendicectomy specimens were fixed in 10% formalin, processed and embedded in paraffin, and 3-4 µm thick sections were made. Sections were stained with haematoxylin and eosin stain and histopathological diagnosis was reported by pathologist.

STATISTICAL ANALYSIS

The data was analysed using SPSS software version 21.0. The results was tabulated and expressed in frequency and percentage.

RESULTS

A total of 348 specimens were undertaken for histopathological examination. There were 224 (64.36%) females and 124 (35.64%) male patients with female to male ratio of 1.8:1. Age range was from 6 to 65 years. All patients were clinically diagnosed as having appendicitis based on the physical and laboratory examination. The patients presented with the following symptoms: right iliac fossa pain-346 (99.4%), generalised abdominal pain-49 (14.1%), loss of appetite-243 (70%), fever-139 (39.9%), nausea-98 (28.1%), vomiting-51 (14.6%) and diarrhoea-31 (8.9%) cases. The signs elicited in the patients were right iliac fossa tenderness-345 (99.1%), generalised tenderness-56 (16%), rebound tenderness-240 (69%), guarding-121 (34.7%) and rosving's sign-132(37.9%) cases.

Histopathological examination revealed that maximum number of appendicectomy were done in the age group of 11 to 20 years (43.67%) followed by 21 to 30 years (29.59%). Histopathological examination in study cases showed the following diagnosis as shown in [Table/Fig-1]: acute appendicitis-229 (65.80%), chronic appendicitis-60 (17.24%), acute suppurative appendicitis with periappendicitis-20 (5.74%) and acute suppurative appendicitis-14 (4.02%). The other histopathological diagnosis were acute on chronic appendicitis-13 (3.73%), acute gangrenous appendicitis-3 (0.85%), enterobius vermicularis infestation-3 (0.85%), granulomatous appendicitis-2 (0.57%), appendiceal mucocele- 1 (0.30%), eosinophilic appendicitis-1 (0.30%), appendiceal carcinoid-1 (0.30%) and metastatic adenocarcinoma-1 (0.30%).

appendicitis differs considerably by country, geographic region, race, age, sex, socio-economic status, dietary habits, and hygiene. Obstruction is usually in the form of luminal obstructions such as fecolith, fibrosis or stricture which can cause growth of aerobic and anaerobic bacteria. Lymphoid hyperplasia can also narrow the lumen leading to luminal obstruction. Once there is luminal obstruction there is continued mucus secretion and inflammatory exudate which leads to increased intraluminal pressure resulting in obstruction of lymphatic drainage [5]. Maximum number of patients (43.67%) who underwent appendicectomy belonged to the age group of 11-20 years as shown in [Table/Fig-1], which correlated with the study done by Marudanayagam R et al. which also showed that most of the appendicectomies (64.58%) were done in the second decade [1]. Number of appendicectomies performed was more in females (64.36%) as compared to Males (35.64%). This was contrary to findings by Zulfikar I et al., who studied 323 cases of appendicectomies which included 196 (60.7%) males and 127 (39.3%) females [9]. A total of 346 out of 348 (99.42%) appendicectomy specimens were found to be non-neoplastic lesions and only 2 (0.57%) cases were diagnosed as neoplastic lesions. In a study by Blair NP et al., it was reported that 80% of appendicectomy cases were non-neoplastic lesions and 4% were neoplastic [10]. In this study, majority of patients presented with right iliac fossa pain which is similar to present study. In another study by Edino ST et al., they reported that abdominal pain was the most common presenting symptom in such patients [11].

In the present study, acute appendicitis was accounted as most common histopathological lesion for which appendicectomy was done and was diagnosed in 65.80% of patients [Table/Fig-2]. These findings were in correlation with the study done by Edino ST et al., which reported 47.9% cases [11]. Chronic appendicitis constituted

Histopathological diagnosis	Age (in years)							Total cases	Percentage (%) of cases
	1-10	11-20	21-30	31-40	41-50	51-60	>60		
Acute appendicitis	19	104	66	27	11	1	1	229	65.80
Chronic appendicitis	1	26	18	11	4	0	0	60	17.24
Acute suppurative appendicitis and periappendicitis	1	6	6	5	1	1	0	20	5.74
Acute suppurative appendicitis	2	6	3	1	1	0	1	14	4.02
Acute on chronic appendicitis	0	7	5	1	0	0	0	13	3.73
Acute gangrenous appendicitis	0	1	1	0	1	0	0	3	0.85
Enterobius vermicularis infestation	1	2	0	0	0	0	0	3	0.85
Granulomatous appendicitis	0	0	2	0	0	0	0	2	0.57
Eosinophilic appendicitis	0	0	1	0	0	0	0	1	0.30
Mucocele	0	0	1	0	0	0	0	1	0.30
Carcinoid	0	0	0	0	1	0	0	1	0.30
Metastatic adenocarcinoma	0	0	0	0	0	0	1	1	0.30
Total	24	152	103	45	19	2	3	348	100

[Table/Fig-1]: Distribution of histopathological diagnosis of appendicectomies.

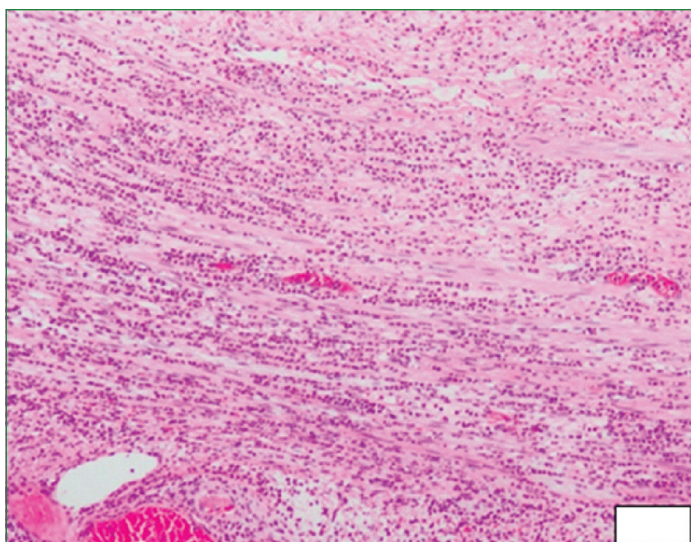
DISCUSSION

Appendicitis affects young population with 40% of cases occurring between the age range of 10 to 29 years. The most common surgical cause of acute abdomen is acute appendicitis. Anorexia is first symptom in 95% of the patients with acute appendicitis. Other clinical features associated are pain, vomiting and fever. If vomiting precedes the onset of pain, the diagnosis of appendicitis should be investigated [5].

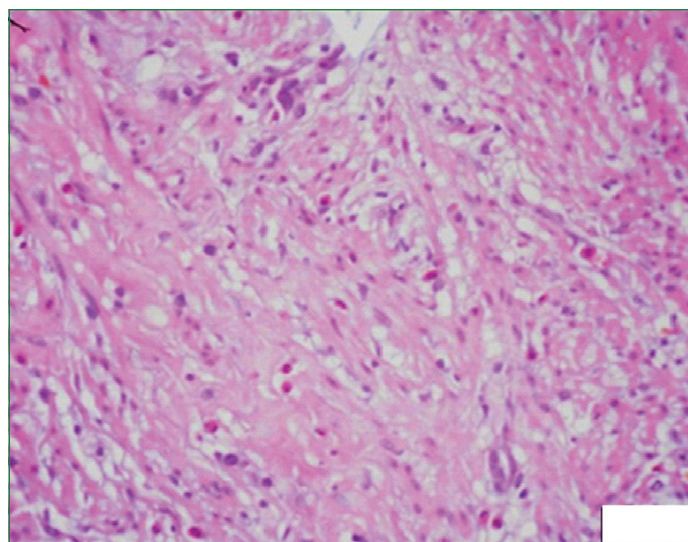
Acute appendicitis is the most frequently encountered surgical emergency. It accounts for about 40% of all the surgical emergencies in the western nations. It is relatively rare in African and Asian countries. Few studies done recently show that there is an increase in incidence of appendicitis in African countries due to acceptance of western diet and lifestyle [2]. The incidence of

the second most common lesion reported in the present study (17.24%) which is similar to the findings by Edino ST et al., who reported 14.7% cases of chronic appendicitis [11]. The other cases in the spectrum included acute suppurative appendicitis with periappendicitis [Table/Fig-3], acute suppurative appendicitis, granulomatous appendicitis, appendiceal mucocele and acute on chronic appendicitis. The present study included one case (0.30%) of eosinophilic appendicitis.

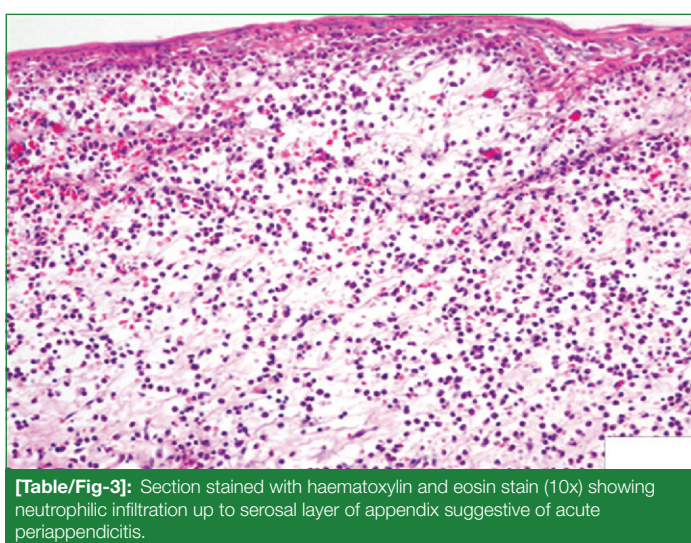
Present study reported 9.76% cases of acute suppurative appendicitis which is similar to study by Sujatha R et al., which reported 6.5% [12]. However, study by Edino ST et al., reported 14.1% cases [11]. In present study, two cases of granulomatous inflammation were detected as an incidental histopathological diagnosis. The reported incidence in present study was 0.57%. There was presence of caseation necrosis, granulomas, and



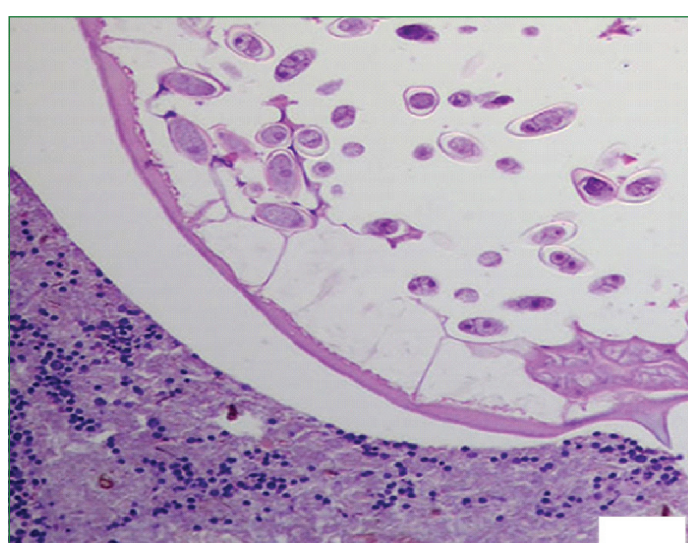
[Table/Fig-2]: Section stained with haematoxylin and eosin stain (10x) showing neutrophilic infiltration in the muscular wall of appendix suggestive of acute appendicitis.



[Table/Fig-4]: Section stained with haematoxylin and eosin stain (40x) showing eosinophilic infiltration in the wall of appendix suggestive of eosinophilic appendicitis.



[Table/Fig-3]: Section stained with haematoxylin and eosin stain (10x) showing neutrophilic infiltration up to serosal layer of appendix suggestive of acute periappendicitis.



[Table/Fig-5]: Section stained with haematoxylin and eosin stain (40x) showing histopathological features suggestive of enterobius vermicularis infestation of appendix.

Langhans' giant cells which was indicative of granulomatous inflammation of the appendix possibly tubercular aetiology. The present study had an incidence of 0.57% which is lower as compared to the study by Sujatha R et al., (2.2%) and Edino ST et al., (9.25%). The occurrence of tubercular appendicitis can either be primary [13] or secondary, the former being very rare with a reported incidence of 0.1-0.6% [11,12].

Gangrenous appendicitis was reported in three (0.85%) cases in the present study. These findings justified the delay by patients in seeking timely treatment. Faecoliths are reported in 40% of acute appendicitis, 65% of gangrenous appendicitis without rupture, and nearly 90% of gangrenous appendicitis cases with rupture [14].

Eosinophilic appendicitis is characterised by a lack of neutrophils, there is eosinophilic infiltration in the muscle layer with oedema supporting muscle fibres [Table/Fig-4]. It may be associated with helminthic infection like schistosomiasis, strongyloides or enterobius. Enterobius vermicularis infestation in the appendix usually produces symptoms resembling acute appendicitis [Table/Fig-5]. The incidence of appendicitis due to *Enterobius vermicularis* worldwide ranges from 0.2% to 41.8% [15]. In the present study, we reported three cases (0.86%) of *Enterobius vermicularis* infestation presenting with features of acute appendicitis which is lower as compared to the study by Sujatha R et al., which reported 3.5% cases [12]. Interestingly, it was an incidental finding in histopathological examination.

Mucocele of the appendix is formed most commonly due to epithelial proliferation, but it can also be a result of inflammation or obstruction. Mucoceles are frequently discovered incidentally, as most are the result of a mucinous cystadenoma that causes no inflammation

[16]. There was one (0.30%) case of appendiceal mucocoele found in the present study which is similar to the study by Babatunde M et al., which reported 0.3% cases [17].

Neoplasms of the appendix are very rare and usually diagnosed during surgery or medical autopsy. In a classical study done by Collins on 71000 appendectomy specimens, Collins found 3271 benign tumours and 958 malignant tumours with an overall incidence of 4.6% for benign tumours and 1.35% for the malignant tumours [18]. Benign tumours of the appendix comprise of leiomyomas, lipomas, neuromas etc. Malignant tumours of the appendix include mucocoeles, carcinoids and adenocarcinomas [18]. Carcinoids are the most common tumour of the appendix and are typically small, firm, circumscribed yellow-brown lesions. Carcinoid tumours may present by appendicitis because of luminal obstruction or elevated levels of 5-hydroxytryptamine, histamine and kinin as these are all potent mediators of inflammation. The reported incidence of carcinoids in several studies ranges from 0.02 to 1.5% of surgically removed appendices [9]. In the present study, there was one case (0.30%) of carcinoid which is much lower as compared to the study by Sujatha R et al., which reported 1.3% cases [12]. In the present study, there was one case of metastatic adenocarcinoma which is very rare. The primary site of malignancy was not possible to detect as the patient was not available for follow-up.

Despite recent advances in the field of surgery, there is no specific laboratory test or examination with adequate specificity and sensitivity to diagnose appendicitis consistently. Results obtained

from all preoperative investigations are non-specific. The final confirmation is always done by histopathology even if there is some rare or co-existing pathology.

Limitation(s)

Present study did not include clinical scoring system like Alvarado score, as all the clinical and laboratory data was unavailable for patients. Immunohistochemistry of neoplastic cases was not possible in the present study as patients were referred immediately for further management and were not available for clinical follow-up.

CONCLUSION(S)

Histological examination of appendicectomy specimens in present study provides an insight for diagnosing important incidental lesions, which have definitive role in the management of the patient. Thus, the advantage of routine histopathological examination surpasses the expenditure of procedure and henceforth is recommended to be conducted for every appendicectomy specimen received, so that any co-existing or unusual pathology remains undiagnosed or missed.

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