Original Research Article

Importance of routine histopathological examination in appendectomy specimens

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Abstract

Background: Acute appendicitis is the most common abdominal emergency. It is a clinical entity with an ongoing diagnostic challenge. Histopathological examinations are the gold standard for the final diagnosis, which has revealed much unusual, unexpected serious underlying pathology. This study is to analyze the histopathological patterns in appendectomy specimens and to establish the role and importance of histopathological examination in diagnosing various serious incidental pathologies. **Materials and Methods:** This is a retrospective study comprising of 181 patients, carried out at VMKVMCH, Department of Pathology, over a period of 2 years from September 2017 to August 2019. Clinical data of patients were collected for all the appendectomy specimens received at the pathology department and histopathology slides were reviewed. **Results:** A total of 181 cases were analyzed. Patients' age ranged from 3 to 77 years. The predominant appendectomy finding was acute appendicitis 86 cases (47.51%) followed by chronic appendicitis 58 cases (32.04%). Among the unusual findings, eosinophilic appendicitis was the commonest 4 cases (2.20%), mucocele, carcinoid and parasite 1 case (0.55%) each respectively. **Conclusion:** Although most of the cases were diagnosed as acute appendicitis, a few of the essential incidental pathologies were missed out pre-operatively and intra-operatively. Hence these serious incidental diagnoses undeniably support the fact that all appendectomy specimens should be sent routinely for histopathological examination, which is not followed in many hospitals in India.

Keywords: Acute appendicitis, Appendectomy specimens, Parasites

Introduction

The appendix is a vestigial organ in humans and it is attached to the caecum. Appendicitis is one of the common causes of acute abdomen and emergency surgery with significant morbidity and mortality.

Acute appendicitis presents with right iliac fossa pain, tenderness, guarding and rigidity with other symptoms like, fever and vomiting [1].

The lifetime risk for appendicitis is 7% commonly occurring in adolescents and young adults. The rate of appendicitis varies among countries. Incidence of acute appendicitis is declining in the United States and Europe, whereas the incidence keeps increasing in developing countries. Age, sex and seasonal variations have association with acute appendicitis but the reason for these variations is not clear [2].

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In developing countries, the incidence is increasing in most urban centers, probably due to adoption of Western diet. Acute appendicitis has been widely reported to commonly occur in males, usually in the age range of 10 to 30 years. It is also understood that seasonal change has a strong association with acute appendicitis incidence. Summer is the season that has higher incidence [3].

Despite of advances in techniques and imaging modalities, there is dilemma in the clinical diagnosis of acute appendicitis. Histopathological examination still remains the gold standard method for confirmation of appendicitis. Histopathological examination not only confirms the diagnosis of appendicitis, but it also identifies the unusual findings such as incidental tumors in the appendix [4]. The practice of sending appendectomy specimens for histopathological analysis varies, because there are no definite guidelines as to whether all appendices should be sent for routine

histopathology. However histopathological examination not only has identified some unusual findings, but also confirms the inflammatory pathological condition at the microcellular level [5].

Histopathological examination of the appendectomy specimens yields important incidental findings. Keeping this in mind a retrospective study was conducted to analyze various histopathological patterns identified in appendices removed after being diagnosed clinically as acute appendicitis.

Materials and Methods

Type of study: A retrospective study was carried out.
Setting: At the Department of Pathology in Vinayaka Mission's Kirupananda Variyar Medical College and Hospital.
Duration of study: 2 years study from 1st September 2017 to 31st August 2019 was included in the study.

Sample size: Total of 181 appendix specimens irrespective of age, from patients who underwent appendectomy was studied.

Sampling methods: Patients who were diagnosed with acute appendicitis, underwent appendectomy by open method or laparoscopy method, and were received at the Pathology department.

Inclusion criteria: Patients who were diagnosed with acute appendicitis and underwent appendectomy.
Exclusion criteria: Patients whose appendix were removed during other surgeries.

Data collection procedure: Data of patients whose appendix were received at the Pathology department were collected for evaluation over a period of 2 years. Patients' additional details were collected from the department of Medical records and the histopathological reports made on all these cases were collected from the Department of Pathology retrospectively.

Data analysis procedure: The collected data were categorized on the basis of varying diagnosis made on appendectomy specimens and the age pattern was analyzed in each category.

Ethical consideration: Submitted.

Results

A total of 181 cases were analyzed. Patients' age ranged from 3 to 77 years. Among these patients, 21 – 30 years age group was the commonest 63 cases (34.80%), followed by 11 – 20 years of age 46 cases (25.41%). Out of the 181 cases, 114 were males (62.98%) and 67 were females (37.01%), hence the male to female ratio is 1.7:1 in this study (Table 1).

Table-1: Age and sex distribution of appendectomy patients.

Age group	Males (n= 114) & %	Females (n = 67) & %	Total (n = 181) & %
1-10	7 (6.14%)	6 (8.95%)	13 (7.18%)
11-20	30 (26.31%)	16 (23.88%)	46 (25.41%)
21-30	48 (42.10%)	15 (22.38%)	63 (34.80%)
31-40	15 (13.15%)	17 (25.37%)	32 (17.67%)
41-50	7 (6.14%)	5 (7.46%)	12 (6.62%)
51-60	4 (3.50%)	7 (10.44%)	11 (6.07%)
61-70	2 (1.75%)	1 (1.49%)	3 (1.65%)
71-80	1 (0.87%)	0	1 (0.55%)

Table-2 Histopathological findings in appendectomy specimens

Microscopic findings	No. of cases (n = 181)	Percentage %
Acute appendicitis without periappendicitis	86	47.51
Acute appendicitis with periappendicitis	12	6.62
Acute suppurative appendicitis	8	4.41
Acute gangrenous appendicitis	4	2.20
Chronic appendicitis	58	32.04
Lymphoid hyperplasia	6	3.31
Eosinophilic appendicitis	4	2.20
Parasite	1	0.55
Mucocele	1	0.55
Carcinoid	1	0.55

Among the 181 cases studied, the predominant histological finding was acute appendicitis in 86 cases (47.51%) followed by chronic appendicitis in 58 cases (32.04%). Among the incidental findings, parasitic infestation in 1 case (0.55%), mucocele in 1 case (0.55%) and carcinoid in 1 case (0.55%) (Table 2).

Discussion

The vermiform appendix is responsible for surgical exploration for suspected appendicitis. Appendicitis still remains the commonest surgical procedures performed in the developing world [6].

In this study, the age of the patients ranged from 3 years to 77 years, where maximum number of appendectomies were performed in young patients belonging to the 3rd decade (21-30 years) of life, 63 cases (34.80%), followed by 2nd decade (11-20 years) of life, 46 cases (25.41%). The same finding was observed in studies conducted by AneelMyageri [1], Zulfikari I [5], R Sujuatha [7], Medha P Kulkarni [8]. The reason behind the age incidence could be as suggested by J A H Lee that the development of lymphoid tissue occurs during adolescence and this leads to an increased chance for the obstruction of the appendicular lumen, hence accounting for the higher incidence of the disease [9]. In a study conducted by Hanumant, he has stated that appendicitis is more common in persons taking poor fiber diet and it was found to be more common in non-vegetarians than vegetarians [10]. The same could be applied in this study too.

Among the cases studied, the gender predilection showed a male preponderance, with a male to female ratio of 1.7:1, which was closest to 1.8:1 seen in a study conducted by A J Omotoso [11]. This could be because of the fact stated in a study conducted by Neha Rathi that health consciousness is seen more among women than men and in addition to it the study also states that masculine ideologies and norms play a significant role in discouraging men from eating healthy [12]. Hence a low dietary fibre intake should have led to such increased appendicitis incidence in men than women in the present study. Of all the histopathological diagnosis done on the 181 appendectomy specimens, most common diagnosis was acute appendicitis in 86 cases (47.51%) followed by chronic appendicitis in 58 cases (32.04%). Similar findings were noted in a study conducted by Hanish Kumar Chawda [13] with 241 cases (57.38%) of acute appendicitis as the highest diagnosis followed by 166 cases (39.52%) of chronic appendicitis.

Acute appendicitis with additional histological findings was seen in 24 cases. They were acute appendicitis with periappendicitis in 12 cases (6.62%), acute suppurative appendicitis in 8 cases (4.41%), on comparison with a study conducted by Sujatha had 3.8% [7], and acute gangrenous appendicitis in 4 cases (2.20%), compared to a study conducted by Medha had 1.53% [8]. The histological changes of early acute appendicitis consist of focal collections of neutrophils within the lumen and lamina propria. Focal erosions, cryptitis, and crypt abscess formation occur later. Most specimens show extensive suppuration extending deep into or through the appendiceal wall. Complications of acute appendicitis include perforation, peritonitis, and periappendiceal abscess [14].

Whether acute appendicitis becomes chronic or whether it can be recognized in a chronic state has long been debated [14, 15, 16]. Chronic appendicitis is characterized by active chronic inflammation with infiltration of the muscle coat and serosa by lymphocytes and plasma cells [8]. Chronic appendicitis incidence is high probably due to the following reasons such as, patients' negligence in seeking medical help at the onset of symptoms and due to the practice of 'over the counter' sale of medicines. The incidental findings seen were luminal parasite and carcinoid, 2 cases (1.10%).

Although the incidence of incidental findings in appendectomy specimens is very low, it is mandatory to subject all the surgically removed appendix to histopathological investigation. In this study, luminal parasite of unidentified species (Figure-1) 1 case (0.55%) was found, close to a study conducted by V Vijayasree [4] with 2 cases (0.2%). The importance of parasite is that, it could be one of the causes to occlude the lumen and lead to appendicitis. In a study conducted by W Chan parasites encountered in the appendix were Enterobius vermicularis, Schistosomiasis, Trichuriasis, Ascariasis and Clonorchiasis [17].

Carcinoid (Figure-2) was seen in 1 case (0.55%), as seen in various other studies conducted by Fatan Limaiem [15], Aneel Myageri [1], V Vijayasree et al [4] and Medha P Kulkarni et al [8]. 0.49%, 0.63%, 0.1%, 0.22% respectively. Neuroendocrine tumors account for 50-77% of all appendiceal neoplasms and found in 0.3 to 0.9% of patients undergoing appendectomy. Carcinoids may mimic appendicitis by causing luminal obstruction accompanied with symptoms caused by elevated levels of serotonin [5]. Microscopic feature of neuroendocrine tumor of appendix is collection of cells demonstrating definite insular pattern of growth with cells extending into the muscular layer [8].

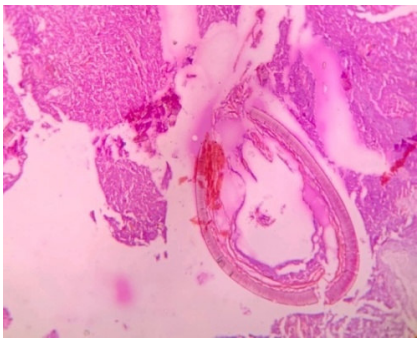

Fig 1: Wall of the luminal parasite (H&E, 10x).

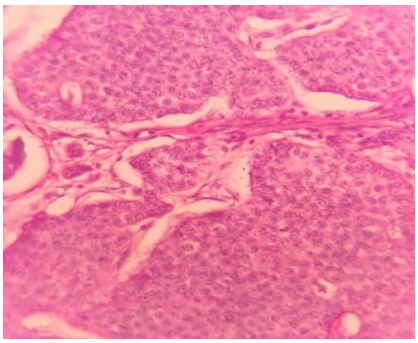

Fig 2: Carcinoid with salt and pepper chromatin (H& E, 40x).

The other findings seen in this study are:

Mucocele 1 case (0.55%), corresponds with the incidence seen in a study done by Shaveta et al, 2 cases (0.6%) [16]. Mucocele is morphological description of appendix where the lumen is dilated and accumulates mucin. It is a clinical term and has been used to cover several pathological entities.

There are wide varieties of benign and malignant lesions that can produce mucocele. Mucocele usually when ruptures will be associated with pseudomyxoma Peritoni [17]. The case included in this study showed excessive accumulation of mucin within a distended lumen of appendix.

Eosinophilic appendicitis with transmural infiltration (Figure-3) was seen in 4 cases (2.20%) and found close to a study conducted by Sujata et al [7] with an incidence of 3.5%. Typical histological features of this entity are eosinophil infiltration and edema in muscular layer of appendix without neutrophilic infiltration and the same features were seen in the present study too.

In few specimens, the appendiceal wall is infiltrated by eosinophils with no other abnormality. This reflects the presence of appendicitis elsewhere in the specimens that was not sampled or represents appendicitis in a resolving phase or a manifestation of eosinophilic gastroenteritis [14].

Lymphoid hyperplasia (Figure-4) was seen in 6 cases (3.31%) as opposed to a higher incidence in a study done by Shahanuma had 21.94% [6]. In these cases, hyperplastic lymphoid follicles could have caused the luminal obstruction, thereby leading to appendicitis.

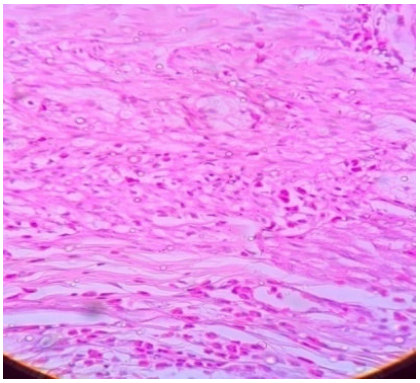

Fig 3: Eosinophilic appendicitis with transmural Eosinophilic infiltrate and muscle edema (H&E, 10x)

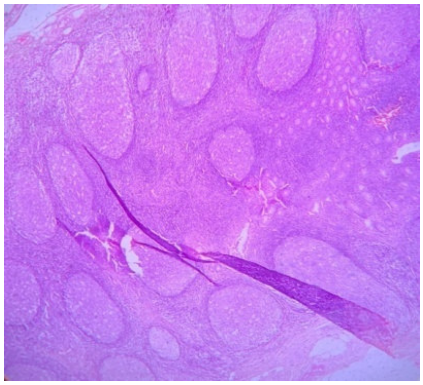

Fig 4: Lymphoid hyperplasia with luminal obliteration (H&E, 4x).

As this is a retrospective study, the important limitation that the present study had was the inability to collect patients' environmental, dietary and socio-psychological data. Their association and incidence rate would have given an idea about their role as an etiological factor in the onset of appendicitis.

Conclusion

Histopathological examination of every resected appendix is required for two purposes. First, it allows the confirmation of acute appendicitis. Second, it may reveal additional underlying pathologies that were not evident pre-operatively or intra-operatively.

Although, the unusual or co-existing pathologies are rarely seen, histopathological examination is required for their final confirmation.

Hence, it is recommended that in order to avoid under diagnosis, all the appendices should be histopathologically examined.

What this study adds to the existing knowledge?

This study proves that pre-operative and intra-operative features of abnormal appendices identified by the surgeons are unreliable and strongly recommends the sending of all appendectomy specimens for routine histopathological examination.

Author's contribution

- **Dr. Roopmala Murugan:** Conception, compilation, design of the study and manuscript preparation.
- **Dr. Thamilselvi R, Dr. Roopmala M, Dr. Saranya B** & **Dr. Poovizhi I:** Interpretation of the data.
- **Dr. Thamilselvi R:** Final approval of the drafted article.

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