



HISTOPATHOLOGICAL EXAMINATION OF APPENDIX – WHY IT IS MUST ?

Pathology

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ABSTRACT

**Objective:** To study various histopathological lesions in resected appendices with special reference to unusual pathologies.  
**Methods:** This is a retrospective five year study of 1016 appendectomy specimens. Detailed gross examination of appendectomy specimens was done, representative bits were taken and processed as per standard protocol for H & E stain. The pertinent clinical data and histopathological diagnoses were analysed.  
**Results:** The frequency of appendectomy specimens contributed to 10.06% in all surgical specimens. Males outnumbered the females (61.42%). Maximum number of cases were found in the age group of 11-20 years (32.68%). The bulk was formed by acute appendicitis (96.65%) with perforation in 5.19% cases. Unusual pathology ranging from granulomatous inflammation to malignancy was observed in 0.69% of cases.  
**Conclusion:** Present study emphasizes histopathological examination in every single resected specimen of appendix, as histopathology is the gold standard confirming the diagnosis.

KEYWORDS

Appendix, Acute Appendicitis, perforation.

INTRODUCTION

It is a common observation that common things are commonly neglected. Appendix is said to be a vestigial organ and does not perform any known physiological function, but acute appendicitis is the most common surgical emergency and appendectomy is one of the most frequent operation performed worldwide.

Incidence of appendicitis is seen in late childhood and early adolescence which parallels to lymphoid development.<sup>(1)</sup> Despite the modern modalities of investigations like USG, MRI and various laboratory tests, the pre operative diagnosis of appendiceal pathologies cannot be made with certainty in many cases. Hence careful histopathological examination of resected appendix remains the gold standard for accurate diagnosis and further management of disease process.<sup>(2,3)</sup>

AIMS AND OBJECTIVES

The present study was aimed at studying various histopathological lesions in resected appendices along with rate of perforation. The study also intends to find out the frequency of unusual pathologies in appendix.

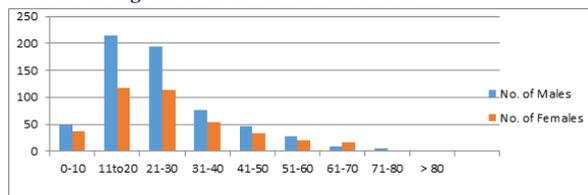
MATERIALS AND METHODS

The present study is a retrospective observational study over a period of five years spanning from Jan 2012 to Dec 2016. The study was undertaken in the Department of Pathology, Dr. V. M. Govt. Medical College, Solapur in collaboration with Department of Surgery. All the appendectomy specimens during this period were included in the study except appendix specimen from cases of congenital megacolon.

The present study consists of 1016 appendectomy specimens. The specimens were received in 10% formalin fixative. The detailed gross examination of appendix was done with special emphasis on luminal obstruction, perforation and any abnormal findings. Representative bits as per the routine protocol were taken and processed in automatic tissue processor for paraffin embedding and H& E staining. Pertinent clinical data were retrieved from hospital records. Careful and detailed histopathological examination of all appendices was done to arrive at a diagnosis. Analysis of histopathological diagnoses was done with special emphasis on unusual pathologies.

RESULTS

Table no. 1 : Age and sexwise distribution of cases



Males outnumbered the females constituting 61.42% of cases. Maximum number of cases were found in the age group of 11-20yrs comprising of 32.68% of cases. Youngest patient was of two days while oldest was 84 yrs.

Table no. 2: Histopathological lesions (Distribution of cases)

Sr. No.	Histopathological lesions	No. of cases	Percentage(%)
1	Acute Appendicitis	982	96.65
2	Chronic Appendicitis	10	0.98
3	Chronic Appendicitis with Enterobius vermicularis	2	0.19
4	Tuberculous appendicitis	2	0.19
5	Mucocele of Appendix	1	0.09
6	Mucinous cystadenoma	1	0.09
7	Carcinoid tumor	1	0.09
8	Normal histology	19	1.87

Acute appendicitis was the commonest pathology observed constituting 96.65% of cases. Normal histology was found in few cases comprising of 1.87%. Unusual pathologies were seen in minority of cases which included worm infestation by Enterobius vermicularis (Figure1a), tuberculosis(Figure 1b),mucocele(Figure1c), mucinous cystadenoma. Single case of carcinoid tumor(Figure1d) was also encountered during study.

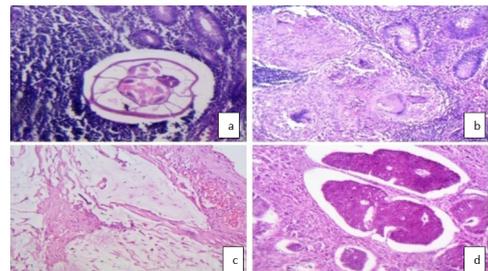


Figure 1 : Photomicrograph of appendices showing E. Vermicularis (a), Tuberculous appendicitis (b), Mucocele (c), Carcinoid tumor(d)

Table no. 3 Association of perforation in acute appendicitis – Distribution of cases (n=982)

Distribution of cases with perforation	No. of cases	Percent age %
Acute focal appendicitis with perforation	27	2.75
Acute suppurative appendicitis with perforation	23	2.34
Acute gangrenous appendicitis with perforation	1	0.10
<b>TOTAL</b>	<b>51</b>	<b>5.19</b>

Amongst Acute appendicitis 51 cases (5.19%) were associated with perforation.

## DISCUSSION

Acute appendicitis stands as the commonest emergency with subsequent laparotomy for appendectomy worldwide.

Histopathological examination of resected appendix satisfies two purposes. It confirms the diagnosis and severity of acute appendicitis along with concurrent perforation. Secondly it detects the associated and accidental pathologies in the appendix which may not be evident on clinical examination and thus has an impact on treatment plan.

Mohammad Ayub Jat et al and Riti T.K. Sinha quoted that in western world acute appendicitis accounts for 40% of surgical emergency. He further added that South Korea has an incidence of acute appendicitis and appendectomy to the tune of 22.71% and 13.56% respectively.<sup>2,4</sup> Present study observed the frequency of appendectomy to be 10.06% amongst all surgical specimens which is comparable with others. Maximum cases occurred in young males in present study, which is in concordance with most of the previous studies.

Acute appendicitis formed the main bulk of appendiceal pathologies in present study (96.65%). This observation is in accordance with Zulfikar et al (86.3%) and Shaveta et al (89.54%).<sup>5,6</sup> The perforation rate of appendix in the present study was low (5.19%) compared to other studies. Subedi et al, Nikumb et al, Shaveta et al and Kulkarni et al reported it to be 7.5%, 9.9%, 18.63% and 49.23% respectively.<sup>7,8,6,9</sup> The low perforation rate in the present study can be attributed to timely arrival of the patient and prompt decision of surgical intervention by the surgeon. This definitely reduces the morbidity and mortality.

Negative appendectomy was found in 19 (1.87%) cases. Mohammad Ayub Jat quoted that various studies have shown rate of negative appendectomy ranging from 6.1% to 34.2%, with higher rate in females.<sup>2</sup> Ayodeji Oluwarotimi Omiyale quoted that incidence of negative appendectomies is on the decline and that is coincided with increased use of CT and diagnostic laparoscopy. CT has very high sensitivity, specificity and positive predictive value.<sup>10</sup> Large data base study have shown rate of negative appendectomy as low as 6 to 8.4% and single institution study as low as 1.7 to 7%. Therefore negative appendectomy rate in present study is in acceptable limit.

Present study observed very low incidence of unusual pathology (0.69%) which is comparable with previous studies. Duzgun et al in his large series of 2458 cases found 0.70% of cases with unusual pathologies. Akbulut et al in his study of 5262 appendices found unusual pathology only in 54 (1.02%) appendices. However Emre et al, Menon et al and Nikumbh et al found it to the tune of 7%, 6.40% and 5.60% respectively.<sup>8</sup>

Present study observed a single case each of Carcinoid tumor, Mucocele and Mucinous cystadenoma. Two cases each of chronic appendicitis with *Enterobius Vermicularis* and Tuberculous appendicitis. Appendiceal carcinoid is the commonest primary malignant tumor occurring in appendix and accounts for 85% of appendicular neoplasms. Most patients with carcinoid tumour undergo operation for acute appendicitis. Most carcinoids are found accidentally on microscopic examination of appendix. Carcinoids are yellow when they are grossly visible. Metastatic rate is 1.4% to 8.8%. Its incidence in resected appendices is 0.3 to 2.27%.<sup>11</sup>

Mucocele of appendix shows localised or globular dilation of appendix containing large amount of mucin. Few authors are of the opinion that the use of term 'mucocele' should be avoided as it does not tell about the underlying cause of mucus accumulation.<sup>11</sup> In few instances the etiology of occlusion is endometriosis, mucosal hyperplasia, cystadenoma, adenocarcinoma. The incidence of appendicular mucocele is very low ranging from 0.2 to 0.3% of all appendectomy specimen.<sup>1</sup> Present study found only a single case of Mucocele (0.09%)

Amongst mucinous neoplasms, mucinous cystadenoma is the commonest tumor. Many appendiceal serrated and villous adenomas display minimal cytological abnormalities. As the adenoma grows it becomes cystic and the term cystadenoma is applied to it. Appendectomy is curative even in the presence of mucocele.<sup>11</sup> Present study observed a single case of mucinous cystadenoma (0.09%)

Pulmonary tuberculosis is the most frequent Tuberculosis can affect any organ in the body. Amongst extrapulmonary sites, gastrointestinal tract is the sixth common tissue affected. The commonest involvement is the extension from ileocecal tuberculosis, however rarely appendix may be primarily involved without any evidence of tuberculosis in the vicinity. The incidence of appendicular tuberculosis varies from 0.1 to 3% in all surgically resected appendix.<sup>1</sup> Present study encountered two cases (0.19%) of appendicular tuberculosis which is in concordance with other studies.

Amongst all worms, infestation by *Enterobius Vermicularis* is the commonest. Global incidence of *Enterobius Vermicularis* varies from 0.2 to 41.8%.<sup>1,4</sup> It may produce symptoms like acute appendicitis. Histopathological examination of appendix is very important as appendectomy will not treat the cause of disease. Complete course of antihelminthic drugs are to be administered. Present study found 0.19% cases of *Enterobius Vermicularis* infestation associated with chronic appendicitis. This fairly co-relates with global incidence.

Matthysens et al suggested that histopathology may be omitted if appendix is macroscopically normal at the time of surgery.<sup>12</sup> Alun E Jones et al quoted an opposite view that histopathological examination of appendiceal specimens only if they appear macroscopically abnormal has the potential to miss important diagnoses which has an impact on patient management.<sup>13</sup> Hence it is mandatory to examine all resected specimen irrespective of clinical diagnosis.

Hussain A et al found that 9% of macroscopically normal appendices were inflamed. On the other hand 14.4% of macroscopically inflamed appendices were microscopically normal. He advised to examine all appendices and to remove normal looking appendices for safer side.<sup>14</sup>

Present study has a very low frequency of unusual pathology comparable to other studies but authors of present study are of the view that diagnosis of unusual pathologies with certainty by histopathological examination outweighs the wastage of resources. Hence present study emphasizes histopathological examination of all resected appendices.

## CONCLUSION

Histopathological diagnosis for acute appendicitis with or without perforation is important to outline the concrete plan of management. Though the appendix is macroscopically normal, microscopy may provide useful clinical and pathological information in the form of incidental, unusual or co-existing lesions, where histopathological study can only confirm it. So present study stresses the importance of histopathology in every single resected specimen of appendix.

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