



ISSN: 2277- 7695

TPI 2015; 4(6): 107-110

© 2015 TPI

www.thepharmajournal.com

Received: 22-06-2015

Accepted: 25-07-2015

**Dr. SJ Pawar**

Department of Pathology KIMS,  
Karad, Maharashtra, India

**Dr. Shakuntla Armane**

Department of Pathology KIMS,  
Karad, Maharashtra, India

## Histopathological study of appendectomy specimens

**Dr. SJ Pawar and Dr. Shakuntla Armane**

### Abstract

**Aim:** Emphasize the role of histopathological examination of appendix and its correlation with clinical presentations.

**Material and Method:** All appendectomy specimens were received in 10% formalin as fixative. Gross features of these appendectomy specimens were recorded as per proforma and sections taken for histopathological study. Minimum three bits were taken from all the specimens, one longitudinal section from distal tip of the appendix, one cross section each from middle and base of appendix.

**Result:** Variety of appendicular lesions are observed in appendectomies done either for clinically suspected appendicitis or during laparotomy done for other illnesses. Though most common lesion observed was acute appendicitis followed by chronic appendicitis, inflammatory and neoplastic diseases of ileo-caecal region also involved appendix as parasitic infestations, ileo-caecal tuberculosis and caecal adenocarcinoma.

**Conclusion:** Each and every appendectomy specimen must be sent for histopathological examination and studied meticulously, as some unusual findings bearing implications on treatment and prognosis may be seen, regardless of the reason for which appendectomy is performed.

**Keywords:** appendectomy specimens, histopathological

### Introduction

Acute inflammation of appendix i.e. appendicitis is sufficiently common that appendicectomy, also termed as appendectomy, is the most frequently performed emergency abdominal operation. Hence, appendix is a frequent surgical specimen in most of the histopathology laboratories.

Diagnosis of acute appendicitis is made, based on history and physical examination along with laboratory and radiological findings<sup>[1]</sup>. However, histopathological study is the gold standard for the diagnosis of acute appendicitis<sup>[2]</sup>. Histopathological examination many a times comes up with an unusual diagnosis bearing significant implications on the treatment, prognosis and outcome of the patient<sup>[3]</sup>.

Our hospital is a tertiary care hospital and referral centre for all surgical emergencies, catering large population of three districts in south-western Maharashtra. Cases of acute pain in abdomen with clinical suspicion of acute appendicitis are often received in our hospital and treated as per standard protocols<sup>[4]</sup>.

As there is little data available from the Indian subcontinent, this study was undertaken to emphasize the role of histopathological examination of appendix and its correlation with clinical presentations.

### Materials and Method

The present study is a two year prospective study, carried out in the department of Pathology in our institute. This includes all appendectomy specimens received in the histopathology section of the department of Pathology from May 2009 to April 2011.

All appendectomy specimens were received in 10% formalin as fixative. Gross features of these appendectomy specimens were recorded as per proforma and sections taken for histopathological study. Minimum three bits were taken from all the specimens, one longitudinal section from distal tip of the appendix, one cross section each from middle and base of appendix

According to the site/location of gross lesion, if any like exudate, perforation etc additional bits were taken from such areas. All bits were fixed in 10% formalin overnight and processed by the routine paraffin tissue processing method. 74 Sections of 3-5 microns thickness were cut on a rotary microtome and stained with Hematoxylin and Eosin (H&E). Periodic Acid Schiff (PAS) stain and Mucicarmine stain were done wherever required<sup>[5]</sup>.

**Correspondence:**

**Dr. SJ Pawar**

Department of Pathology KIMS,  
Karad, Maharashtra, India

Required clinical data was recorded from biopsy requisition forms, indoor case papers and directly by interviewing the patients whenever possible. Microscopic findings were studied in detail and histopathology reports were given.

**Results**

During the study period of two years, a total of 268 appendectomy specimens were studied. This comprises 4.5% (268/5906) of total specimens received in the histopathology section of the department of Pathology in our hospital. Out of these 268 cases, 213 (79.5%) were surgically resected as a therapeutic measure for clinically suspected appendicitis and remaining 55 (20.5%) for other reasons as shown below. (Table 1) Out of 268 appendices, 55 (20.5%) appendix specimens were removed in the course of ileo-caecal resection or laparotomy done for other diseases like intestinal obstruction, gastrointestinal malignancies, Hirschsprung disease and other surgeries as shown in table above.

**Table 1:** Reasons for appendectomy among all cases

Reasons for appendectomy	Number of cases	Percentage (%)
Clinically suspected Appendicitis	213	79.5
Bowel resection for intestinal obstruction	30	11.2
Bowel resection for gastrointestinal malignancies	08	2.9
Hirschsprung disease	05	1.9
Incidental appendectomies with other surgeries	12	4.5
Total	268	100

Out of 268 cases studied, 258 (96.3%) showed appendicular pathology. These appendices were distributed in both the groups i.e. clinically suspected appendicitis group and appendices removed in the course of ileo-caecal resection or laparotomy done for other diseases group.

Out of 213 appendices removed with clinical suspicion of appendicitis, 212 (99.5%) showed appendicular pathology while in only one case appendix did not show any significant pathology as shown in pie chart below.

Mean length of appendix in our study was 5.8 cms. Maximum number (196/268 i.e. 73.2%) of the appendices were in the range of 5 to 10 cms in length. Smallest being 1 cms in length and longest appendix was 13 cms in length.

**Discussion**

Diseases of vermiform appendix are known since ancient times. Appendicitis still remains the most important cause of acute abdominal condition, peritonitis and emergency abdominal operation. In addition to the findings of acute inflammation, the excised appendix can be the site of a variety of unusual inflammatory conditions and neoplasms [7].

In the present prospective study we have studied histopathological findings in all appendectomy specimens at our institution over a period of two years and correlated these findings with the clinical presentations [6]. We have studied all appendectomy specimens removed including those removed as a part of bowel resections.

We received total 268 appendectomy specimens during our study period. Out of these 268 cases, 213 (79.5%) appendices

were surgically resected as a therapeutic measure for clinically suspected appendicitis and remaining 55 (20.5%) were removed in the course of ileo-caecal resection or laparotomy done for other diseases. Out of 213 cases where appendectomy was performed with clinical suspicion of appendicitis, 212 (99.5%) cases showed appendicular pathology. Out of 55 cases where appendectomy was performed during laparotomy done for other illnesses, 46 (83.6%) cases showed appendicular pathology.

This observation emphasises the role of histopathological examination in all specimens, as a large proportion i.e. 83.6% of appendectomies done for reasons other than appendicitis also revealed appendicular pathologies.

Our study also shows a lower percentage of unremarkable appendices, as compared to other studies, which may be attributable to clinical expertise of surgeons in our hospital and round the clock availability of radiological investigations like sonography and Computed tomography (CT) for diagnosing appendicitis.

Our study shows 21.8% of cases of acute appendicitis in age above 40 years, which is higher than that observed by other authors. Most of these cases were from the group of acute necrotising/gangrenous appendicitis. Our hospital is a tertiary care hospital so referral of patients with complications is the likely contributory factor for this finding. In acute appendicitis cases, Marudanayagam *et al.* 2006, reported male preponderance with M: F ratio of 1.5:1, which is comparable to our male to female ratio of 1.62: 1.

Appendices in chronic non-specific appendicitis cases harbor a chronic inflammatory reaction of unknown etiology mediated by T lymphocytes and increased lymphoid tissue with concomitant germinal centre hyperplasia indicating a simultaneous stimulation of B cell mediated immune response. In our study 65 (84.4%) out of 77 total cases of chronic non-specific appendicitis showed the presence of hyperplastic lymphoid follicles with prominent germinal centres. This can sometimes cause obliteration of appendicular lumen.

Fibrous occlusion of the distal tip of the appendix occurs as a part of the natural aging process. This process starts distally and progresses proximally. But, the findings of increased numbers of nerve fibers, Schwann cells and enlarged ganglia in these patients suggests that not all such cases are physiologic aging phenomenon as earlier postulated. It may be result from previous episodes of inflammation followed by neural remodelling [10].

WHO classification of tumors of the digestive system, 2010, categorizes these as miscellaneous tumors of the appendix i.e. neuromas [8].

As this entity is not accepted uniformly by many authors, very few studies have given an estimate of this entity. However, using the criteria as given by Aravindan *et al.* we found that incidence of eosinophilic appendicitis is comparatively much less than acute and chronic appendicitis. Only 5 cases (1.8%) of the total 268 cases showed features of acute eosinophilic appendicitis.

In the present study, over the all rate of Enterobius infestation noted was 1.2%. These three cases had variable clinical presentation as acute appendicitis, chronic appendicitis and intestinal obstruction. Worldwide, the reported rate of Enterobius infestation in patients with symptoms of appendicitis ranges from 0.2-41.8%. This wide range denotes effect of environmental and climate factors on parasite infestation rate.

Identification of adult worm in the tissue depends on

demonstrating a pair of cuticular crests, typical eggs in the parasite uterus or the characteristic narrow meromyarian type of musculature <sup>[10]</sup>.

Our cases showed both gravid uterus and cuticular crests. This parasite wanders widely and frequently invades the lower female genital tract <sup>[9]</sup>. As one of our patient was a female in reproductive age group, its detection and early treatment with anti-helminthic drugs helps in prevention of uro-genital infestations by the worm.

In the present study, idiopathic granulomatous appendicitis was diagnosed in one (0.4%) case. Granulomatous inflammation of the appendix is uncommon. It has an incidence of 1.3-2.3% in under-developed countries <sup>[11, 12]</sup>.

It is a poorly understood entity. It may represent an early manifestation of other granuloma-associated diseases, such as Crohn's disease, sarcoidosis, parasitic or bacterial infections. In this setting, appendiceal involvement occurs before other disease manifestations become evident, and therefore the etiology of the granuloma is unclear <sup>[10]</sup>.

Our case was a 25 yr old male, who presented with recurrent pain in abdomen since 2 years. A clinical diagnosis of recurrent appendicitis was considered and an appendectomy was performed.

There was no evidence of foreign body or transmural inflammation suggestive of Crohn's disease. Special stains done for fungi and tubercle bacilli were negative. PCR test for *Yersinia* infection could not be done due to patient non-compliance, however further investigations were done to rule out other causes of granulomatous inflammation. By exclusion diagnosis given was idiopathic granulomatous appendicitis.

Specific cause of granulomatous inflammation could not be determined in the immediate post-operative period. Provisional nature of the diagnosis was explained to the surgeon and patient was advised to come for follow up <sup>[10]</sup>.

The presence of granulomas in an appendix specimen should prompt a search for Crohn's disease elsewhere in the bowel, 94 but only 5-10% of patients with granulomatous appendicitis develop Crohn's disease elsewhere in the gastrointestinal tract.

In present study, one case of granulomatous appendicitis was diagnosed as tuberculous appendicitis. This was a 22 year old female presenting as intestinal obstruction due to abdominal tuberculosis. She underwent ileocaecal resection, which showed multiple tubercles over serosa. On microscopic examination, tuberculous granulomas were seen in bowel and appendiceal wall. 20 % Ziehl-Neelsen stain revealed acid fast bacilli, confirming the diagnosis of intestinal tuberculosis with appendiceal involvement.

Secondary tuberculosis involvement of the appendix can either occur as a local extension of ileocaecal tuberculosis, as retrograde lymphatic spread from distant lesions, or as appendicular serositis and periappendicitis in peritoneal tuberculosis. In our case, no evidence of papillary formation was noted, in contrast to the study of Wolff & Ahmed who reported a papillary architecture in 88.9% of cases studied. In cases where it could not be demonstrated, its absence can be attributed to marked luminal dilatation, leading to a stretched out wall and resultant flattening of the lining tissue.

Neoplastic lining of the lesion differentiates this entity from simple mucocele. Also, in our case there was no gross or microscopic evidence of invasion in wall or outside the wall by mucin or neoplastic epithelial cells, ruling out malignant neoplasm <sup>[13]</sup>. We observed that average hospital stay in patients of acute appendicitis cases without perforation was only six days while in acute appendicitis cases with perforation

it was extended to 10 days. Similar findings were also seen by Sajad Salati *et al.* Hence perforated *appendicitis* results in increased mortality and increased hospital stay. This finding highlights the need of early detection and surgical intervention in acute appendicitis cases.

### Conclusion

Results from this study show that variety of appendicular lesions are observed in appendectomies done either for clinically suspected appendicitis or during laparotomy done for other illnesses. Though most common lesion observed was acute appendicitis followed by chronic appendicitis, inflammatory and neoplastic diseases of ileo-caecal region also involved appendix as parasitic infestations, ileo-caecal tuberculosis and caecal adenocarcinoma. Rarely Hirschsprung disease can also involve appendix. Tumors of appendix are rare and studies with larger sample size are required to comment upon them.

Hence each and every appendectomy specimen must be sent for histopathological examination and studied meticulously, as some unusual findings bearing implications on treatment and prognosis may be seen, regardless of the reason for which appendectomy is performed.

**Conflict of interest:** No conflict of interest

**Funding:** KIMSDU, Karad

### References

1. Norman J, Leslie H. Appendix. In: Weidner N, Cote R, Suster S, Weiss LM editors. *Modern surgical pathology*. 2nd ed. Saunders Elsevier. 2009; 1:837-852.
2. Russel MG, Dorant E, Brummer RJM *et al.* Appendectomy and the risk of ulcerative colitis, *Gastroenterology*. 1997; 113(2):377-82.
3. Lally KP, Cox CS, Andrassy RJ. Appendix. In: Townsend CM, Beachamp RD, Evers BM, Mattox KL, editors. *Sabiston text book of surgery*. 16th ed. New Delhi: Harcourt (India) Pvt. Ltd. 2002, p. 917-28.
4. *Gastrointestinal tract*. In: Rosai J, editor. *Rosai and Ackerman's surgical pathology*. 9th ed. Philadelphia, PA: Elsevier Mosby. 2009, p. 757-761.
5. Jones AE, Phillips AW, Jarvis JR, Sargen K. The value of routine histopathological examination of appendectomy specimens. *BMC Surgery*. 2007; 7:17 doi: 10. 1186/1471-2482-7-17.
6. Williams GR. Presidential Address: A History of Appendicitis with Anecdotes Illustrating Its Importance: *Ann Surg*. 1983; 197(5):495-506.
7. Berger DH, Jaffe BM. The Appendix: In Brunnicardi F.C, Andersen D.K *et al.* eds, *Schwartz Principles of Surgery*, 8th ed Mc Graw Hill. 2005, 1119-1139.
8. Singh I, Pal GP. Alimentary system-II, In *Human Embryology*, 7th ed: Mac Millan. 2001, 172-173.
9. Day DW, Jass JR, Price AB *et al.* Appendix. In: *Morson's and Dawson's Gastrointestinal Pathology*, 4th ed, Blackwell Science. 2003, 407-432.
10. Fenoglio-Preiser CM, Noffsinger AE, Stemmermann GN, Lantz PE, Issacson PG. The neoplastic and non-neoplastic diseases of appendix. In: *Gastrointestinal pathology an atlas and text*. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins, a Wolters Kluwer business, 2008, p. 497-535.
11. Borley NR. Vermiform appendix. In: *Standaring S*, editor-

in-chief. Gray's anatomy. 39th ed. Edinburgh: Elsevier Churchill Livingstone, 2005, p. 1189-90.

12. Buschard K, Kjaeldgaard A. Investigation and Analysis of the Position, Fixation, Length and Embryology of the vermiform appendix: Acta Chir Scand. 1973; 139:293-298.
13. The large bowel, anal canal and ischiorectal fossa. In: Decker GAG, editor. Lee Mc Gregor's synopsis of surgical anatomy. 12th ed. Bombay: Varghese Publishing House. 1995, p. 41-2.