

# Histopathological Spectrum of Rare and Diverse Lesions of Vestigial Appendix: A Cross-sectional Study from a Tertiary Care Hospital in Marathwada Region of Maharashtra, India

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## ABSTRACT

**Introduction:** The appendix, though often associated with acute appendicitis, can present with a variety of pathologies, some of which have significant clinical implications. These include rare inflammatory, infectious, and neoplastic conditions that highlight the diagnostic and therapeutic importance of histopathological evaluation.

**Aim:** To study the spectrum of diverse appendiceal lesions, focusing on their histopathological characteristics and clinical relevance.

**Materials and Methods:** The present retrospective cross-sectional study analysed 32 appendectomy specimens with rare lesions (January 2022- May 2024) in the Department of Surgical Pathology of a Tertiary Care Hospital in the Marathwada Region of Maharashtra, India. Histopathological evaluation included Haematoxylin and Eosin (H&E) staining, special stains {e.g., Ziehl-Neelsen, Periodic Acid-Schiff (PAS) stain}, Tuberculosis-polymeraseChainReaction(TB-PCR), and Immunohistochemistry (IHC) for neoplastic cases. Demographics, clinical-radiological data, and histopathological parameters (H&E, special stains, IHC) and TB-PCR wherever needed were analysed. Results were presented as frequencies/percentages using Statistical Package for Social Sciences (SPSS) v24.0 software.

**Results:** Histopathological analysis identified 13 distinct pathologies among 32 cases: tuberculous appendicitis 5 (15.6%), Low-grade Appendiceal Mucinous Neoplasms

(LAMN) 8 (25%), appendiceal neuromas 8 (25%), Inflammatory Myofibroblastic Tumour (IMT) 1 (3.1%), and leukaemic infiltration 1 (3.1%). Other significant findings included deposits of mucinous adenocarcinoma 1 (3.1%), Neuroendocrine Tumour (NETs) 1 (3.1%), and appendiceal diverticulum 1 (3.1%). Infectious aetiologies included tapeworm 1 (3.1%) and parasitic infestations 2 (6.25%) and one case of amoebic appendicitis 1 (3.1%). Additionally, mesothelial inclusion cysts 1 (3.1%) and lymphangiectasia 1 (3.1%) were identified. The clinical relevance of each lesion was evaluated by reviewing patient records and operative notes wherever available, and interpreting the potential diagnostic and therapeutic implications of the histological findings.

**Conclusion:** Histopathological evaluation of appendectomy specimens is crucial for identifying diverse appendiceal lesions, many of which may mimic acute appendicitis clinically. Gross (especially the base of the appendix) and microscopy of every appendix needs to be studied meticulously, irrespective of the clinical diagnosis. Early identification and accurate diagnosis are essential for guiding patient management and improving outcomes. While tuberculous appendicitis and parasitic infections are more common in endemic regions, neoplastic lesions such as LAMN and NETs carry significant implications for prognosis and treatment. Rare entities like appendiceal neuromas and IMT further emphasise the diagnostic value of histopathological examination.

**Keywords:** Adenocarcinoma, Appendix, Inflammatory myofibroblastic tumour, Tuberculosis

## INTRODUCTION

The vermiform appendix, a vestigial organ, is often overlooked until it becomes inflamed. Appendix is now recognised as a site of diverse pathological processes that may significantly impact clinical outcomes [1]. While acute appendicitis is a common surgical emergency, the attempt to uncover a spectrum of incidental lesions ranging from infectious and inflammatory conditions to neoplastic and secondary infiltrative processes should be made [2]. While acute appendicitis remains the most common surgical emergency, lifetime incidence being 7-8%, rare appendiceal lesions occur in 0.5-2% of appendectomy specimens [3,4]. These findings, though rare, emphasise the importance of routine histological evaluation of appendectomy specimens to ensure accurate diagnosis and optimal patient management. Conditions such as tuberculous appendicitis and parasitic infestations, including *Enterobius vermicularis* and tapeworms, are of particular concern in endemic regions, often mimicking acute appendicitis clinically [5]. Benign yet uncommon findings such as appendiceal neuromas and diverticula, mesothelial inclusion cysts, and lymphangiectasia highlight the histopathological

diversity of appendiceal lesions. In contrast, neoplastic lesions like LAMN, mucinous adenocarcinoma, and neuroendocrine carcinoma pose significant diagnostic and therapeutic challenges due to their potential for malignancy and recurrence [6,7]. Despite the clinical and pathological significance of rare lesions such as IMT, leukaemic infiltrates, and appendiceal diverticula, these rare appendiceal lesions are often underreported, leading to a lack of awareness about their prevalence and histopathological features & clinical implications [8]. Despite their rarity, these lesions carry substantial diagnostic and therapeutic implications. Underreporting persists due to inadequate histopathological sampling and regional variations in prevalence [9]. This gap is critical in tertiary centres where complex cases aggregate. The rationale for this study stems from the need to understand and document the histopathological spectrum of rare and diverse lesions of the appendix, which may carry significant diagnostic, prognostic, and therapeutic implications. This study seeks to enhance understanding and encourage meticulous evaluation of all appendectomy specimens. Thus, the aim of the study was, to study the spectrum of diverse and rare appendiceal

lesions, focusing on their histopathological characteristics and clinical relevance found in appendectomy specimens at a tertiary care centre. Objectives of the study were as follows:

- To identify and classify rare and incidental lesions of the appendix in appendectomy specimens;
- To relate the histopathological findings with available clinical data;
- To highlight the diagnostic and therapeutic implications of these lesions to assess their clinical relevance.

## MATERIALS AND METHODS

The present retrospective cross-sectional study was conducted in the Department of Surgical Pathology in a Tertiary Care Hospital in Maharashtra, India from January 2022 to May 2024, based on the availability of complete histopathological data at the time of manuscript preparation. (IEC no: Pharma//EC-GMCA/ 183 /2024).

All appendectomy specimens meeting the inclusion criteria and showing rare or diverse appendiceal lesions received between January 2022 and May 2024 were included in the study. This approach was based on convenience sampling, as the study was retrospective and descriptive. A total of 32 such cases were identified and analysed, and submitted for histopathological examination. These specimens were received from patients presenting with various clinical indications, primarily acute appendicitis, as well as incidental findings during surgeries for other abdominal conditions.

### Inclusion criteria:

- All appendectomy specimens with features of mucinous neoplasm, granulomatous lesions, benign tumours, and malignant tumours; received during the study period;
- Specimens with complete clinical, radiological, and histopathological data.

### Exclusion criteria:

- Acute appendicitis with or without perforation;
- Inadequately preserved specimens;
- Specimens without sufficient clinical data.

## Study Procedure

**Histopathological examination:** All specimens were fixed in 10% neutral buffered formalin and processed according to standard histopathological techniques. All the specimens were sectioned at the tip, body and base of the appendix and additional sections wherever necessary. Sections were stained with H&E. Special stains, including Ziehl-Neelsen for tuberculosis and PAS for parasitic infestations, were employed where necessary. IHC was performed for cases suspected of neoplastic lesions to confirm the diagnosis (e.g., CK7, CK20, and CDX2 for mucinous neoplasms; synaptophysin and chromogranin for NETs). Slides were viewed and examined under an Olympus CX 21i microscope.

### Data collection and analysis:

- Clinical and demographic details (age, gender, clinical presentation, and indication for surgery) were retrieved from hospital records.
- Histopathological diagnoses were recorded, and lesions were classified into inflammatory, infectious, benign and malignant categories.
- The clinical relevance of each lesion was evaluated by reviewing patient records and operative notes wherever available, and interpreting the potential diagnostic and therapeutic implications of the histological findings.

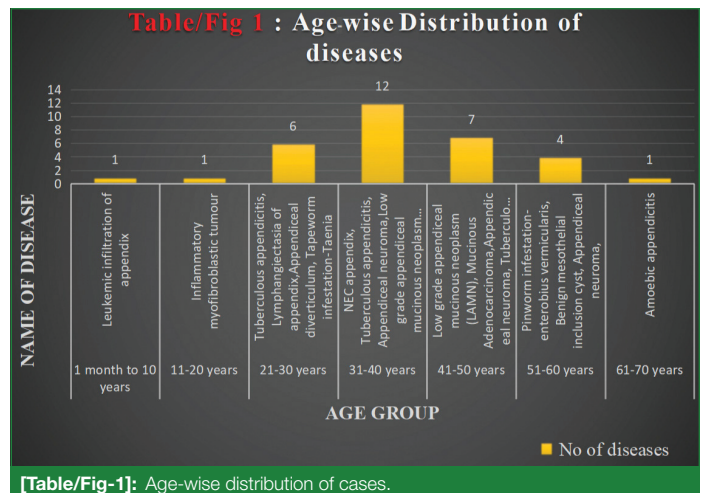
## STATISTICAL ANALYSIS

Data were entered in Microsoft Excel 2024 (Microsoft Corporation, NY, USA) and analysed using Statistical Package for Social Sciences (SPSS) version 24.0 (IBM Corp., Armonk, NY, USA). Descriptive statistical methods, including frequencies, percentages, and proportions, were

applied to summarise categorical variables such as types of lesions, age groups, and gender distribution. Also, a small sample size of rare lesions (n=32), no inferential or comparative statistical tests were applied, as the study was observational and descriptive.

## RESULTS

A total of 32 cases of appendiceal lesions were analysed, demonstrating a wide spectrum of neoplastic, inflammatory, infectious, and incidental pathologies. The age-wise distribution of these lesions is depicted in [Table/Fig-1], showing that the highest number of cases (n=12) occurred in the 31-40 year age group, followed by 41-50 years (n=7). In contrast, the fewest cases (n=1) were noted in the age groups of one month to 10 years (Leukaemic infiltration of appendix), 11-20 years (Inflammatory myofibroblastic tumour), and 61-70 years (Amoebic appendicitis). Of the 32 patients, 78% were male and 22% were female, showing a clear male predominance in the occurrence of rare appendiceal lesions.



[Table/Fig-1]: Age-wise distribution of cases.

**Neoplastic lesions:** Low-grade mucinous neoplasm cases 8 (25%) were diagnosed incidentally in most of the cases ([Table/Fig-2], case 1). These cases mostly presented with abdominal pain as the first symptom. These findings on abdominal ultrasound were reported as acute appendicitis. However, out of eight cases, one case was reported as mucocoele of the appendix on ultrasound and another one was suspected as mucinous neoplasm. After histopathology [Table/Fig-3-5] all met the criteria to be diagnosed as LAMN. Another case ([Table/Fig-2], case 2) was an operated case of the appendix, which was diagnosed as LAMN two years back. This patient presented with small bowel obstruction and was operated on for a suspected case of ileocaecal adenocarcinoma. The investigators received a loop of the ileocaecum, which showed shiny and congested mucosa with few flattened mucosal folds. Serosa was thickened focally with gelatinous nodules. However, the previous histopathology report of the appendix mentioned that the status of the base of the appendix was not known. Thus, raising the possibility of the spread of mucinous adenocarcinoma from the appendix to the ileocaecal serosal surface. Metastatic deposits of adenocarcinoma in mesenteric lymph nodes were also seen [Table/Fig-6,7]. On further evaluation, radiological investigations studies showed the presence of mucin pockets along the peritoneum, thus confirming the presence of Disseminated Peritoneal Adenomucinosis (DPAM). It turned out as mucinous adenocarcinoma of the ileocaecum 1 (3.1%) diagnosed in a patient with a prior history of LAMN of the appendix. IHC on the tumour was positive for CK20 and CDX2.

**Neuroendocrine Tumour (NETs) 1 (3.1%):** A 38-year-old female ([Table/Fig-2], case 3) presented with acute abdominal pain, which was operated on for acute appendicitis. Histological examination showed a tumour at the tip and body of the appendix, infiltrating the wall of the appendix as well as the mesoappendix [Table/Fig-8]. IHC confirmed positivity for chromogranin and synaptophysin.

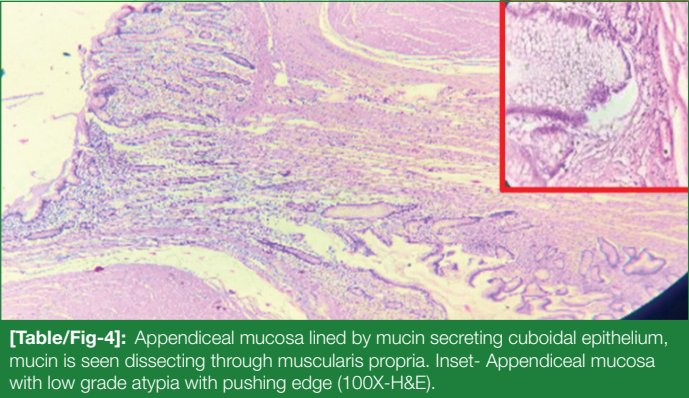


S. no.	Lesion type	No. of cases	Key Pathological Features
1	Low-grade Appendiceal Mucinous Neoplasm (LAMN)	8	<b>Gross:</b> Dilated and turgid appendix. Cut section showed lumen filled with gelatinous material. <b>Microscopy:</b> Apical mucin-filled epithelium, elongated nuclei with low grade dysplastic changes, Atrophic Lymphoid tissue, acellular mucin extending upto mesoappendix but not serosal surface (one case).
2	Mucinous Adenocarcinoma of ileocaecum in a diagnosed case of LAMN appendix 2 years back.	1	<b>Gross of loop of intestine (Ileocecum):</b> Congested and shiny serosa, Cut surface showed flattening of mucosa at places, no evidence of grey-white, glistening tumour. <b>Microscopy:</b> Tumour cells arranged in glandular pattern, fragmented glands, singly scattered along the serosal surface. Metastatic deposits of adenocarcinoma in mesenteric lymph nodes. <b>IHC:</b> CK20 & CDX2 positive.
3	Neuroendocrine Tumour (NETs)	1	Monomorphic cells with finely stippled Chromatin in nests & acini infiltrating mesoappendix. <b>IHC:</b> Chromogranin & synaptophysin positive.
4	Inflammatory Myofibroblastic Tumour	1	<b>Gross:</b> 6.5 cm mass arising from mid 1/3rd of appendix. <b>The cut-section:</b> grey white with necrotic areas. <b>Microscopy:</b> Spindle shaped myofibroblasts, plasma cell predominant inflammatory infiltrate along with lymphocytes & neutrophils. <b>IHC:</b> Vimentin & SMA in spindle cells +ve.
5	Leukaemic infiltration of appendix	1	Transmural infiltrate of immature myeloid cells. Flow cytometry on bone marrow showed Acute Myeloid Leukaemia (AML).
6	Appendiceal neuroma	8	Fibrous tissue proliferation obliterating appendix lumen replacing mucosa and submucosa & proliferating nerve fibers. Few cases showed replacement by fat.
7	Lymphangiectasia of appendix	1	Variably dilated mucosal & submucosal vascular channels (lymphatics) filled with plasma and surrounded by few plasma cells.
8	Benign mesothelial inclusion cyst	1	Small variably sized cysts along the serosa lined by single layer of flat to cuboidal epithelium with focal hobnail change.
9	Appendiceal diverticula	1	<b>Gross:</b> Small & multiple outpouchings noted at distal end (0.2-0.4 cm in diameter) filled with gelatinous material. <b>Microscopy:</b> Lumen lined by mucosa & submucosa was connected to diverticula with intact mucosa & submucosa with inspissated mucin.
10	Tuberculous appendicitis	5	Granulomas, chronic inflammation CB NAAT positive cases (02) and Defaulter (03).
11	Amoebic appendicitis	1	Ulcerated mucosa with lumen filled with granular necrotic debris and trophozoites of <i>Entamoeba histolytica</i> were seen. Trophozoites were PAS positive.
12	Pinworm infestation-enterobius vermicularis	1	Lumen of appendix showed Enterobius Vermicularis- incidental finding.
13	Tapeworm infestation-taenia	2	Ulcerated mucosa. lumen, mucosa, submucosa, muscularis propria & serosa showed numerous eggs of <i>taenia</i> and mixed inflammatory infiltrate.

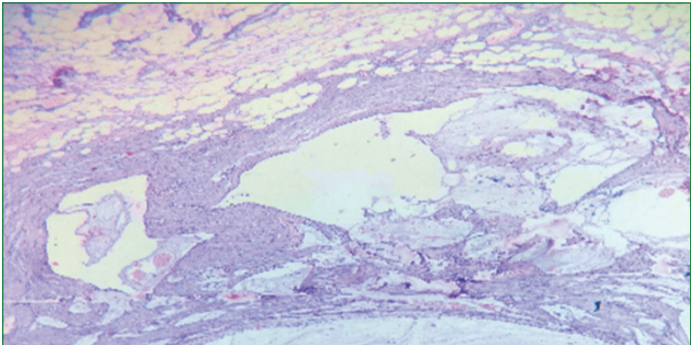
[Table/Fig-2]: Key pathological features of lesions.



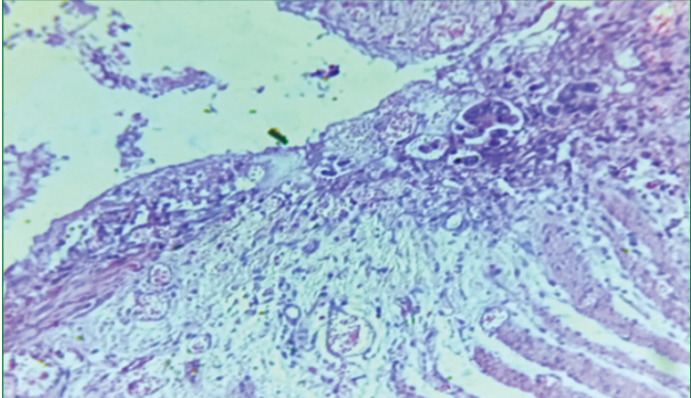
[Table/Fig-3]: Gross- dilated and congested appendix. Inset- Cut section shows lumen filled with gelatinous material.



[Table/Fig-4]: Appendiceal mucosa lined by mucin secreting cuboidal epithelium, mucin is seen dissecting through muscularis propria. Inset- Appendiceal mucosa with low grade atypia with pushing edge (100X-H&E).



[Table/Fig-5]: Mucin pools are seen in all layers along with acellular mucin in mesoappendix (100X-H&E).

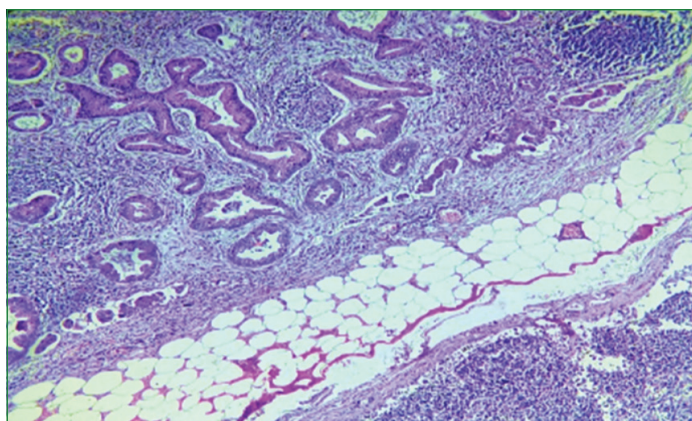


[Table/Fig-6]: Tumour cells arranged in glandular pattern, fragmented glands, singly scattered, along the serosal surface (200X-H&E).

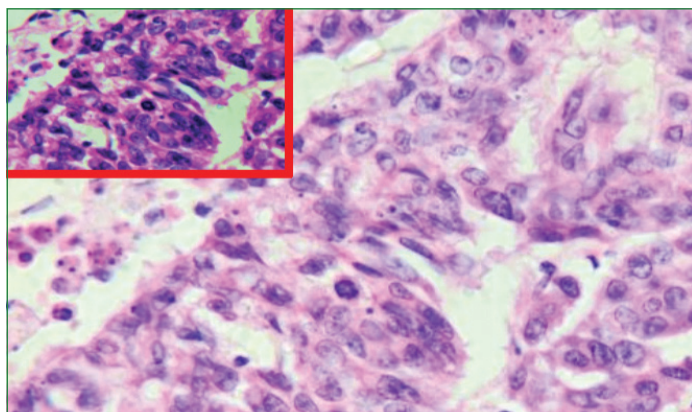
**Inflammatory Myofibroblastic Tumour (IMT) (n=1, 3.1%):** Another case ([Table/Fig-2], case 4) of a young 13-year-old male presenting with abdominal pain and lump, which was clinically thought to be an organised haematoma, turned out to be an IMT. A 6.5 cm mass arising from the mid-third of the appendix was identified. The cut

surface was grey-white with necrotic areas. Microscopically, the tumour was composed of spindle-shaped myofibroblasts with a plasma cell-rich inflammatory infiltrate. Atypical mitoses were absent. IHC was positive for vimentin and SMA [Table/Fig-9].

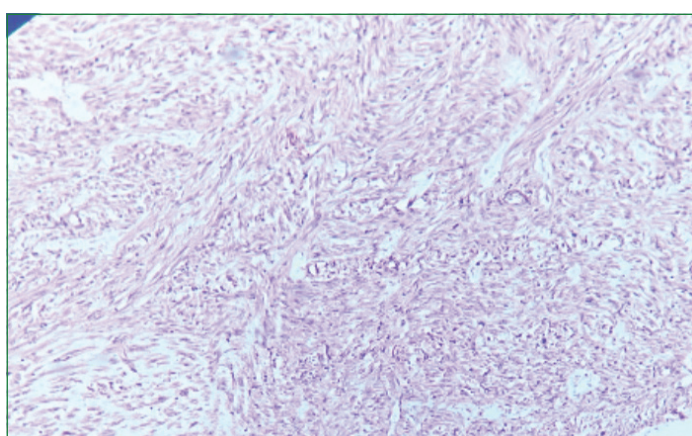




[Table/Fig-7]: Metastatic deposits of adenocarcinoma in mesenteric lymph nodes (200X-H&E).



[Table/Fig-8]: Monomorphic cells with finely stippled Chromatin with infiltration in mesoappendix (200X H&E).



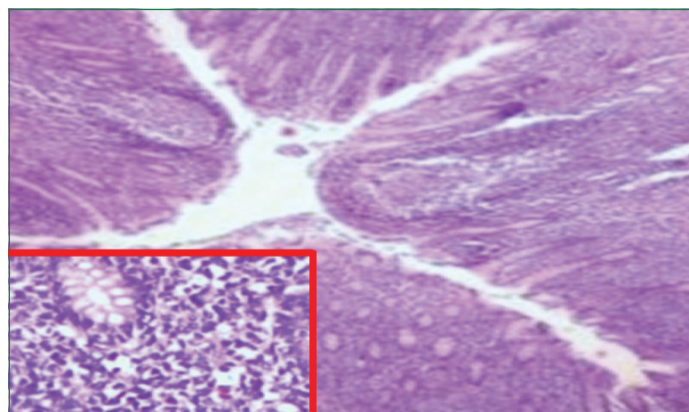
[Table/Fig-9]: Spindle shaped myofibroblasts, plasma cell predominant inflammatory infiltrate along with lymphocytes & neutrophils (40X H&E).

#### Leukaemic infiltration ([Table/Fig-2], case 5) (n=1, 3.1%):

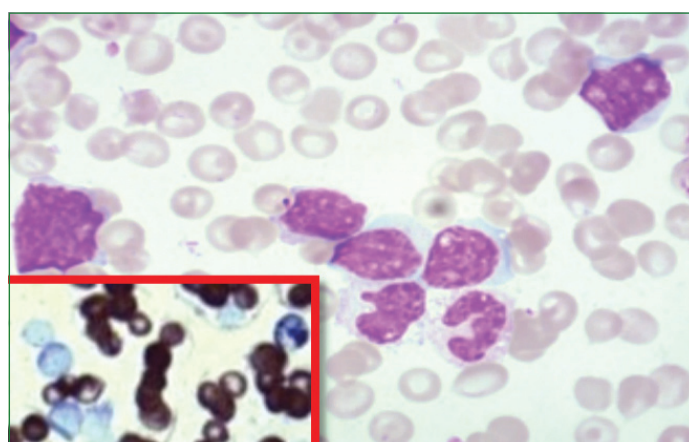
Four-month-old female child presented with vomiting, loose stools, and poor general condition. Hence, exploratory laparotomy with prophylactic appendectomy was done. Histology demonstrated a transmural infiltrate of immature myeloid cells in the appendix. Flow cytometry on bone marrow confirmed a diagnosis of Acute Myeloid Leukaemia (AML). The mucosa, submucosa, muscularis propria and mesoappendix showed monomorphic, round to oval cells with hyperchromatic nuclei and focal inconspicuous nucleoli that were arranged in a diffuse pattern [Table/Fig-10]. Further work-up showed peripheral blood smear showing leucocytosis ( $58000/\text{mm}^3$ ) and 60% blasts, which were Myeloperoxidase (MPO) negative [Table/Fig-11]. Flow cytometry subtyped it based on these markers: CD 13, CD 33, CD 117, CD 34, CD 7 (Positive markers) as AML. Other negative markers were CD 10, CD 19, CD 20, CD 3, and CD 79 $\alpha$ .

**Non-neoplastic lesions:** Appendiceal neuroma ([Table/Fig-2], case 6) 8 (25%): Most cases were incidentally detected in an age group

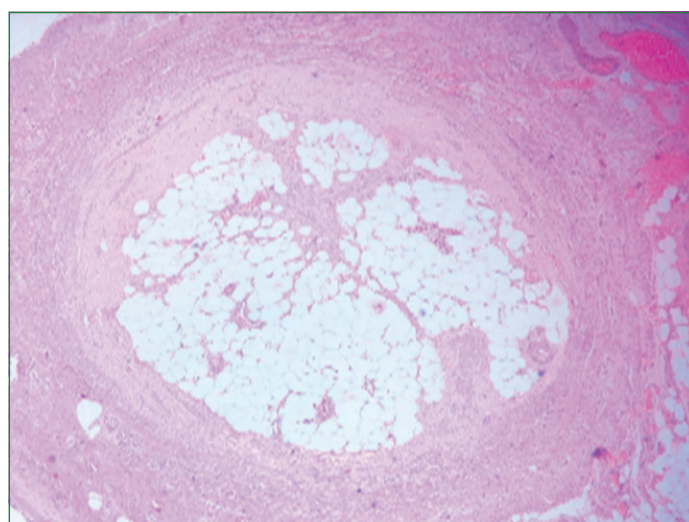
of 41 to 60 years with male preponderance. Grossly, the appendix was thin like a fibrous cord without a lumen. Out of eight cases, two cases showed luminal fat along with increased nerve bundles on microscopy [Table/Fig-12].



[Table/Fig-10]: Shows layers of appendix infiltrated by large cells. Inset-400x-Mucosa infiltrated by medium to large monomorphic cells with scant to no cytoplasm & hyperchromatic nuclei (40X H&E).



[Table/Fig-11]: Peripheral smear showing blasts, Inset: MPO negative blasts (1000X Leishman Stain).



[Table/Fig-12]: Fibrous tissue proliferation obliterating appendix lumen & replacement by fat, (40X H&E).

**Lymphangiectasia ([Table/Fig-2], case 7) 1 (3.1%):** 25-year-old male with abdominal pain was operated. Grossly, the appendix was congested; however body of the appendix showed few serosal pockets which, on cutting open, oozed thin yellow-white fluid. Microscopy revealed variably dilated mucosal and submucosal lymphatic channels filled with plasma, surrounded by scattered plasma cells. The case was evaluated for any other similar abnormalities, especially from childhood, but no complaints were reported. This patient was lost to follow-up.



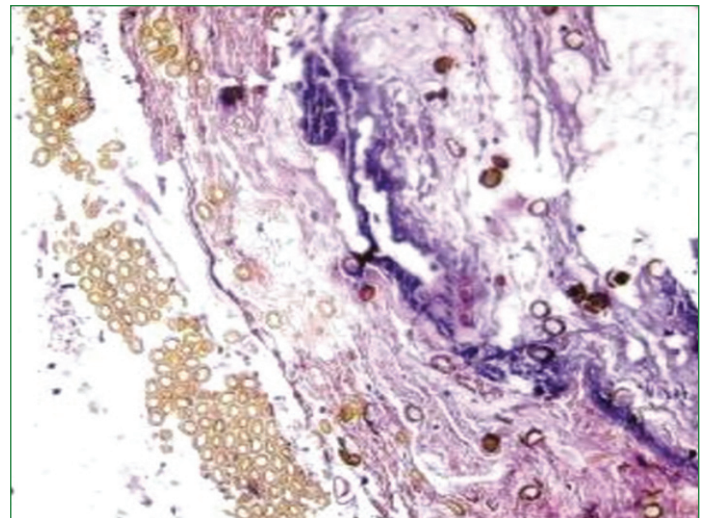
Benign mesothelial inclusion cyst with recurrent appendicitis ([Table/Fig-2], case 8) 1 (3.1%) was an incidental finding in a 55-year-old male.

Appendix Diverticula ([Table/Fig-2], case 9) 1 (3.1%) was identified on gross as a small outpouching with a blind end and lumen continuous with the lumen of the appendix, with narrowing at the mouth, and was filled with gelatinous material. Microscopically, the diverticula were lined by intact mucosa and submucosa with inspissated mucin. It was studied for the presence of LAMN; however, it didn't meet the diagnostic criteria. It was reported as type 4 appendix diverticula.

**Infectious and inflammatory lesions:** Tuberculous appendicitis ([Table/Fig-2], case 10) 5 (15.6%): All cases were from the age group of 21 to 40 years. Microscopy showed granulomas with chronic inflammation. Two cases were CB-NAAT (TB PCR) positive, while three were defaulters in treatment.

Amoebic appendicitis ([Table/Fig-2], case 11) 1 (3.1%): 65-year-old male came with complaints of pain in the abdomen. Clinically, was diagnosed as acute appendicitis with perforation. On gross, the appendix was turgid, congested and lumen showed dirty necrotic material. Microscopy demonstrated ulcerated mucosa with necrotic debris containing trophozoites of *Entamoeba histolytica*, which were PAS-positive. Further patient was evaluated and had similar lesions in the ileocaecal region.

**Parasitic Infestations:** *Enterobius vermicularis* ([Table/Fig-2], case 12) 1 (3.1%) was found incidentally within the appendiceal lumen [Table/Fig-13]. *Taenia* infestation ([Table/Fig-2], case 13) (n=2, 6.2%) showed ulcerated mucosa with numerous *Taenia* eggs infiltrating the mucosa, submucosa, muscularis propria, and serosa, accompanied by a mixed inflammatory infiltrate [Table/Fig-14]. The two cases had different clinical presentations and gross findings. The first case was 44-year-old male who presented with vomiting and pain in the abdomen for three days. Grossly, the 7 cm long appendix was swollen, congested with an intact tip, and with a blocked lumen. The second case was of a 30-year-old female presenting with severe colicky, continuous pain in peri-umbilical region that shifted to the right iliac fossa for two days. She also had a high-grade fever for four days. Grossly, a 9.5 cm long appendix with mesoappendix was congested and gangrenous externally. Lumen was blocked, and the tip was intact. It was difficult to determine the species as *Taenia saginata* or *Taenia solium*. The second case, in addition, showed eosinophils in all layers of the appendix. This study underscores the heterogeneous pathological spectrum of appendiceal lesions, reinforcing the importance of detailed histopathological evaluation for accurate diagnosis and appropriate clinical management.

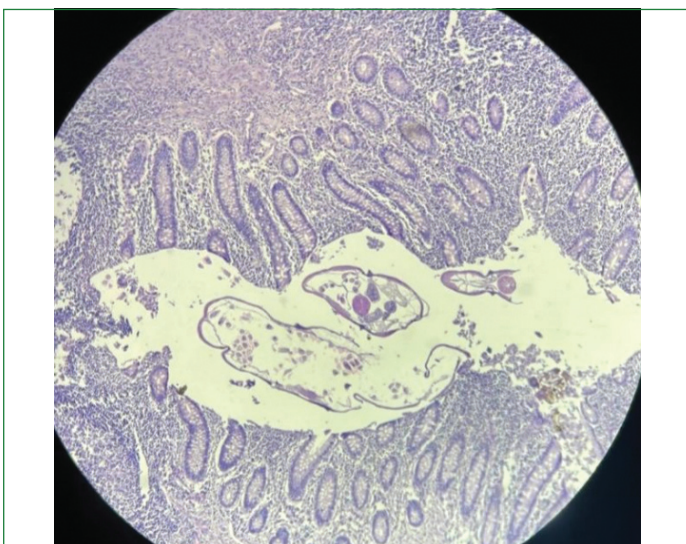


[Table/Fig-14]: Sloughed off mucosa & submucosa, muscle coat & serosa showed taenia eggs with mononuclear inflammatory infiltrate (40X& H&E).

## DISCUSSION

Appendiceal lesions exhibit a diverse pathological spectrum, encompassing neoplastic, inflammatory, infectious, and incidental findings. In the present study, a total of 32 cases of appendiceal lesions were analysed, revealing various distinct histopathological entities [Table/Fig-2]. Systematic histopathological evaluation of all appendectomy specimens plays a crucial role in patient management. While many cases are diagnosed as acute appendicitis intraoperatively, microscopic examination may reveal unexpected and clinically significant lesions such as NETs, LAMNs, granulomatous inflammation suggestive of tuberculosis, or parasitic infestations. These findings are often incidental and not evident on imaging or gross examination, yet they necessitate changes in post-operative management, including further oncologic evaluation, infectious disease treatment, or extended follow-up.

**Neoplastic lesions:** The spectrum of lesions observed in the present study aligns with the literature, emphasising the rarity and diversity of appendiceal pathologies. However, neoplastic lesions, particularly LAMN and NETs, are increasingly recognised due to improved histopathological and immunohistochemical techniques and stringent classification systems, such as the World Health Organisation (WHO), as per Pai RK et al., [10,11]. LAMNs accounted for 25% of cases (n=8). Most of these cases were diagnosed incidentally, with the primary presenting symptom being abdominal pain. Similar to the present study findings, previous studies by Pai RK et al., and Misdraji J et al., have reported that LAMNs are frequently misdiagnosed as acute appendicitis on ultrasound, with final confirmation requiring histopathological evaluation [12]. A crucial observation in the present study was the progression of LAMN to mucinous adenocarcinoma of the ileocecum (n=1), which is consistent with reports in the literature indicating that incompletely resected LAMNs may lead to DPAM, highlighting the malignant potential of these lesions [13]. This progression aligns with reports by Shaib WL et al., who emphasised the importance of complete resection and long-term surveillance to detect recurrence or metastasis [14]. The absence of base evaluation in the original LAMN resection, a known risk factor for recurrence, likely contributed to this outcome. NETs of the appendix 1 (3.1%) have been well-documented in the literature, with a reported prevalence of 0.3-2% in appendectomy specimens [15]. The tumour in the present study involved the mesoappendix, highlighting the necessity of complete histopathological examination to determine the extent of invasion and prognosis. The tumour was positive for chromogranin and synaptophysin on IHC, which aligns with standard diagnostic criteria [16,17]. IMTs of the appendix are rare, with only a few documented cases in the literature. The case in present study involved a young male with a 6.5 cm tumour, exhibiting spindle cell



[Table/Fig-13]: Appendix lumen showing pinworm *Enterobius vermicularis* (400X& H&E).

proliferation with inflammatory infiltrates, and positive IHC staining for vimentin and SMA. The IMT, though rare, shares feature with cases described by Coffin CM et al., [18]. A review by Montgomery E et al., emphasises that IMTs, though rare, should be considered in the differential diagnosis of appendiceal masses, particularly in paediatric patients [19]. Leukaemic infiltration of the appendix (n=1) is an uncommon finding and was observed in a four-month-old child in our study. Flow cytometry confirmed AML. Similar reports by Noronha et al., suggest that leukaemic involvement of the appendix is rare and typically presents with non-specific gastrointestinal symptoms [20].

**Non-neoplastic lesions:** Appendiceal neuromas 8 (25%) were incidentally detected, showing a male predominance. The present study findings correlate with those of Al-Janabi MH et al., who noted that appendiceal neuromas often present as fibrotic obliteration of the lumen with proliferating nerve fibers [21]. Lymphangiectasia (n=1) of the appendix was a rare finding in the present study. The literature on appendiceal lymphangiectasia remains sparse; however, studies by Meng MM et al., suggest that localised lymphangiectasia can occur as an incidental finding and may be associated with chronic inflammatory conditions [22]. Benign mesothelial inclusion cysts (n=1) and appendiceal diverticula (n=1) were both incidental findings. Appendiceal diverticula, though rare, have been reported in association with increased risk for LAMN. However, the diverticulum in the present study did not meet the criteria for LAMN [11].

**Infectious and Inflammatory lesions:** Tuberculous appendicitis 5 (15.6%) was observed in young adults, with two cases confirmed by CB-NAAT. Tuberculous appendicitis remains an underdiagnosed entity, often presenting with chronic inflammation and granulomas, as described in studies by Padda RS et al., [23-25]. Parasitic infestations, including *Enterobius vermicularis* (n=1) and *Taenia species* (n=2), were identified. The latter showed extensive infiltration of all layers of the appendix, a finding consistent with reports by Vasiliades M et al., who described similar cases of appendiceal taeniasis presenting with severe colicky pain [26]. Amoebic appendicitis (n=1) demonstrated PAS-positive *Entamoeba histolytica* trophozoites, reinforcing the need for histopathological evaluation in cases suspected of appendicitis with perforation. Amoebic appendicitis is rarely reported but can mimic acute bacterial appendicitis, as noted by Haque R et al., [27]. Furthermore, clinicopathological correlation was assessed descriptively by comparing presenting clinical features, imaging, and intraoperative findings with histopathological diagnosis for each case. Furthermore, evaluating the clinical relevance of each lesion was an objective of this study. It was carried out by reviewing patient records and operative notes wherever available, and interpreting the potential diagnostic and therapeutic implications of the histological findings. Correlation of histopathological findings with clinical presentation, radiological impressions, and intraoperative notes highlighted key diagnostic challenges. For instance, neoplastic lesions like LAMNs and NETs often mimicked acute appendicitis and were diagnosed only after histopathology, significantly altering postoperative surveillance and treatment. Infectious lesions such as tuberculosis and parasitic infestations also presented as acute abdomen but required targeted antimicrobial or antiparasitic therapy. This underlines the importance of histopathological examination not only for diagnosis but also for guiding appropriate clinical decision-making and therapeutic interventions.

Therefore, routine and thorough histopathological assessment is essential not only for accurate diagnosis but also for guiding appropriate clinical decision-making and modifying treatment protocols where needed.

## Limitation(s)

Limitations of the present study include its retrospective and single-institutional design, which may limit the generalisability of the findings. The relatively small sample size (n=32) reflects the rarity

of these lesions but restricts the ability to draw statistical inferences or establish incidence rates. Additionally, follow-up data were not available for all cases, especially those diagnosed incidentally or referred from other departments, making it difficult to assess long-term clinical outcomes. The possibility of selection bias also exists, as only specimens with sufficient clinical and histological data were included. Interobserver variability in histopathological diagnosis was not evaluated, which could influence the consistency of rare lesion identification.

## CONCLUSION(S)

The current study highlights the rare yet clinically significant spectrum of appendiceal lesions beyond acute appendicitis. Histopathological examination remains the gold standard for diagnosis, often uncovering unexpected infectious, inflammatory, and neoplastic conditions. Timely identification of entities like LAMN, NETs, and tuberculosis can critically alter patient management and prognosis. Even incidental findings like neuromas and diverticula carry diagnostic importance. Grossing must include the base, tip, and body to ensure comprehensive evaluation. Routine and meticulous histopathological analysis of all appendectomy specimens is essential for accurate diagnosis and optimal patient outcomes.

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