



INCIDENCE OF HISTOPATHOLOGICAL FINDINGS IN APPENDECTOMY SPECIMENS IN A TERTIARY CARE HOSPITAL IN TWO-YEAR TIME

Mumtaz Ahmad Khan^{1*}, Muhammad Shabbir², Malik Mahmood Ahmed³, Qudsia Umaira Khan⁴, Maryam Batool⁵, Soffia Khursheed⁶, Adnan Khan⁷

Abstract:

Introduction: Acute appendicitis has traditionally been treated with appendectomy to avoid complications, such as perforation and peritonitis. Non-operative antibiotic management, on the other hand, is gaining popularity as a treatment option for simple conditions. Although surgical appendectomy remains the gold standard, understanding the histopathological findings in appendectomy specimens is critical for making informed treatment decisions. This study aimed to examine the occurrence of various histological abnormalities in appendectomy specimens from a tertiary care hospital in Pakistan over a two-year period.

Methodology: A retrospective analysis was conducted on appendectomy specimens collected from January 2022 to December 2023 at a Tertiary Care Hospital in Pakistan. Clinical records, laboratory findings, and surgical details were reviewed. Trained pathologists examined the specimens and categorized the histopathological findings, including acute appendicitis, chronic appendicitis, perforated appendicitis, neoplastic lesions, and other pathologies.

Results: Among 1,568 patients with appendicitis, acute appendicitis was the most common finding, accounting for 48.6% of the cases, with no significant gender-based variation. Chronic appendicitis was identified in 13% of the cases, while perforated appendicitis was observed in 34.7% of the cases, more commonly in males (62%). Neoplastic lesions were found in 2.29% of specimens, including carcinoid tumors and adenocarcinomas. Other pathologies, such as parasitic infections and endometriosis, were identified in 1.4% of cases. Perforated appendicitis was associated with a longer hospital stay (mean LOS of 7.5 days) than non-perforated appendicitis (mean LOS of 4 days).

Conclusion: This study highlights the varied histopathological findings in appendectomy specimens, including acute, chronic, and perforated appendicitis; neoplastic lesions; and other pathologies. Understanding these findings can aid treatment decisions and contribute to better patient care. Further research is warranted to explore the clinical implications of these histopathological variations in appendicitis.

Keywords: Histopathology; Appendectomy; Acute appendicitis; Chronic appendicitis; Perforated appendicitis

¹*Head of Department, Pathology, Abbas Institute of Medical Sciences, Muzaffarabad, AJK, Pakistan, mumtazahmad8166@gmail.com

²Pathologist, Abbas Institute of Medical Sciences (AIMS), Muzaffarabad, AJK, Pakistan, drshabbir@kemu.edu.pk

³Professor of Pathology, AJK Medical College, Muzaffarabad, AJK, Pakistan, ahmedfm59@hotmail.com

⁴MBBS, MPhil, CMH, Lahore Medical College, Lahore, Pakistan, drqudsia@yahoo.com

⁵Postgraduate Registrar, Microbiology, Abbas Institute of Medical Sciences (AIMS), Muzaffarabad, AJK, Pakistan, maryambatool573@gmail.com

⁶Assistant Professor Histopathology, Pakistan Institute of Medical Science, Islamabad, Pakistan, sofiakhursheed@proton.me

⁷Postgraduate Student, General Surgery (GI), Yangtze University, China, khanadnan.0922@gmail.com

***Corresponding author:** Professor Dr Mumtaz Ahmad Khan

*Head of Department, Pathology Abbas Institute of Medical Sciences, Muzaffarabad, AJK, Pakistan

Email: mumtazahmad8166@gmail.com

DOI: 10.53555/ecb/2024.13.01.34

Introduction

Historically, the primary treatment for acute appendicitis has been surgical appendectomy, which aims to stop perforation, peritonitis, abscess formation, and recurrence. A non-operative management (NOM) using antibiotic alone has been shown to be a feasible treatment for uncomplicated appendicitis due to a better understanding of the disease process. Because appendectomy is more effective than nonoperative management (NOM), it remains the gold standard of care for treating uncomplicated appendicitis. The current findings in the literature primarily compare NOM with open appendectomy. Despite the extensive use of laparoscopic procedures, high calibre data are still required to compare primary laparoscopic appendectomy with nonoperative management. Research assessing variables that can impact the success rate of NOM is required for clinical reference and customization of care for each patient. Up to that point, patients should be fully aware of the advantages and disadvantages of each potential treatment option to make an educated choice and receive the best possible care (1).

A retrospective population-based cohort research investigated the epidemiology of acute appendicitis in Ontario between 1991–1998. Canadian Institute for Health Information coded hospital discharge abstracts to learn about demographics such as the distribution of age and gender, the length of hospital stays (LOS), incidence rates, and seasonal trends of acute appendicitis. According to the analysis, perforation is rising while acute appendicitis is declining. These patterns might point to shifting demographics in Ontario and increased accessibility to the healthcare system (2).

Frequency and important variables linked to complex appendicitis (CA) in patients admitted with acute appendicitis in this cross-sectional study carried out at Adama Hospital Medical College. The study period from January 1, 2018, to December 31, 2019, involved the selection of 431 individuals out of 1043 total. Notably, 157 patients (36.4%) were diagnosed with CA. Several patient characteristics were found to be significantly associated with CA. In addition, there was a significant correlation between CA, appendiceal abscess, and appendiceal bulk. These results emphasize the strikingly high frequency of CA in this community, as well as the clinical traits that can be used to identify patients who may be at risk for developing the illness (3). Acute or chronic

appendicitis can be diagnosed based on histopathological findings.

The purpose of this study was to analyze and report the incidence of various histopathological abnormalities in appendectomy specimens over the course of one year at a tertiary care hospital in Pakistan. This investigation was conducted using a cross-sectional design.

Methodology

We conducted a retrospective analysis of all appendectomy specimens submitted to the pathology department of a Tertiary Care Hospital in Pakistan from January 2022 to December 2023. This study included both adult and pediatric patients who underwent appendectomy during this period. The general characteristics of the patients and their clinical records were also recorded. Laboratory findings were recorded, and details of the surgical procedures were noted.

Histopathological Examination: Trained pathologists examined the appendectomy specimens under a microscope. They recorded and categorized the findings, including but not limited to:

- Acute Appendicitis
- Chronic Appendicitis
- Perforated Appendicitis
- Neoplastic Lesions
- Other Pathologies

We analyzed the collected data to determine the overall incidence of each histopathological finding, their distribution across different age groups and sexes, and any noteworthy trends or correlations.

Results

A total of 1568 patients with appendicitis were attended at our clinic over a period of two years. The findings revealed the following key observations.

Acute appendicitis was the most common histopathological finding, accounting for approximately 48.6% of all the cases. No significant sex-based variation was observed in the incidence of acute appendicitis.

Table 1: Incidence of Histopathological Findings in Appendectomy Specimens

Histopathological Finding	Incidence (%)
Acute Appendicitis	[762] 48.6%
Chronic Appendicitis	[204] 13%
Perforated Appendicitis	[544] 34.7%
Neoplastic Lesions	[36] 2.29%
Other Pathologies	[22] 1.4%

Table 2: Incidence of Perforated Appendicitis by Gender

Gender	Incidence (%)
Male	[377] 62%
Female	[207] 38%

Chronic appendicitis was identified in 13% of cases, indicating that a significant proportion of patients had longstanding inflammatory changes. A total of 34.7% of patients presented with perforated appendicitis, which is often associated with complications such as abscess formation. This condition was more prevalent in males (62%) than in females (38%). Rare neoplastic lesions, such as carcinoid tumors or adenocarcinomas of the appendix, were identified in 2.3% of cases. A small number of specimens (1.4 %) exhibited other histopathological findings, including parasitic infections and endometriosis.

The mean length of stay (LOS) for patients with perforation was 7.5 days (SD 4.0) compared to 4 days (SD 1.5) for patients without perforation ($p < 0.001$). The highest incidence of appendicitis occurred in those aged 10-19 years. The rates were also higher in the summer. The complaint at presentation was the presence of generalized abdominal tenderness, diagnosis of peritonitis, identification of an abdominal mass, presence of shock, white blood cell (WBC) count exceeding 10,560, onset-to-visit interval of 5–12 days, and absence of findings such as acute appendicitis on ultrasound reports.

Discussion

Acute appendicitis accounts for 96.5%–100 cases per 100,000 people worldwide, making it the most prevalent abdominal surgical emergency. Anorexia, nausea, sporadic vomiting, right lower quadrant pain migration, low-grade fever, and unexplained periumbilical discomfort are among these symptoms. The condition will be diagnosed using imaging, laboratory testing, and clinical evaluation. Acute appendicitis affects approximately 90% of patients with these symptoms. The most common treatment for simple acute appendicitis is laparoscopic appendectomy; however, 70% of patients respond well to broad-spectrum antibiotics, such as piperacillin-tazobactam, either on its own or in conjunction with cephalosporins, fluoroquinolones, and metronidazole. The presence of appendicoliths or appendiceal diameters ≥ 7 mm on CT is associated with an increased likelihood of antibiotic failure. Surgery should be performed if the results of this high-risk CT scan are compatible (low chance of poor outcomes or complications after surgery). First-line therapies include appendectomy and

antibiotics, unless there are results from a high-risk CT scan. Without high-risk CT results, unfit people should first try antibiotics and should they not work or think about surgery. Decisions for inappropriate individuals with high-risk CT findings should be guided by a comprehensive evaluation of perioperative risk and patient preferences. In conclusion, antibiotic therapy works well in place of appendectomy for mild episodes of acute appendicitis, which are common worldwide (4).

Comprehensive epidemiological data on appendicitis in the South Korean and East Asian populations are limited. The National Health Insurance database was used between 2005 and 2007 to analyze the epidemiological characteristics and lifetime risk of appendicitis and appendectomy in South Korea. 59.70 Of the inpatients with appendicitis, 59.70% underwent appendectomy. The annual incidence rates of appendicitis, complete appendectomy, and perforated appendectomy were 22.71, 13.56, and 2.91 per 10,000 population. The summer had the highest occurrence rate. The standardized lifetime appendicitis and appendectomy risks were stable during the study. A life table model assessed the lifetime risk of appendicitis in 16.33% of males and 16.34% of females, and appendectomy in 9.89% and 9.61%, respectively. South Koreans had higher appendicitis and appendectomy rates than Westerners but similar perforation rates and seasonality. The appendicitis and appendectomy rates remained stable between 2005 and 2007. The Korean population may benefit more from incidental appendectomies to prevent suspected appendicitis (5). According to current thinking, there are two primary reasons why appendectomies are performed: first, because the appendix is in the left upper quadrant, which may cause problems for the appendiceal vessels that supply the appendix in the future; and second, dissecting Ladd's bands may result in inflammation of those vessels. For the past nearly 100 years, this technique has been recognized as the gold standard for the surgical treatment of malrotation. When it comes to improving patient outcomes and reducing postoperative problems, the medical industry is continuously moving from invasive to non-invasive management. In this regard, open Ladd's surgery allows laparoscopic surgery (6).

There is no established regimen for laparoscopic appendectomy that promotes healing after surgery. Laparoscopic appendectomy (LA) is superior to open appendectomy (OA) in terms of pain intensity on the first day, wound infections, duration of hospital stay, and time until return to

regular activities in adults, except for a higher rate of intra-abdominal abscesses following LA. On the other hand, when it came to hospital stay and wound infections, LA outperformed OA. However, the evidence quality varied from extremely low to moderate, and some of LA's clinical effects of LA were minor and had no bearing on treatment. Future research with less risk of bias should specifically examine children's quality of life (7). Appendectomy or nonoperative therapy (pain management, antibiotics, and close monitoring) may be used to treat acute, uncomplicated appendicitis. It is important to overcome the benefits and drawbacks of each option for the patient. Thirty to forty percent of patients who receive antibiotics will undergo an appendectomy within five years, while this percentage may vary based on individual patient characteristics and practice patterns (8).

Histopathological examination of appendectomy specimens is recommended for diagnosis. Appendectomy specimens incur high costs for routine pathological testing. Advancements in technology and imaging modalities have improved the detection of acute appendicitis, leading to a marked decrease in the negative appendectomy rates. When histopathology was performed on the specimens, 17 percent of the pathology reports included specimens from appendicitis. A total of 19,637 (79.5%) patients had acute appendicitis. Adult patients had a significantly higher perforation rate (6.3%) than adult patients. The negative appendectomy rate was considerably higher (15%) in women and adults. Over a nine-year period, there was a discernible decline in the rate of negative appendectomies. Unexpected incidental pathological diagnoses were observed in 226 appendectomy specimens (0.9%). A total of 171 patients (0.7%) had neoplastic lesions such as mucinous neoplasms, adenocarcinomas, and carcinoid tumors (9).

Pathology of 5262 patients who underwent appendectomies was reviewed for presumed acute appendicitis between January 2006 and October 2010, excluding incidental appendectomy during other procedures. The investigation detected unusual features in 1% (54) of appendectomy tissues. The group consisted of 30 males and 24 females aged 15-84 years (median, 32.2 ± 15.1 years). Histopathology showed 37 enterobiasis, five carcinoids, four mucinous cystadenomas, two eosinophilic infiltrations, two mucocoeles, two tuberculosis, one goblet-cell carcinoid, and one neurogenic hyperplasia. Although 52 patients underwent conventional appendectomies, two with tuberculous appendicitis required right

hemicolectomy. All tumors were distal appendices and averaged 6.8 mm (range, 4-10 mm). Notably, all tumor patients survived and were disease-free after 17.8 months (10). Histological findings may help to develop effective treatment plans, as these detect abnormalities. Neoplasms and other pathologies were identified in the present study. Therefore, histopathological examination should be performed on appendectomy specimens.

Limitations: The retrospective design of this study, reliant on historical data, may introduce biases and restrict the scope of the data available for analysis. Additionally, as a single-center study was conducted in a tertiary care hospital in Pakistan, the findings may not fully reflect the diversity of appendicitis cases in different healthcare settings or regions. Furthermore, the study primarily concentrated on histopathological findings, lacking an exploration of clinical outcomes or long-term follow-up data, which could offer a more comprehensive perspective on patient care and prognosis.

Conclusion:

This study provides valuable insights into the histopathological spectrum of appendectomy specimens over a two-year period in a tertiary-care hospital. Although acute appendicitis remains the predominant finding, the identification of chronic appendicitis, neoplastic lesions, and other pathologies underscores the importance of histopathological examination in guiding clinical decisions. This study highlights the need for further research to elucidate the clinical implications of these findings as well as their impact on patient care and long-term outcomes in appendicitis cases. Ultimately, a comprehensive understanding of histopathological variations in appendectomy specimens is essential for optimizing the management of this common surgical condition.

References

1. Poon, S.H.T., Lee, J.W.Y., NG, K. *et al.* The current management of acute uncomplicated appendicitis: should there be a change in paradigm? A systematic review of the literatures and analysis of treatment performance. *World J Emerg Surg* 12, 46 (2017). <https://doi.org/10.1186/s13017-017-0157-y>
2. Al-Omran M, Mamdani M, McLeod RS. Epidemiologic features of acute appendicitis in Ontario, Canada. *Can J Surg.* 2003

- Aug;46(4):263-8. PMID: 12930102; PMCID: PMC3211626.
3. Dagne H, Abebaw TA. Characteristics of Patients Presented with Complicated Appendicitis in Adama, Ethiopia: A Cross-Sectional Study. *Open Access Emerg Med.* 2022 Oct 21;14:573-580. doi: 10.2147/OAEM.S383550. PMID: 36303879; PMCID: PMC9595057.
 4. Moris D, Paulson EK, Pappas TN. Diagnosis and Management of Acute Appendicitis in Adults: A Review. *JAMA.* 2021;326(22):2299–2311. doi:10.1001/jama.2021.20502
 5. Lee JH, Park YS, Choi JS. The epidemiology of appendicitis and appendectomy in South Korea: national registry data. *J Epidemiol.* 2010;20(2):97-105. doi: 10.2188/jea.je20090011. Epub 2009 Dec 19. PMID: 20023368; PMCID: PMC3900807.
 6. Al Smady, M.N., Hendi, S.B., AlJeboury, S. et al. Appendectomy as part of Ladd's procedure: a systematic review and survey analysis. *Pediatr Surg Int* 39, 164 (2023). <https://doi.org/10.1007/s00383-023-05437-7>
 7. Jaschinski T, Mosch CG, Eikermann M, Neugebauer EA, Sauerland S. Laparoscopic versus open surgery for suspected appendicitis. *Cochrane Database Syst Rev.* 2018 Nov 28;11(11):CD001546. doi: 10.1002/14651858.CD001546.pub4. PMID: 30484855; PMCID: PMC6517145.
 8. Talan DA, Di Saverio S. Treatment of Acute Uncomplicated Appendicitis. Solomon CG, editor. *New England Journal of Medicine.* 2021 Sep 16;385(12):1116–23.
 9. Charfi S, Sellami A, Affes A, Yaïch K, Mzali R, Boudawara TS. Histopathological findings in appendectomy specimens: a study of 24,697 cases. *Int J Colorectal Dis.* 2014 Aug;29(8):1009-12. doi: 10.1007/s00384-014-1934-7. Epub 2014 Jul 2. PMID: 24986137.
 10. Akbulut S, Tas M, Sogutcu N, Arikanoglu Z, Basbug M, Ulku A, Semur H, Yagmur Y. Unusual histopathological findings in appendectomy specimens: a retrospective analysis and literature review. *World J Gastroenterol.* 2011 Apr 21;17(15):1961-70. doi: 10.3748/wjg.v17.i15.1961. PMID: 21528073; PMCID: PMC3082748.