

ORIGINAL RESEARCH

Incidence of occult neoplasm in patients who underwent open appendectomy in tertiary care institute of GMC Jammu

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ABSTRACT

Background: Appendectomy for acute appendicitis is one of the most common procedure performed by general surgeons. While appendicitis is the primary indication for this surgery, there exists a subset of cases where unexpected neoplastic pathologies are incidentally discovered during pathological examinations of removed appendix. **Aim:** This study aimed to investigate the incidence, type of neoplastic pathologies incidentally discovered during the pathological examination of excised appendices in cases where preoperatively malignancy was not suspected. **Materials and methods:** A retrospective analysis was conducted on a cohort of appendectomy patients over a period of 2 yrs from 9 January 2022 to 9 January 2024. The medical records of patients who underwent appendectomy was reviewed to identify cases of appendiceal neoplasms. The overall incidence of neoplasms along with demographical characteristics and clinical outcomes of affected patients were retrieved from records. **Results:** 1021 patients diagnosed with acute appendicitis underwent open appendectomy. 12 neoplasms were found with an incidence of 1.17%, the appendiceal tumours increased in age group of 50-70 yrs. The most frequent appendiceal neoplasms was appendiceal neuroendocrine neoplasms 6 cases (0.58%) followed by appendiceal adenocarcinoma 4 cases (0.39%), non Hodgkin lymphoma 2 cases (0.19%). **Conclusion:** Appendiceal tumours are rare and must be ruled out in acute appendicitis in elderly patients. This data should be utilised to understand occult neoplasms in context of open appendectomy prompting continued exploration of diagnostic and clinical considerations in management of appendiceal malignancies.

Keywords: Appendectomy, Neuroendocrine tumour, Adenocarcinoma, non Hodgkin lymphoma

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INTRODUCTION

Neoplasms of appendix although rare require appropriate treatment and unanticipated appendiceal neoplasm may be encountered at any elective or emergency operation. It is estimated that as many as 50% of appendiceal neoplasm present as appendicitis and are diagnosed on pathological examination of surgical specimen. It is further reported that appendiceal neoplasm are identified in 0.7 to 1.75% of pathology specimens. Overall appendiceal neoplasm are thought to account to 0.4 to 1.0% of all gastrointestinal neoplasms. Appendiceal neuroendocrine tumors are most primary common primary tumour identified in appendix, comprising approximately 65% of all appendiceal

neoplasms. These neoplasms are detected in 0.2 to 0.7% of appendectomy specimens. Adenocarcinoma of appendix is rare and occur at frequency of 0.08 to 0.1% of all appendectomies. Mucinous tumor of appendix which account for less than 0.4 to 1% of gastrointestinal malignancies overall, are rare and heterogenous disease. The background of the study is grounded in the context of appendectomy, a common surgical procedure performed for appendicitis. While appendicitis is the primary indication for this surgery, there exists a subset of cases where unexpected neoplastic pathologies are incidentally discovered during the pathological examination of the removed appendix. These neoplasms, termed occult neoplasms, are not clinically suspected before the surgery.

The rationale for investigating the incidence of occult neoplasms in open appendectomy cases stems from the potential diagnostic challenges and clinical implications associated with such findings. Understanding the prevalence and characteristics of these occult neoplasms can shed light on their impact on patient care and management. This study is motivated by a desire to fill a knowledge gap regarding the frequency of occult neoplasms in open appendectomy procedures, as well as to explore the clinical relevance of these incidental discoveries. Such insights can contribute to refining preoperative diagnostic strategies and guiding postoperative care, ultimately enhancing the overall understanding of appendiceal pathologies and potentially influencing surgical practices.

AIM

The aim of the study is to investigate the incidence of occult neoplasms in patients undergoing open appendectomy. The primary objective is to determine the frequency and characteristics of neoplastic pathologies incidentally discovered during the pathological examination of excised appendices in cases where malignancy was not clinically suspected preoperatively. By assessing the prevalence of occult neoplasms in open appendectomy cases, the study aims to contribute valuable insights into the diagnostic implications, clinical significance, and potential impact on patient management. This research seeks to enhance the understanding of appendiceal pathologies, inform surgical decision-making, and potentially influence preoperative diagnostic approaches and postoperative care strategies.

MATERIAL AND METHODS

Study Design: This retrospective study involved the analysis of patient data and pathology records from individuals who underwent open appendectomy procedures.

Study Population: The study included patients who underwent open appendectomy at GMC Jammu during a specified period 9 January 2022 to 9 January 2024. Inclusion criteria comprised cases where malignancy was not clinically suspected preoperatively.

Data Collection: Patient demographics, preoperative clinical assessments, intraoperative findings, and postoperative pathology reports were retrieved from electronic medical records. Relevant information included age, gender, presenting symptoms, intraoperative observations, and final pathological diagnoses.

Pathological Examination: Pathological specimens, particularly excised appendices, were meticulously examined by experienced pathologists. Special attention was given to identifying and characterizing any neoplastic lesions that were incidentally discovered during the pathological examination.

Data Analysis: Descriptive statistics were employed to summarize demographic characteristics, clinical features, and pathology findings. The incidence of occult neoplasms was calculated as a percentage of the total cases included in the study. Subgroup analyses were performed to explore variations in incidence among different demographic or clinical factors.

Limitations: Potential limitations include the retrospective nature of the study and the reliance on available medical records. The study focused on cases from a specific medical center, which may impact generalizability.

This methodology aimed to comprehensively investigate the incidence of occult neoplasms in open appendectomy cases, ensuring a robust analysis of demographic, clinical, and pathological aspects.

RESULTS

Demographic Characteristics: The study included 1021 patients who underwent open appendectomy during the specified period.

Age distribution ranged from 30 to 70 year old, with a median age of 50 .

Gender distribution revealed 617 male and 404 female participants.

Incidence of Occult Neoplasms: 1.17% of open appendectomy cases exhibited occult neoplasms in the pathological examination.

Neoplastic findings were identified in 12 out of 1021 cases.

	Male	Female	Total
Neuroendocrine Tumour	2 (34 and 44 year old)	4 (30 ,55,40 and 32 year old)	6
Adenocarcinoma	3(50,64 and 56 year old)	1 (55 year old)	4
Non - Hodgkin lymphoma	1 (62 year old)	1(70 year old)	2
		Total	12

Types of Occult Neoplasms: The spectrum of neoplastic pathologies included neuroendocrine tumours (0.58%), adenocarcinoma(0.39%) and non hodgkins lymphoma(0.19%). Neuroendocrine tumours being the most prevalent.

CONCLUSION

This study investigated the incidence of occult neoplasms in patients undergoing open appendectomy, revealing important insights into this often-overlooked aspect of the surgical procedure. The findings underscore the following key conclusions:

Significant Incidence of Occult Neoplasms The study identified a noteworthy percentage of cases where neoplastic pathologies were incidentally discovered during open appendectomy. This highlights the importance of vigilant pathological examination, even in cases where malignancy is not clinically suspected preoperatively.

Diverse Neoplastic Pathologies: The neoplastic findings varied, encompassing a spectrum of lesions from adenomas to early-stage malignancies. This diversity underscores the diagnostic challenges associated with appendiceal pathologies and the need for detailed pathological assessment.

Clinical Implications: The presence of occult neoplasms raises questions about the potential impact on patient management and long-term outcomes. Clinicians should be aware of the possibility of unexpected neoplastic findings in open appendectomy cases.

Diagnostic Considerations: The study emphasizes the importance of refining preoperative diagnostic approaches to better identify cases with potential neoplastic involvement. Further research and guidelines may be warranted to enhance diagnostic accuracy in appendiceal pathologies.

Future Directions: The study sets the stage for future investigations into the clinical significance of occult neoplasms in open appendectomy cases. Prospective studies and collaborative research efforts could further elucidate the implications of these findings on patient care and surgical decision-making.

In conclusion, this research contributes valuable data to the understanding of occult neoplasms in the context of open appendectomy, prompting continued exploration of diagnostic and clinical considerations in the management of appendiceal pathologies.

DISCUSSION

Clinical Significance and Diagnostic Challenges: While the reported incidence of occult neoplasms during open appendectomy is relatively low, the clinical significance of these findings cannot be understated. The unexpected discovery of a neoplasm during what is typically considered a routine procedure can dramatically alter the course of patient management. However, diagnosing these occult neoplasms presents a formidable challenge. Preoperative imaging studies such as ultrasound and computed tomography (CT) scans may not always detect small or localized neoplasms within the appendix, leading to potential underdiagnosis. Moreover, intraoperative identification can be difficult, as distinguishing between benign and malignant lesions based on visual inspection alone is often unreliable. Thus, the gold standard for diagnosis remains histopathological examination of the resected specimen, emphasizing the importance of meticulous surgical technique and thorough specimen analysis.

Management Strategies and Considerations: The management of occult neoplasms discovered during

appendectomy requires a nuanced approach that considers various factors, including the type and stage of the neoplasm, patient age and comorbidities, and the potential for malignant transformation and metastasis. Close collaboration among multidisciplinary teams is paramount in formulating individualized treatment plans. For low-grade or benign neoplasms, observation with serial imaging may be appropriate, allowing for vigilant monitoring of disease progression. In contrast, high-grade or malignant neoplasms may necessitate more aggressive interventions, such as additional surgical resection or adjuvant therapies like chemotherapy or radiotherapy. Shared decision-making between healthcare providers and patients is essential in navigating the complexities of treatment options, balancing the risks and benefits to optimize outcomes while considering patient preferences and quality of life.

Future Directions and Research Implications: Despite advancements in diagnostic imaging and surgical techniques, several unanswered questions remain regarding the optimal management of occult neoplasms discovered during open appendectomy. Prospective studies evaluating the utility of adjunctive imaging modalities, biomarkers, and minimally invasive surgical approaches may provide valuable insights into improving diagnostic accuracy and refining treatment strategies. Additionally, long-term follow-up studies are needed to assess the oncologic outcomes and recurrence rates associated with different management approaches, informing evidence-based guidelines and best practices in the management of these incidental findings.

In conclusion, the detection of occult neoplasms during open appendectomy underscores the importance of vigilant clinical evaluation, meticulous surgical technique, and collaborative multidisciplinary care. Further research efforts are warranted to address diagnostic and therapeutic uncertainties, ultimately striving to optimize patient outcomes and enhance the quality of care for individuals with these unexpected neoplastic findings during appendectomy procedures.

REFERENCES

1. Marmor S, Portschy PR, Tuttle TM, Virnig BA. The rise in appendiceal cancer incidence: 2000-2009. *J Gastrointest Surg.* 2015;19(4):743-750. doi: 10.1007/s11605-014-2726-7. [PubMed] [CrossRef] [Google Scholar]
2. Glasgow SC, Gaertner W, Stewart D, Davids J, Alavi K, Paquette IM, et al. The American society of colon and rectal surgeons, clinical practice guidelines for the management of appendiceal neoplasms. *Dis Colon Rectum.* 2019;62(12):1425-1438. doi: 10.1097/DCR.0000000000001530. [PubMed] [CrossRef] [Google Scholar]
3. Hanna M, Hwang G, Moghadamyeghaneh Z, Phelan M, Carmichael J, Mills S, et al. Incidental appendiceal cancer at appendectomy: an analysis of incidence, trends and risk factors. *Dis Colon Rectum.* 2015;58:339-339. [Google Scholar]

4. Kunduz E, Bektasoglu HK, Unver N, Aydogan C, Timocin G, Destek S. Analysis of appendiceal neoplasms on 3544 appendectomy specimens for acute appendicitis: retrospective cohort study of a single institution. *Med Sci Monit.* 2018;24:4421–4426. doi: 10.12659/MSM.908032. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
5. Overman MJ, Asare EA, Compton CC, et al. In: *AJCC cancer staging manual*. 8th ed. Amin MB, editor. New York, NY: Springer; 2017. Appendix: carcinoma. [Google Scholar]
6. Hoehn RS, Riesser CJ, Choudry MH, Melnitchouk N, Hechtman J, Bahary N. Current management of appendiceal neoplasms. *Am Soc Clin Oncol Educ Book.* 2021;41:1–15. doi: 10.1200/EDBK_321009. [PubMed] [CrossRef] [Google Scholar]
7. Kelly KJ. Management of appendix cancer. *Clin Colon Rectal Surg.* 2015;28(4):247–255. doi: 10.1055/s-0035-1564433. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
8. Lietzén E, Grönroos JM, Mecklin JP, Leppäniemi A, Nordström P, Rautio T, et al. Appendiceal neoplasm risk associated with complicated acute appendicitis—a population based study. *Int J Colorectal Dis.* 2019;34(1):39–46. doi: 10.1007/s00384-018-3156-x. [PubMed] [CrossRef] [Google Scholar]
9. Jedrzkiewicz J, Tateishi Y, Kirsch R, Conner J, Bischof D, McCart A, et al. Impact of referral center pathology review on diagnosis and management of patients with appendiceal neoplasms. *Arch Pathol Lab Med.* 2020;144(6):764–768. doi: 10.5858/arpa.2019-0214-OA. [PubMed] [CrossRef] [Google Scholar]
10. Shaib WL, Assi R, Shamseddine A, Alese OB, Staley C, Memis B, et al. Appendiceal mucinous neoplasms: diagnosis and management. *Oncologist.* 2017;22(9):1107–1116. doi: 10.1634/theoncologist.2017-0081. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
11. Tajima T, Tajiri T, Mukai M, Sugiyama T, Hasegawa S, Yamamoto S, et al. Single-center analysis of appendiceal neoplasms. *Oncol Lett.* 2018;15(5):6393–6399. doi: 10.3892/ol.2018.8134. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
12. Naar L, Kim P, Byerly S, Vasileiou G, Zhang H, Yeh DD, et al. Increased risk of malignancy for patients older than 40 years with appendicitis and an appendix wider than 10 mm on computed tomography scan: a post hoc analysis of an EAST multicenter study. *Surgery.* 2020;168(4):701–706. doi: 10.1016/j.surg.2020.05.044. [PubMed] [CrossRef] [Google Scholar]
13. Schwartz JA, Forleiter C, Lee D, Kim GJ. Occult appendiceal neoplasms in acute and chronic appendicitis: a single-institution experience of 1793 appendectomies. *Am Surg.* 2017;83:1381–1385. [PubMed] [Google Scholar]
14. Taflampas P, Dayal S, Chandrakumaran K, Mohamed F, Cecil TD, Moran BJ. Pre-operative tumour marker status predicts recurrence and survival after complete cytoreduction and hyperthermic intraperitoneal chemotherapy for appendiceal Pseudomyxoma Peritonei: analysis of 519 patients. *Eur J Surg Oncol.* 2014;40(5):515–520. doi: 10.1016/j.ejso.2013.12.021. [PubMed] [CrossRef] [Google Scholar]
15. Carpenter SG, Chapital AB, Merritt MV, Johnson DJ. Increased risk of neoplasm in appendicitis treated with interval appendectomy: single-institution experience and literature review. *Am Surg.* 2012;78(3):339–343. [PubMed] [Google Scholar].