

ORIGINAL RESEARCH

Histopathological Findings and Demographic Trends in Appendiceal Mucinous Neoplasm: A Retrospective Study

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ABSTRACT

Background: Appendiceal mucinous neoplasms (AMNs) represent a rare and heterogeneous group of lesions with diverse histopathological features and clinical presentations. Understanding the demographic and clinicopathological characteristics of these neoplasms is crucial for accurate diagnosis and optimal patient management. **Methods:** We conducted a retrospective study analyzing seven cases of Low-grade Appendiceal Mucinous Neoplasms (LAMNs) from the archives of the Department of Pathology, Dr. Somervell Memorial CSI Medical College, Kerala. Demographic data, clinical presentations, radiological findings, histopathological features, and treatment outcomes were comprehensively evaluated. **Result:** The study cohort comprised seven patients diagnosed with LAMNs, with a mean age of 38.71 years. There was a slight male predominance, with 57.1% of cases being male. Histopathological evaluation revealed a spectrum of epithelial morphologies, with 57% of cases exhibiting a classic villous pattern. The majority of cases were classified as pTis stage, indicating mucinous adenocarcinoma in situ. **Conclusion:** Our study provides valuable insights into the demographic and clinicopathological characteristics of LAMNs, highlighting the variability in gender distribution and histopathological patterns observed. The prognostic significance of LAMN staging underscores the importance of accurate diagnosis and staging for optimal patient management.

Key words: Appendiceal mucinous neoplasms, Low-grade Appendiceal Mucinous Neoplasms, histopathology, demographics, prognosis, retrospective study.

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INTRODUCTION

Appendiceal mucinous neoplasms (AMNs) represent a heterogeneous group of lesions characterized by mucin-producing epithelial cells within the appendix. These neoplasms, though rare, have gained increasing attention due to their potential for varied clinical presentations, histopathological diversity, and therapeutic implications^[1]. Over the years, there has been a growing interest in understanding the histological spectrum and demographic patterns associated with AMNs to facilitate early diagnosis, optimize management strategies, and improve patient outcomes.

AMNs encompass a spectrum of lesions ranging from benign mucinous adenoma to malignant mucinous adenocarcinoma, with intermediate entities like mucinous cystadenoma and mucinous

adenocarcinoma in situ^[2]. The histopathological features of AMNs are diverse, often exhibiting a continuum of changes from low-grade to high-grade dysplasia, and occasionally progressing to invasive carcinoma. Understanding these histological variations is paramount for accurate diagnosis, prognostication, and therapeutic decision-making^[3]. The demographic profile of patients with AMNs also warrants exploration to identify potential risk factors, characterize the age and gender distribution, and assess any geographic or ethnic disparities. While AMNs can occur across all age groups, a bimodal age distribution has been observed, with peaks in the third and sixth decades of life. However, there is considerable variability in the reported age distribution, possibly influenced by regional

differences, genetic predispositions, and environmental factors^[4].

Several studies have attempted to elucidate the clinical and demographic characteristics of patients with AMNs^[4,5]. These investigations have highlighted the predominance of females, particularly in younger age groups, suggesting a potential hormonal influence on the pathogenesis of AMNs. Additionally, certain genetic syndromes, such as familial adenomatous polyposis (FAP) and Muir-Torre syndrome, have been associated with an increased risk of developing AMNs, emphasizing the importance of genetic predisposition in disease pathogenesis^[6].

Geographic and ethnic variations in the incidence and presentation of AMNs have also been documented. While some studies have reported a higher prevalence of AMNs in Western populations, others have noted a rising incidence in Asian countries^[7]. These disparities may reflect differences in dietary habits, socioeconomic factors, access to healthcare, and genetic predispositions among diverse populations. Moreover, advancements in diagnostic imaging modalities and increased awareness among clinicians have led to more frequent incidental detection of AMNs during abdominal imaging studies, further contributing to the observed demographic trends.

In addition to demographic factors, the clinical presentation of AMNs can vary widely, ranging from asymptomatic incidental findings to acute appendicitis, pseudomyxoma peritonei (PMP), or metastatic disease. The mode of presentation often correlates with the histological subtype and extent of mucin production within the appendix. While mucinous adenomas may remain asymptomatic or manifest with nonspecific abdominal symptoms, mucinous adenocarcinomas tend to present with more aggressive features and a poorer prognosis^[7,8].

Given the heterogeneous nature of AMNs and their diverse clinical presentations, a multidisciplinary approach involving radiologists, pathologists, surgeons, and oncologists is essential for accurate diagnosis, staging, and treatment planning. Recent advancements in imaging techniques, including computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET), have improved preoperative evaluation, and staging of AMNs, facilitating optimal surgical management and prognostication. Therefore, the present study was conducted with the objectives of studying the histopathological findings and demographic trends associated with AMNs and clinical experience.

MATERIALS AND METHODS

Study Setting: A retrospective study was conducted to analyze cases of Appendiceal Mucinous Neoplasms (AMNs) archived in the Department of Pathology, Dr. Somervell Memorial CSI Medical College, Kerala. The study aimed to elucidate the histopathological findings and demographic trends associated with

AMNs, drawing insights from a cohort of seven cases identified from the institutional archives.

Case Selection: The study cohort comprised patients diagnosed with AMNs. Cases were identified through a thorough review of pathology records and electronic databases, utilizing relevant diagnostic codes and search terms associated with AMNs. Inclusion criteria encompassed histologically confirmed AMNs, including mucinous adenomas, mucinous cystadenomas, mucinous adenocarcinomas, and mucinous adenocarcinomas in situ. Cases with incomplete clinical or pathological data were excluded from the analysis.

Data Collection: Demographic and clinical data were collected from electronic medical records, pathology reports, and operative notes. The following variables were recorded for each case: age at diagnosis, gender, presenting symptoms, radiological findings, histopathological features, tumor size, extent of mucin production, presence of dysplasia or invasive carcinoma, and treatment received. Histopathological specimens, including appendectomy specimens and surgical resections, were reviewed by experienced pathologists to confirm the diagnosis and assess for any additional pathological features.

Histopathological Evaluation: Histopathological evaluation of AMN specimens was performed according to standard protocols, including gross examination, tissue processing, and microscopic examination of hematoxylin and eosin (H&E)-stained sections. Additional histochemical and immunohistochemical stains were utilized as needed to further characterize the mucinous neoplasms and assess for the presence of dysplasia or invasive carcinoma. Special stains such as Alcian blue and periodic acid-Schiff (PAS) were employed to highlight mucin production and mucin composition within the lesions.

Data Analysis: Descriptive statistics were utilized to summarize the demographic and clinical characteristics of the study cohort. Continuous variables were expressed as mean \pm standard deviation or median with interquartile range, depending on the distribution of data. Categorical variables were presented as frequencies and percentages. Comparative analyses were performed to identify any significant associations between demographic factors, histopathological features, and clinical outcomes using appropriate statistical tests.

Ethical Considerations: This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and approved by the Institutional Review Board of Dr. Somervell Memorial CSI Medical College, Kerala. Patient confidentiality and data anonymity were strictly maintained throughout the study period, and informed consent was waived given the retrospective nature of the study.

RESULT

The study included a total of seven participants diagnosed with Low-grade Appendiceal Mucinous Neoplasm (LAMN). Table 1 shows the characteristics of the study participants. The mean age of the participants was 38.71 years, with a range spanning from 18 to 57 years. The cohort displayed a slight male predominance, with 57.1% of the cases being male and 42.9% female. The size of the appendices varied widely, ranging from 4 cm to 12.5 cm, with a mean size of 6.86 cm. Notably, all cases exhibited free surgical margins, indicating complete excision of the neoplastic lesions.

Histopathological examination revealed that the majority of the cases (57.1%) exhibited a villous epithelial morphology, while the remaining cases (42.9%) demonstrated an undulating pattern. Regarding the T stage classification, approximately 57.1% of cases were categorized as pTis stage, indicating mucinous adenocarcinoma in situ, while the remaining 42.9% showed invasion of the visceral peritoneum (pT4a stage). Serosal mucin was present in 42.9% of cases. These findings underscore the diverse histopathological spectrum and clinical presentation of AMNs, reflecting the heterogeneity inherent to this rare neoplastic entity.

Table 1: Characteristics of the study participants

Groups		Endometrial thickness before treatment	Endometrial thickness after treatment
Compaction group	Mean \pm SD	9.41 \pm 1.76	8.48 \pm 1.70
	Median (IQR)	9.25 (8.08-10.63)	8.10 (7.20-9.60)
	(minimum, maximum)	(5.8, 15)	(5.3, 14)
Increased endometrial thickness	Mean \pm SD	8.38 \pm 1.06	9.62 \pm 1.63
	Median (IQR)	8.35 (7.53-9.10)	9.40 (8.40-10.08)
	(minimum, maximum)	(6.5, 11.4)	(7.1, 13.9)

Overall, the study provides valuable insights into the clinicopathological characteristics of AMNs in the study population. The descriptive statistics elucidate the age distribution, gender predominance, appendiceal size variability, histopathological features, and T stage classification of LAMNs. Despite the small sample size, these findings contribute to our understanding of AMNs and may guide clinicians in the diagnosis, management, and prognostication of this rare but clinically significant condition. Further research with larger cohorts and prospective study designs is warranted to validate these observations and explore additional prognostic factors associated with AMNs.

DISCUSSION

Appendiceal mucinous neoplasms (AMNs) represent a rare and heterogeneous group of lesions with diverse histopathological features and clinical presentations. In this study, we comprehensively analyzed the demographic and clinicopathological characteristics of seven patients diagnosed with Low-grade Appendiceal Mucinous Neoplasms (LAMNs) at our institution. Our findings shed light on the varied nature of AMNs and provide insights into their diagnosis, management, and prognostication.

The age distribution of our study cohort revealed a wide range, spanning from 18 to 57 years, with a mean age of 38.71 years. The demographic distribution of LAMN cases in our study mirrors the findings of Gok et al.^[5], who reported a male predominance, with men accounting for 42% of cases. In contrast, Gundogaret al.^[6] observed a higher prevalence of LAMNs in females, with a female-to-male ratio of 15 to 4. Our study, with 57% of cases being men, falls closer to the distribution reported by Gok et al. This discrepancy underscores the variability in gender distribution observed across different studies and highlights the need for further investigation into potential contributing factors.

While the exact etiology of AMNs remains unclear, certain genetic syndromes, such as familial

adenomatous polyposis (FAP) and Muir-Torre syndrome, have been associated with an increased risk of developing AMNs. Further genetic studies are warranted to elucidate the underlying molecular mechanisms driving the development of AMNs and identify potential therapeutic targets^[8].

Gender distribution in our study cohort demonstrated a slight male predominance, with 57.1% of cases being male and 42.9% female. This finding contrasts with some previous studies that have reported a higher prevalence of AMNs in females. However, the small sample size of our study limits the generalizability of these findings, and larger population-based studies are needed to elucidate any gender disparities in the incidence and presentation of AMNs. Additionally, the influence of hormonal factors on the pathogenesis of AMNs warrants further investigation, particularly given the observed predilection for females in certain age groups^[5].

The size of the appendices in our study cohort varied widely, with sizes ranging from 4 cm to 12.5 cm, and a mean size of 6.86 cm. While the clinical significance of appendiceal size in the context of AMNs remains uncertain, larger lesions may pose diagnostic and therapeutic challenges, particularly in distinguishing between benign and malignant lesions and determining the extent of surgical resection. The

presence of free surgical margins in all cases underscores the importance of complete excision of the neoplastic lesions to minimize the risk of recurrence and progression to invasive carcinoma. However, the optimal surgical approach for AMNs, including the extent of appendectomy and the role of additional procedures such as cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (HIPEC), remains a subject of debate and requires further investigation through prospective studies and clinical trials^[6].

In the present study, the histopathological evaluation of LAMNs revealed variability in epithelial morphology, consistent with findings reported by Lu et al.^[7]. Lu et al. identified an undulating pattern in 82% of cases and a villous pattern in 46% of cases. In our study, 57% of LAMNs exhibited a classic villous pattern, while 43% demonstrated an undulating or scalloped pattern. These findings suggest variability in histopathological presentation across different study populations, potentially influenced by patient demographics and pathological evaluation techniques. Most cases in our study were classified as pTis stage, indicating mucinous adenocarcinoma in situ, while a subset demonstrated invasion of the visceral peritoneum (pT4a stage). The presence of serosal mucin in approximately 42.9% of cases highlights the potential for peritoneal dissemination and pseudomyxoma peritonei (PMP), a rare but devastating complication of AMNs. Early detection and accurate staging of AMNs are essential for risk stratification and treatment planning, including the consideration of adjuvant chemotherapy and close surveillance for disease recurrence^[8].

This present study provides valuable insights into the demographic and clinicopathological characteristics of AMNs, highlighting the diverse nature of this rare neoplastic entity. Despite its rarity, AMNs pose diagnostic and therapeutic challenges due to their varied histopathological features and clinical presentations. A multidisciplinary approach involving radiologists, pathologists, surgeons, and oncologists is essential for accurate diagnosis, staging, and treatment planning. Further research is needed to elucidate the underlying molecular mechanisms driving the development of AMNs, identify potential prognostic markers, and optimize therapeutic strategies to improve patient outcomes. Through collaborative efforts and ongoing research, we aim to enhance our understanding of AMNs and ultimately improve the management of patients affected by this rare but clinically significant disease.

Limitations: This study is subject to several limitations inherent to its retrospective design,

including potential selection bias, incomplete data documentation, and reliance on archival records. Additionally, the relatively small sample size of the study cohort may limit the generalizability of findings to broader populations. Despite these limitations, the study provides valuable insights into the histopathological spectrum and demographic trends of AMNs in the study setting. Further prospective studies with larger sample sizes are warranted to validate these findings and explore additional prognostic factors associated with AMNs.

CONCLUSION

The present study elucidates the demographic and clinicopathological characteristics of Low-grade Appendiceal Mucinous Neoplasms (LAMNs), contributing to the understanding of this rare entity. Our findings align with previous literature, highlighting the variability in gender distribution and histopathological patterns observed in LAMNs. The prognostic significance of LAMN staging underscores the importance of accurate diagnosis and staging for optimal patient management.

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