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FREQUENCY OF NEGATIVE APPENDECTOMIES IN A TERTIARY CARE HOSPITAL OF RAWALPINDI

Muhammad Zakir Khan[*1], Sikander Riaz[2], Salwa A. H. Abughalioun[3], Sajeela Murtaza[4], Usman Qureshi[5], Jehangir Sarwar Khan[6]

[*1,2,3,6]*Holy Family Hospital Rawalpindi*
[4]*Mayo Hospital Lahore*
[5]*Benazir Bhuitto Hospital Rawalpindi*

[*1]zakirkhanpanezai5@gmail.com, [2]sikandarcheema0075@gmail.com, [3]salwa.pal99@gmail.com, [4]sajeela_murtaza@hotmail.com, [5]dr_usman72@hotmail.com, [6]jskdr@hotmail.com

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Corresponding Author: *
Muhammad Zakir Khan

Abstract

Background: *One of the most frequent surgical emergencies worldwide is acute appendicitis. Even with the availability of numerous imaging modalities and clinical scoring systems like the Alvarado score, the current negative appendectomy rates in tertiary care facilities remain unacceptable. The prevalence of acute appendicitis in Rawalpindi's general population ranges from 6% to 10% [1, 2], and diagnostic precision and decision-making need to be reassessed. This study sought to determine the prevalence of negative appendectomies performed in a Rawalpindi tertiary care hospital using histopathological correlation and standardized clinical criteria.*

Methods:
Between October 31, 2024, and February 28, 2025, a prospective cross-sectional study was carried out at Holy Family Hospital's Department of Surgery, Unit 1. The study included 305 patients, ages 18 to 60, who were clinically diagnosed with acute appendicitis (Alvarado score ≥7 [3]) and, when necessary, ultrasonographically diagnosed with the condition using non-random consecutive sampling. Appendicular mass or a history of conservatively treated appendicitis were exclusion criteria. Every patient had an open appendectomy; the gold standard for diagnosis was histopathological examination of the specimens. Using a 95% confidence level, a 5% margin of error, and an expected negative appendectomy frequency of 5%, the sample size was determined using the WHO calculator.

Results *: Out of the 305 patients, 31 (10.2%) had negative appendectomies and 274 (89.8%) had acute appendicitis with histopathological confirmation. Compared to men (7.1%), women had a higher negative appendectomy rate (13.4%) ($p < 0.05$). The positive group's mean Alvarado scores were 8.1 ± 1.1, while the negative group's were 6.4 ± 1.0 ($p = 0.001$). Figure 1 (bar graph) and Figure 2 (pie chart) show the histopathological results.*

Conclusion: *The need to improve preoperative diagnostic procedures is highlighted by our setting's 10.2% negative appendectomy rate. It may be possible to decrease needless surgeries by increasing clinical scoring thresholds and using advanced imaging selectively.*

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INTRODUCTION

One of the most common causes of surgical emergency admissions globally is still acute abdominal pain, with acute appendicitis responsible for a significant percentage of these cases. Approximately 8–10% of people worldwide will experience acute appendicitis at some point in their lives, resulting in 15–20 million appendectomies annually. [3] Between 6% and 10% of people in Pakistan are said to have acute appendicitis, which places a heavy burden on tertiary care facilities like Rawalpindi's Holy Family Hospital. [2,3]

Correct and timely diagnosis of acute appendicitis is essential because postponed treatment raises the risk of sepsis, perforation, and peritonitis, while unnecessary surgery (negative appendectomy) exposes patients to operative risks, possible complications, and higher medical expenses. Despite improvements in diagnostics, the rate of negative appendectomy—which is defined as the removal of an appendix that is histologically normal—remains unacceptable, frequently ranging from 10% to 15% in many centers. [4] Furthermore, in low- and middle-income settings, where there are limited operating rooms, hospital beds, and surgical staff, negative appendectomies add to resource strain.

The Alvarado score was first used in 1986 to stratify risk by combining laboratory results (leukocytosis, left shift), symptoms (migration of pain, anorexia, nausea/vomiting), and signs (tenderness in the right lower quadrant, rebound tenderness, elevated temperature) into a 10-point scale. [5] Although it provides a quick, bedside tool for clinical decision-making, studies have found that its sensitivity and specificity vary greatly among populations, with some claiming sensitivity as low as 65% when a cutoff of ≥7 is used [6] In contrast, contrast-enhanced computed tomography (CT) and ultrasonography show greater diagnostic accuracy (up to 95%), but their routine use is hindered by cost, radiation exposure, operator dependence, and restricted access in many resource-constrained environments. [6, 8]

The best balance between sensitivity and specificity is achieved by a combined strategy that reduces negative appendectomy rates without appreciably delaying treatment, according to recent meta-analyses. This strategy uses clinical scoring to guide selective imaging. [9] However, there is still a dearth of evidence from South Asia, and local validation is crucial because patient demographics, imaging accessibility, and disease presentation vary by region.

Therefore, this study intends to ascertain the frequency of negative appendectomies at Holy Family Hospital over a four-month period (October 31, 2024, to February 28, 2025), correlate radiological and clinical (Alvarado score) findings with histopathology, and identify factors linked to unnecessary surgeries. We hope to reduce unnecessary appendectomies in similar resource-constrained hospitals and inform more accurate diagnostic algorithms by clarifying these relationships in our context.

Methods

Study Design and Setting:

A descriptive cross-sectional study was conducted from October 31, 2024, to February 28, 2025, at the Department of Surgery, Unit 1, Holy Family Hospital, Rawalpindi. authorized by Rawalpindi Medical University's Ethical Review Board (Approval No. RMU/ERB/2022/148).

Patient Groups and Choices

Adults (18–60 years old) who appear at the emergency room with suspected acute appendicitis (Alvarado score ≥7 [12]), ± ultrasound.

Inclusion Requirements

Men and women

- 18–60 years old
- Alvarado score of ≥7

Exclusion Criteria:

- Phlegmon or appendicular mass during examination or imaging.
- Previously treated appendicitis conservatively
- Major comorbidities or pregnancy make surgery contraindicated.

Sample Size

Using the WHO calculator [10], the expected negative appendectomy rate was 5% [4], with a 95% confidence interval and a 5% margin of error of at least 73. A total of 305 patients were enrolled to guarantee accuracy.

Data collection : Alvarado scores, histopathology, imaging, operative details, and demographics were all recorded in a structured pro forma. A consultant

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histopathologist examined the specimens from an open appendectomy carried out by skilled surgeons. Histologically, acute appendicitis is characterized by focal ulceration, clogged subserosal vessels, or neutrophilic infiltration of the muscularis propria [11].

Statistical analysis :

Data analysis was done using SPSS 23.0. Continuous variables are represented by mean ± SD, and categorical variables by n (%). Patients with normal appendices as a percentage of total patients is known as the negative appendectomy rate. $p < 0.05$ significant; independent t-test for Alvarado scores, chi-square for categorical comparisons.

Results

Demographics and Clinical Characteristics

Table 1. Baseline Characteristics (n = 305)

Variable	Total (n=305)	Positive (n=274)	Negative (n=31)	p-value
Age, mean ± SD (years)	30.1 ± 10.3	30.4 ± 10.1	27.2 ± 11.2	0.217
Gender, n (%)				0.042*
– Male	160 (52.5%)	152 (55.5%)	8 (25.8%)	
– Female	145 (47.5%)	122 (44.5%)	23 (74.2%)	
Alvarado score, mean ± SD	7.9 ± 1.2	8.1 ± 1.1	6.4 ± 1.0	0.001*

** significant*

Negative Appendectomy Frequency

274 (89.8%) confirmed acute appendicitis; 31 (10.2%) were negative. Higher in females (15.9%) vs. males (5.0%) ($p = 0.042$).

Operative and Postoperative Data

Mean operative time 46 ± 13 min; mean hospital stay 2.5 ± 0.9 days. No major intraoperative or postoperative complications were recorded.

Graphical Data:

Figure 1: Bar graph of positive vs. negative histopathology

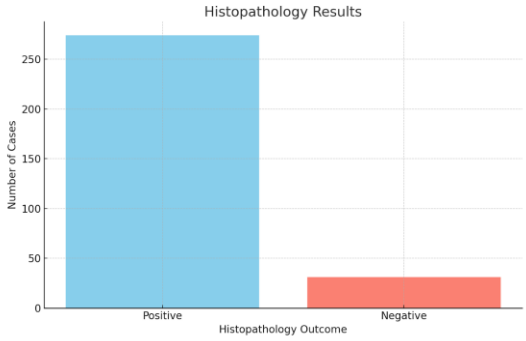
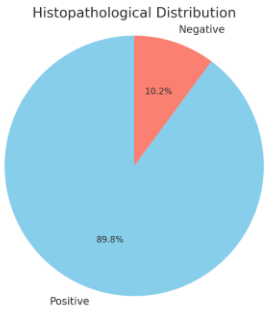


Figure 2: Pie chart of histopathological distribution



Discussion:

Around the world, acute abdominal pain continues to rank among the most common causes of surgical emergency admissions, with acute appendicitis contributing significantly to these cases. An estimated 8–10% of people worldwide will experience acute appendicitis at some point in their lives, resulting in 15–20 million appendectomies annually. [1] Acute appendicitis is reported to affect 6% to 10% of people in Pakistan, placing a heavy burden on tertiary care facilities like Rawalpindi's Holy Family Hospital. [2,3]

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In contrast to unnecessary surgery (negative appendectomy), which exposes patients to operative risks, potential complications, and increased healthcare costs, early and accurate diagnosis of acute appendicitis is essential. Delays in intervention increase the risk of perforation, peritonitis, and sepsis. Despite advancements in diagnostics, the rate of negative appendectomy—which is defined as the removal of an appendix that is histologically normal—remains unacceptable, frequently ranging from 10% to 15% in many centers. [4] Additionally, in low- and middle-income settings, where operating rooms, hospital beds, and surgical staff are scarce, negative appendectomies add to resource strain.

Originally developed in 1986, the Alvarado score combines laboratory results (leukocytosis, left shift), symptoms (migration of pain, anorexia, nausea/vomiting), and signs (tenderness in the right lower quadrant, rebound tenderness, elevated temperature) into a 10-point rating system to assess risk. [5] Although it provides a quick bedside tool for clinical decision-making, studies have found that its sensitivity and specificity vary greatly among populations, with some claiming sensitivity as low as 65% when a cutoff of ≥7 is used. While contrast-enhanced computed tomography (CT) and ultrasonography show greater diagnostic accuracy (up to 95%), their routine use is hindered by radiation exposure, cost, operator dependence, and limited access in many resource-constrained environments. [7, 8]

According to recent meta-analyses, a combined strategy that uses clinical scoring to direct selective imaging produces the best sensitivity and specificity balance, lowering the rate of negative appendectomy without appreciably postponing treatment. [9] South Asian evidence is still lacking, though, and local validation is crucial because of regional variations in patient demographics, imaging accessibility, and disease presentation.

Therefore, the purpose of this study is to ascertain the frequency of negative appendectomies at Holy Family Hospital over a four-month period (October 31, 2024, to February 28, 2025), correlate radiological and clinical findings (Alvarado score) with histopathology, and identify factors linked to unnecessary surgeries. By clarifying these connections in our context, we intend to reduce unnecessary appendectomies in comparable resource-constrained hospitals and contribute to more accurate diagnostic algorithms.

conclusion

A total of 10.2% of Holy Family Hospital's 305 patients had a negative appendectomy. Negative surgery was more likely to occur in women and those with lower Alvarado scores. Reducing needless appendectomies can minimize patient morbidity and resource consumption by implementing higher clinical score thresholds and targeted imaging. To create standardized protocols in environments with limited resources, more multicenter research is necessary.

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