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Frequency of Perforated Appendix in Acute Appendicitis in Ayub Teaching Hospital Abbottabad

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ABSTRACT

Objective: Our study's goal is to ascertain how frequently patients with acute appendicitis who are hospitalized to Ayub Teaching Hospital in Abbottabad have perforated appendices. Even though perforated appendices are frequent in Pakistan, not much research has been done on the topic. **Study design:** Descriptive, cross sectional study. **Settings:** Department of Surgery, Ayub Teaching Hospital, Abbottabad. **Study duration:** January 2025 to June 2025. **Methodology:** Total 145 patients between the ages of 10 and 60 who had acute appendicitis were included, regardless of gender. We excluded acute abdominal discomfort from any other cause, such as acute pancreatitis, peritonitis, intestinal blockage or perforation, or any visceral perforations. A thorough medical history, physical examination, and standard laboratory tests were conducted. The surgeries were performed by a single surgeon who detected the presence and absence of a perforated appendix. **Results:** The study's participants ranged in age from 10 to 60, with a mean age of 37.12 ± 11.24 years. 78 patients, or 53.79% of the total, were between the ages of 36 and 60. With a male to female ratio of 1.3:1, 82 (56.55%) of the 145 patients were men and 63 (43.5%) were women. 44 (30.34%) of the patients in our study had a ruptured appendix as a result of acute appendicitis. **Conclusion:** Appendix perforation is still a serious side effect of acute appendicitis that can affect patient morbidity and clinical outcomes.

INTRODUCTION

The most frequent surgical emergency worldwide is appendicitis. Appendicitis has a 0.8 lifetime risk in western nations, a 0.052% population incidence in the UK, and an estimated fewer than 9 cases per 100,000 in South Africa. Only 5–10% of instances of appendicitis occur in the senior population, making it known to be a disease that primarily affects younger people. However, given the recent increase in life expectancy, the disease's incidence appears to be on the rise in this age range. Between the ages of 10 and 30, acute appendicitis is most common.[1,2]

Acute appendicitis is primarily diagnosed clinically, and it can show either typical or atypically. The typical presentation begins with a few hours of vague peri-umbilical pain that progresses to the right iliac fossa (RIF) and is accompanied by nausea, vomiting, or lack of appetite. Pain in the right lower quadrant may be an early sign in atypical histories, which do not follow this usual pattern. Furthermore, high rates of morbidity and mortality have been linked to delayed diagnosis and treatment due to the frequently unusual appearance and delay in seeking medical attention. In both young and old age groups, the prognosis for uncomplicated appendicitis is almost comparable. Perforation, on the other hand, significantly deteriorates the condition and raises morbidity and mortality rates.[3,4] Ultrasound or CT scans are used clinically to help diagnose complex acute appendicitis. To lower the negative appendectomy rate, it is standard practice to admit and monitor patients with an unclear diagnosis and postpone surgery until the diagnosis is more certain. Delays in diagnosis and decisive care are caused by both the patient's pre-admission and the surgeon's post-admission delays. Acute appendicitis can cause complications, such as an inflammatory mass, an appendix rupture or abscess, and widespread peritonitis, if treatment is not received. Since suppuration, perforation with or without bleeding, and appendix gangrene are among the other severe problems brought on by the development of the acute inflammatory process, early surgery is essential to halting the condition's progression.[5-7]

According to a study, between 40% and 70% of patients develop perforated acute appendicitis, which increases the risk of postoperative complications and death. In order to enhance patient safety and results, emergency doctors (EPs) find it difficult to diagnose perforated appendicitis at

the ED in a timely and accurate manner.[8]

Our study's goal is to ascertain how frequently patients with acute appendicitis who are hospitalized to Ayub Teaching Hospital in Abbottabad have perforated appendices. Even though perforated appendices are frequent in Pakistan, not much research has been done on the topic. In addition to contributing to the body of knowledge already in existence, this study will assist emphasize the significance of the illness and the necessity of educating medical professionals about it and how to prevent it.

MATERIALS AND METHODS

The department of surgery at Ayub Teaching Hospital in Abbottabad conducted this descriptive cross-sectional study between January and June of 2025. After being approved by the institutional ethical review committee, 145 patients who satisfied the inclusion criteria were selected via non-probability sequential sampling. The informed consent of each patient will be sought. A sample size of 145 cases has been established with a 40.0%[8] frequency of perforated appendix in acute appendicitis, a 95% confidence level, and an 8% margin of error. Regardless of gender, all patients with acute appendicitis who were between the ages of 10 and 60 were included. We excluded acute abdominal discomfort from any other cause, such as acute pancreatitis, peritonitis, intestinal blockage or perforation, or any visceral perforations.

In doing this study, ethical issues were of utmost importance. All participating patients, or their legal guardians in the event that they were unable to give consent individually, kindly provided written informed consent. This strategy upheld the principles of autonomy and informed decision-making in medical research by guaranteeing that all participants were fully informed about the study's goals, methods, possible risks, and advantages. All study participants followed the same preoperative regimen, which guaranteed consistency in patient assessment and decision-making. Only a specialist consultant general surgeon made the crucial choice to continue with surgery for acute appendicitis.

Data on perforated appendicitis were meticulously documented, closely following the study's operative criteria. This definition most likely contained particular requirements for identifying an appendix as perforated, such as the presence of fecaliths in the peritoneal cavity, obvious holes in the appendix wall, or significant peritoneal contamination. Finding out how common perforated acute appendicitis was in the research population was the main goal of data gathering.

All procedures were carried out by the same surgical team in order to maintain uniformity and reduce variation in surgical technique and evaluation. A highly skilled consultant surgeon with at least five years of post-fellowship experience in general surgery oversaw this team. In order to add another level of observation and data verification, the researcher, who was also involved in the study design and data collecting, helped with these surgeries. In addition to standardizing the surgical techniques, this method made it possible to capture intraoperative discoveries in real time.

Data analysis was done with SPSS version 23.0. After the Shapiro-Wilk test was used to assess for normality, quantitative variables such as age and the duration of the complaint were expressed as mean±standard deviation or median (IQR). Frequencies and percentages were used to characterize categorical factors such as gender, family history, socioeconomic status, education level, residence status, and outcome variables. To account for effect modification, the outcome variable was stratified by age, gender, BMI, duration of complaints, and residential status. Fisher's exact test or post-stratification chi square was applied at a 5% significance level.

RESULTS

The study's participants ranged in age from 10 to 60, with a mean age of 37.12 ± 11.24 years. 78 patients, or 53.79% of the total, were between the ages of 36 and 60. With a male to female ratio of 1.3:1, 82 (56.55%) of the 145 patients were men and 63 (43.5%) were women. In our study, the average duration of symptoms was 26.60 ± 13.58 hours. A mean BMI of 27.48 ± 3.01 kg/m2 was recorded. Table 1 displays the distribution of patients with additional confounding variables.

44 (30.34%) of the patients in our study had a ruptured appendix as a result of acute appendicitis (Figure 1). Table 2 displays the stratification that was utilized to account for effect modifiers such age, gender, BMI, duration of complaints, and residential status.

Table 1

Distribution of Patients with other Confounding Variables (n=145)

Confounding variables		Frequency	%age
Age (years)	10-35	67	46.21
	36-60	78	53.79
Gender	Male	82	56.55
	Female	63	43.45
Duration of disease (hours)	≤24	80	55.17
	>24	65	44.83
BMI (kg/m²)	≤30	113	77.93
	>30	32	22.07
Education	Uneducated	38	26.21
	Educated	107	73.79
Socioeconomic status	Poor	30	20.69
	Middle	69	47.59
	Upper	46	31.72
Place of residence	Rural	52	35.86
	Urban	93	64.14

Figure 1

Frequency of Perforated Appendix in Acute Appendicitis (n=145).

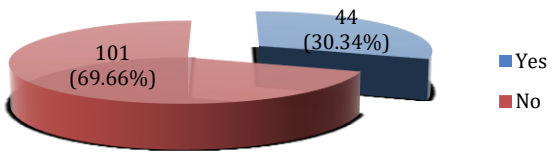

Table 2
Stratification of Perforated Appendix with Respect to Age, Gender, BMI, Duration of Complaints and Residential Status.

Variables		Yes (n=44)	No (n=101)	P-value
Age (years)	10-35	19 (28.36%)	48 (71.64%)	0.629
	36-60	25 (32.05%)	53 (67.95%)	
Gender	Male	24 (29.27%)	58 (70.73%)	0.748
	Female	20 (31.75%)	43 (68.25%)	
Duration of disease (hours)	≤24	24 (30.0%)	56 (70.0%)	0.920
	>24	20 (30.77%)	45 (69.23%)	
BMI (kg/m^2)	≤30	37 (32.74%)	76 (67.26%)	0.238
	>30	07 (21.88%)	25 (78.12%)	
Education	Uneducated	10 (26.32%)	28 (73.68%)	0.529
	Educated	34 (31.78%)	73 (68.22%)	
Socioeconomic status	Poor	07 (23.33%)	23 (76.67%)	0.329
	Middle	25 (36.23%)	44 (63.77%)	
	Upper	12 (26.09%)	34 (73.91%)	
Place of residence	Rural	12 (23.08%)	40 (76.92%)	0.155
	Urban	32 (34.41%)	61 (65.59%)	

DISCUSSION

One of the most common surgical emergencies that surgical residents encounter during their residency is acute appendicitis. Acute appendicitis diagnosis is particularly difficult because it mostly depends on clinical evaluation. Given its remarkable sensitivity (94%) and specificity (95%) when compared to other investigative modalities, CT scans of the abdomen and pelvis with contrast became a frequently used diagnostic technique in situations when diagnostic ambiguity persists.[9,10] However, reliance on clinical evaluation is still common in outlying healthcare settings where access to CT scans may be restricted. As a result, there is an increased chance of failing to receive a diagnosis, and a delay in diagnosis can result in serious morbidity and death from perforation.[11,12] The current literature on appendicitis is in agreement with the distribution of intraoperative findings in this investigation. The most frequent observation was a grossly inflamed appendix, which is consistent with earlier research that found an incidence of inflammatory appendix ranging from 65% to 85%.[13,14] The second most frequent finding was a perforated appendix, which is in line with research showing that perforation occurs in 20–30% of cases of appendicitis.1,18 The incidence of perforated appendicitis was 19.3% in our study compared to 11.3% in a study conducted in Pakistan by Nighat G et al.[15] Lastly, the reported incidence of negative appendectomy ranges from 5% to 25%, which is similar with the 8.2% incidence of normal appendix.[16] A number of research have looked into the relationship between appendicitis and gender, with varying degrees of success. While some studies have indicated greater incidence rates in males, others have found no discernible difference in the incidence of appendicitis between males and girls.[17,18] A study carried out at a major Turkish hospital revealed no discernible difference between males and girls in the incidence of appendicitis or other intraoperative findings.[19] This conclusion is supported by the results of our investigation, which showed no statistically significant difference in intraoperative findings between male and female appendectomy patients.

According to earlier research, the age range of 36–60 years old accounted for the largest percentage of patients with a highly inflamed appendix. According to a study by Bolandparvaz et al., most of the people in their study who had acute appendicitis were between the ages of 20 and 40.[20] The age group of 20 to 30 years old had the highest incidence of acute appendicitis, according to another study by Al-Qahtani et al.[21] Furthermore, the current study's findings regarding the lack of gangrenous appendicitis in the 15–25 age group are consistent with earlier findings. There were no occurrences of gangrenous appendicitis in the 10–19 age range, according to a study by Karaman et al. (2018).[22]

Patients with acute appendicitis who experienced symptoms for longer than 24 hours were more likely to experience perforation and the formation of an abscess, according to a study by Tsai et al.[23] Likewise, Zhao et al.'s study discovered a substantial correlation between the length of symptoms and the severity of appendicitis as well as the likelihood of complications.[24]

Numerous research have looked into the relationship between BMI and intraoperative results in individuals having appendicectomies. Higher BMI was linked to a higher risk of severe appendicitis, including perforation and abscess formation, according to a systematic review and meta-analysis of 11 studies involving 7,163 individuals (24).[25] Overweight and obese patients had a higher risk of developing complex appendicitis than patients of normal weight, according to another study involving 1,253 patients.[26] Nevertheless, other research has found no connection between the severity of appendicitis and BMI. For instance, BMI was not a significant predictor of appendiceal perforation in a research involving 399 individuals.[27]

According to the study, the two main factors contributing to perforation are advancing age and delayed intervention. Notwithstanding these conclusions, it is important to note some of the study's shortcomings. First of all, the study was cross-sectional. Second, the study was conducted at a single location. Thirdly, the power of the results can be improved by increasing the sample size. Finally, the follow-up data was not collected.

The study's conclusions have significant clinical ramifications, highlighting the necessity of public awareness initiatives to promote prompt medical attention for severe stomach discomfort. Enhancing diagnostic accessibility should also be a priority for healthcare policies, especially in rural areas where delayed presentations are more prevalent. This study highlights the significance of early detection and surgical intervention in mitigating the complications of ruptured appendicitis. Delays in hospital presentation continue to be a substantial predictor of adverse outcomes, highlighting the need for improved patient education and accessibility to healthcare. In order to expand the number of less invasive surgical options, more research should be done to determine whether laparoscopy is a good substitute for open appendectomy, which is still the most prevalent surgical technique for perforated cases. Future studies should also focus on enhancing perioperative care practices and early diagnostic technology to reduce morbidity and improve overall patient prognosis.

CONCLUSION

Appendix perforation is still a serious side effect of acute appendicitis that can affect patient morbidity and clinical outcomes. Early identification of risk variables, such as patient age and symptom duration, is essential for accelerating the right kind of care and perhaps averting perforation.

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