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Original Article

Frequency of Acute Peritonitis Secondary to Various Sites of Viscus Perforation in a Tertiary Care Hospital

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ABSTRACT

Objective: To determine the frequency and sites of acute peritonitis in patients with viscus perforation presenting to Lady Reading Hospital, Peshawar.

Study Design: Cross-sectional study.

Place and Duration of Study: Department of General Surgery, Lady Reading Hospital, Peshawar, Pakistan, from Jan to Aug 2025.

Methodology: This study involved 143 patients of both genders aged between 18 and 60 years presenting with viscus perforation. All patients underwent CT imaging for confirmation of viscus perforation and assessment for acute peritonitis based on fever (≥101°F), positive ascitic fluid bacterial culture, and absolute polymorphonuclear leukocyte (PMN) count ≥250 cells/mm³ in ascitic fluid. Age, gender, socioeconomic status, educational level, and perforation sites were analyzed, and a chi-square test was used with significance set at $p \leq 0.05$.

Results: The mean age of patients was 38.3±11.9 years. There were 89(62.2%) male and 54(37.8%) female patients. Out of 143 patients with viscus perforation, 35(24.5%) developed acute peritonitis. The sites of perforation leading to acute peritonitis were: colon 15 (42.9%), small intestine 16 (45.7%), appendix 2 (5.7%), and stomach 2 (5.7%). Longer duration of symptoms (p-value=0.003) and lower socioeconomic status (*p*-value=0.021) had significant associations with development of acute peritonitis.

Conclusion: Acute peritonitis secondary to viscus perforation was found in approximately one-quarter of patients presenting to our center. Small intestine and colon perforations were the most common sites leading to acute peritonitis. Delayed presentation and poor socioeconomic conditions were significant risk factors for developing acute peritonitis following viscus perforation.

Keywords: Emergency treatment; General surgery; Intestinal perforation; Peritonitis.

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INTRODUCTION

Viscus perforation represents a surgical emergency characterized by the rupture of hollow abdominal organs, including the stomach, intestines, or appendix. This condition allows gastrointestinal contents, bacteria, and digestive enzymes to leak into the normally sterile peritoneal cavity, potentially leading to severe inflammation and systemic infection. [1] The etiology of viscus perforation is diverse, encompassing peptic ulcer disease, traumatic injuries, inflammatory bowel conditions, diverticulitis, malignancy, and iatrogenic causes during medical procedures. [2]

Acute peritonitis, defined as rapid-onset inflammation of the peritoneum, frequently complicates viscus perforation and represents a life-threatening condition requiring immediate surgical intervention. [3] The clinical presentation typically includes severe abdominal pain, fever, nausea, vomiting, and abdominal rigidity. Without proper recognition and appropriate treatment, acute peritonitis can progress to septic shock, multiple organ failure, and death. [4] The mortality rate associated with acute peritonitis varies significantly, ranging from 10% to 40%, depending on factors such as the site of perforation, delay in diagnosis, patient comorbidities, and adequacy of initial management. [5]

The anatomical location of viscus perforation significantly influences the clinical course and prognosis of patients. Perforations of the upper gastrointestinal tract, particularly gastroduodenal perforations secondary to peptic ulcer disease, often present with a sudden onset of severe epigastric pain and may be associated with pneumoperitoneum on imaging.[6] In contrast, small bowel perforations may result from various causes, including trauma, inflammatory conditions, or ischemia, and typically

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present with more generalized abdominal pain and signs of peritoneal irritation.[7]

Large bowel perforations, commonly associated with diverticular disease, malignancy, or inflammatory conditions, pose challenges due to the high bacterial load and fecal contamination of the peritoneal cavity. [8] These cases often require a more aggressive surgical approach, including bowel resection, colostomy formation, and intensive antibiotic therapy. The complexity of managing colonic perforations is further complicated by the presence of associated medical comorbidities in affected patients. [9]

A study by Al Bisher HM et al., demonstrated that among patients with viscus perforation, acute peritonitis developed in 23.9% of cases. The distribution of perforation sites in their cohort showed small intestine involvement in 45.5% of cases, colon in 42.4%, appendix in 6.1%, and stomach in 6.1%.[10] These findings showed the predominance of lower small intestinal tract perforations in the development of acute peritonitis and highlight the importance of specific management approaches based on the site involved.

This study aims to address the existing knowledge gap by estimating the frequency, proportion, and anatomical distribution of acute peritonitis among patients with newly diagnosed viscus perforation presenting to Lady Reading Hospital, Peshawar. Additionally, it explores the association of acute peritonitis with patient-related factors such as age, gender, socioeconomic status, educational level, residential background, and duration of symptoms. The findings are expected to offer valuable inputs for clinicians, support evidence-based surgical decision-making, guide regional public health strategies, and serve as a foundation for future research in emergency abdominal surgery.

METHODOLOGY

This was a cross-sectional study conducted at the Department of General Surgery, Lady Reading Hospital, Peshawar, Pakistan, from Jan to Aug 2025. Ethical approval was obtained from the institutional review board with Ref: No. 491/LRH/ MTI (Dated: 22/11/2024). The estimated sample size was 195 using WHO sample size software with 95% confidence level, 6% margin of error, and an expected frequency of acute peritonitis of 23.9% in patients with viscus perforation; however, 143 patients fulfilling the inclusion criteria were recruited within the study duration.[10]

Inclusion Criteria: Patients of either gender, aged between 18 and 60 years, with viscus perforation confirmed on CT imaging showing extravasation of contrast material, bowel wall discontinuity, and pneumoperitoneum were included.

Exclusion Criteria: Patients with previous abdominal surgery documented in medical records, pregnant women confirmed on ultrasound, history of severe comorbidities (chronic kidney disease, liver cirrhosis, malignancy), and history of allergies to contrast material were excluded.

Patients were included in the study using the Non-Probability, Convenient Sampling technique. Diagnosis of viscus perforation was made upon CT imaging confirmation showing extravasation of contrast material, bowel wall discontinuity, and pneumoperitoneum. Acute peritonitis was defined as fever ≥101°F measured by digital thermometer, combined with positive ascitic fluid bacterial culture and absolute polymorphonuclear leukocyte (PMN) count ≥250 cells/mm^3 in ascitic fluid obtained through diagnostic paracentesis.[3] Subsequently, 143 patients with viscus perforation, who met the inclusion and exclusion criteria, were enrolled in this study. Detailed history and written informed consent were obtained from the patient or their attendants. Diagnostic paracentesis was performed under sterile conditions to obtain ascitic fluid for bacterial culture and cell count analysis. CT imaging was performed using standard protocols with intravenous contrast material administration. All patients with confirmed viscus perforation were managed surgically following standard preoperative resuscitation. An exploratory laparotomy was performed in all cases under general anesthesia. The timing of surgery varied depending on patient stability and referral status, as some cases presented after prior management at peripheral facilities. Intraoperative findings were used to confirm the site of perforation and presence of peritonitis. Patient's demographic details along with perforation sites and presence of acute peritonitis were noted and recorded into the attached proforma. All assessments, including clinical evaluation, paracentesis, and data recording, were performed by a trainee medical officer of general surgery to ensure consistency and eliminate bias. Confounding variables were controlled through detailed history taking and a thorough review of all records.

Data were analyzed using Statistical Package for Social Sciences version 26.0. Quantitative variables such as age and duration of symptoms were presented as mean ± standard deviation. Categorical variables, including gender, socioeconomic status, educational level, perforation site, and presence of acute peritonitis, were presented as frequencies and percentages. The frequency of acute peritonitis was calculated overall and stratified by anatomical site of perforation, including gastric, duodenal, ileal, colonic, and appendiceal, as identified on CT and intraoperative findings. Comparisons of proportions across different perforation sites as well as across patient-related characteristics such as age, gender, socioeconomic status, and duration of symptoms were performed using the chi-square test. A p-value of 0.05 or less was considered statistically significant.

RESULTS

A total of 143 patients with viscus perforation were analysed for baseline characteristics as presented in Table-I. The mean age of patients was 38.3±11.9 years, with the majority (36.4%) belonging to the 31-45 years age group. Male patients comprised 62.2% of the study population. More than half of the patients (54.5%) belonged to a poor socioeconomic status, and 39.2% were uneducated. Rural residents constituted 59.4% of the study population, reflecting the catchment area of Lady Reading Hospital. Out of 143 patients with viscus perforation, 35 (24.5%) developed acute peritonitis. Among patients who developed acute peritonitis, small intestine perforation was the most common site (45.7%), followed closely by colon perforation (42.9%). Appendix and stomach perforations each accounted for 5.7% of acute peritonitis cases, as shown in Table- II. Statistical analysis revealed that patients from poor socioeconomic status were significantly more likely to develop acute peritonitis, as presented in Table-III (71.4% vs 49.1%, $p=0.021$). Additionally, patients with symptom duration >3 days had a significantly higher risk of developing acute peritonitis (77.1% vs 51.9%, $p=0.003$). Age, gender, educational level, and residential status showed no significant association with the development of acute peritonitis.

DISCUSSION

This study provides important insights into the frequency and characteristics of acute peritonitis secondary to viscus perforation in the Pakistani population, specifically from Peshawar. The findings demonstrate that acute peritonitis developed in 24.5% of patients with viscus perforation, which is consistent reporting rates of 24.9%.[10] This similarity suggests that despite geographical and healthcare system differences, the pathophysiology and clinical course of this condition remain relatively consistent across different populations. Although we initially anticipated a higher frequency of peritonitis, the observed rate was comparatively lower. This may be explained by the inclusion of contained perforations, early referral to tertiary care, and prior antibiotic exposure, which can prevent the progression of perforation to generalized peritonitis.

Table-I: Baseline Characteristics of Study Participants (n=143)

Characteristics	Category	Values
Age	Mean Age (years)	38.3±11.9
Duration of symptoms	Mean Duration of Symptoms (days)	3.6±1.8
Age Groups	18-30 years	45(31.5%)
	31-45 years	52(36.4%)
	46-60 years	46(32.2%)
Gender	Male	89(62.2%)
	Female	54(37.8%)
Socioeconomic Status	Poor	78(54.5%)
	Middle	51(35.7%)
	Rich	14 (9.8%)
Educational Level	Uneducated	56(39.2%)
	Primary	41(28.7%)
	Secondary	32(22.4%)
	Higher	14 (9.8%)
Residential Status	Rural	85(59.4%)
	Urban	58(40.6%)
Profession	Labor/Farmer	67(46.9%)
	Business	28(19.6%)
	Housewife	31(21.7%)
	Others	17(11.9%)

Table-II: Distribution of Acute Peritonitis and Sites of Viscus Perforation (n=143)

Variable		n(%)
Acute Peritonitis	Present	35(24.5%)
	Absent	108(75.5%)
Sites of Viscus Perforation (Overall)	Colon	58(40.6%)
	Small Intestine	52(36.4%)
	Appendix	21(14.7%)
	Stomach	12(8.4%)
Sites of Perforation in Patients with Acute Peritonitis (n=35)	Small Intestine	16(45.7%)
	Colon	15(42.9%)
	Stomach	2(5.7%)
	Appendix	2(5.7%)

The demographic profile of our study population reveals several interesting patterns. The male predominance (62.2%) observed in our study aligns with findings of Furrukh et al., who represented 78%

male predominance, potentially reflecting occupational hazards, lifestyle factors, and healthcare-seeking behaviors.[11] The mean age of 38.3 years indicates that viscus perforation primarily affects the productive age group, which has significant socioeconomic implications for families and healthcare systems in developing countries was reported by Chandran *et al*.[12]

Table-III: Association of Various Factors with Development of Acute Peritonitis (n=143)

	Factor	Acute Peritonitis Present (n=35)	Acute Peritonitis Absent (n=108)	*p*-value
Age Groups	≤40 years	18(51.4%)	63(58.3%)	0.472
	>40 years	17(48.6%)	45(41.7%)	
Gender	Male	23(65.7%)	66(61.1%)	0.641
	Female	12(34.3%)	42(38.9%)	
Socioeconomic Status	Poor	25(71.4%)	53(49.1%)	0.021
	Middle/Rich	10(28.6%)	55(50.9%)	
Educational Level	Uneducated/Primary	28(80.0%)	69(63.9%)	0.082
	Secondary/Higher	7(20.0%)	39(36.1%)	
Residential Status	Rural	24(68.6%)	61(56.5%)	0.219
	Urban	11(31.4%)	47(43.5%)	
Duration of Symptoms	≤3 days	8(22.9%)	52(48.1%)	0.003
	>3 days	27(77.1%)	56(51.9%)	

The high proportion of patients from poor socioeconomic backgrounds (54.5%) and rural areas (59.4%) reflects the catchment area characteristics of Lady Reading Hospital as a major public sector tertiary care facility. More concerning is the finding that poor socioeconomic status was significantly associated with the development of acute peritonitis (p=0.021). This association likely reflects multiple factors, including delayed healthcare seeking due to financial constraints, limited access to quality healthcare facilities, poor nutritional status, and higher prevalence of risk factors such as peptic ulcer disease in economically disadvantaged populations, like findings of Abbasi *et al*.[13]

Our study revealed that small intestine perforation (45.7%) was slightly more common than colon perforation (42.9%) in patients who developed acute peritonitis. This distribution is consistent with international studies, though the exact percentages vary across different geographical regions. Bisher *et al*.,[10] reported small intestine as the most frequent site (56.3%) compared to 25% for colon, while Hameed *et al*.,[14] observed a predominance of ileal perforations over colonic perforations in their series. The predominance of small bowel and colonic perforations in acute peritonitis cases can be explained by the higher bacterial load and more severe inflammatory response associated with these sites compared to gastric or appendiceal perforations.

The relatively low frequency of acute peritonitis secondary to appendiceal perforation (5.7%) in our study may reflect improved emergency care systems and earlier recognition of acute appendicitis, leading to timely surgical intervention before perforation occurs. However, this finding should be interpreted cautiously as our study specifically focused on patients who had already developed viscus perforation, and many cases of acute appendicitis are managed before progression to perforation.[15] sA particularly significant finding in our study was the strong association between delayed presentation (>3 days of symptoms) and development of acute peritonitis (p=0.003). This is supported by Malik *et al*., who found that patients presenting more than 24 hours after symptom onset had higher rates of generalized peritonitis and worse outcomes.[16] Similarly, Raza *et al*., reported that longer delays correlate with increased mortality in peritonitis cases.[17]

In contrast, Agnesi *et al*., in an acute appendicitis cohort, found that in-hospital delays did not significantly increase risk of complications or severity, suggesting that extra-hospital delay (time before first presentation) may be more relevant than delay within hospital settings.[18] Comparing our results with similar studies from the region, Neupane *et al*., reported that delayed presentation was strongly associated with higher morbidity and mortality in patients with perforated peritonitis, supporting our findings.[19] Likewise, an analysis from the National Trauma Registry of Iran reported by Mirzamohamadi *et al*., highlighted that educational and socioeconomic factors significantly influenced outcomes in patients with abdominal emergencies, consistent with our observations.[20]

Our data show that 39.2% of patients were uneducated and 28.7% had only primary education, suggesting health literacy affects timely treatment for abdominal emergencies. Although education level was not statistically significant (p=0.082), enhancing health education may prompt faster healthcare access and reduce acute peritonitis. The study highlights the need for public health campaigns about severe abdominal symptoms, improved access for disadvantaged and rural groups, and efficient emergency care for viscus perforation. Strengthening primary healthcare is essential for early detection and referral, and targeted

efforts for socioeconomically disadvantaged populations might lower rates of complicated viscus perforation.

Our study has several limitations that should be acknowledged. As a single-center study, the findings may not be generalizable to other regions with different population characteristics or healthcare systems. The short duration and study design limit our ability to establish causal relationships between identified risk factors and outcomes. Additionally, we did not assess long-term outcomes or mortality rates, which would provide valuable information about the clinical impact of acute peritonitis in our population.

CONCLUSION

Acute peritonitis was a frequent finding among patients with viscus perforation, particularly the small intestine and colon, showing variation across demographic and clinical factors. These results highlight local trends and provide a concise overview of their occurrence within the studied population.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MD & AUA: Data acquisition, data analysis, critical review, approval of the final version to be published.

QUA & IUH: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MF & WU: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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