

Outcome of Acute Peritonitis Related to Cause and Duration of Presentation

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ABSTRACT

Objective: To determine the outcome of acute cause-related peritonitis correlated with duration of inflammation within 24, 24-48, and after 48 hours of hospital admission.

Methodology: Cross-sectional study was conducted in Surgical Ward #3, Jinnah Postgraduate Medical Centre from September 2019 to March 2021. Patients over 12 years were included in this study. The duration, cause and outcomes of peritonitis were noted. All complications were recorded and treated accordingly.

Results: One hundred and thirty patients between the ages of 13 to 80 years old were included, 104 were males (76.8%) and 32 females (23.18%). 37 patients (28.2%) were from 13–20 years, 61 (44.2%) from 21–40, 33 (23.91%) from 41–60, and 5 (3.6%) above 60 years. Mortality showed 2 patients (1.47%) expired in 24–48 hours, and 6 (4.4%) in 48 hours. The cause of peritonitis included typhoid ileal perforation (41%), duodenal perforation (33%), ruptured appendix (28%), intestinal tuberculous (14%), gangrenous gut (7%), tumor perforation (6%), liver abscess (3%), and gastric perforation and rectal tear (1%). Notably, 2.4% of patients with typhoid peritonitis, 3.0% with duodenal perforation 3.5% with ruptured appendix, 14.2% with tuberculous intestine, 33.3% with tumor perforation and 100% with liver abscess perforation passed. The common complications were paralytic ileus (8%) and burst abdomen (8%).

Conclusion: Typhoid ileal perforation was the major cause of peritonitis, and paralytic ileus and burst abdomen were the most common complications contributing to the mortality rate.

Keywords: Mortality, Peritonitis, Complications, Sepsis.

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Introduction

For several decades, perforated hollow viscus causing peritonitis has remained a surgical emergency worldwide.¹ Current medical advances, emerging intensive care facilities, and progress with surgical research, has shifted peritonitis treatment to operative rather than conservative management, which has shown improved mortality rates. Peritonitis is the inflammation of the peritoneum that lines the abdomen, which under homeostatic conditions, encloses a sterile environment.² Peritoneal breach by either perforation, trauma, gangrene, tumor obstruction, ischemia, or previous surgeries (e.g.,

anastomotic leak resulting in bacterial spillage in the abdominal cavity) are all causes that contribute to peritonitis.³ It has been proposed that infection triggers a cascade of events that impairs the function of several organs⁴ and organ systems. This eventually leads to septicemia, metabolic and circulatory instability thus causing renal failure and pulmonary insufficiency. In advance age, it can prove fatal and leads to high mortality and morbidity. All these cases may explain the high mortality observed in postoperative patients.⁵ However, a proper history, thorough examination with vital monitoring in the emergency room, and appropriate laboratory investigations and radiographs are required to confirm and lead the surgeon to a diagnosis.

Therefore, laparotomy and peritoneal toilet can reduce the mortality and morbidity so early surgical management is ideal for peritonitis. Hence, it is challenging for the surgeon to assess and make the timely diagnosis, prompt intervention and addressing the primary pathology would show better outcome in patients which is the subject of the research described herein.

Lower gastrointestinal (GI) perforations are common in Western countries. These diagnostic/therapeutic procedures are common in Pakistan, despite the fact that Pakistan and other South Asian countries are still dealing with upper gastrointestinal perforation, implying that the causes of acute peritonitis in Western and Asian countries may differ. Across various South Asian countries, factors such as unhygienic conditions and smoking increase the risk of *Salmonella typhi* and *Helicobacter pylori* infection. The latter is a key contributor to gastric perforation, which is a common cause of mortality in patients with H. pylori infection.⁶ Sepsis is a life-threatening condition which leads to death so early detection, intensive care and treatment can reduce mortality rate. Thus, fluid replacement and administration of antibiotic will reduce the organ failure due to sepsis. Sepsis more than 30 hours and hypotension had negative prognostic value and might be high risk for 30 days mortality.

Therefore, laparotomy and peritoneal toilet can reduce the mortality and morbidity so early surgical management is ideal for peritonitis. Hence, it is challenging for the surgeon to assess and make the timely diagnosis, prompt intervention and addressing the primary pathology would show better outcome in patients. Acute peritonitis affects about 9.3 patients per 1000 hospital admissions.⁷

The objectives of this study were two-fold: first, to ascertain causes of peritonitis; and second, to determine how the duration of inflammation affects peritonitis-related complications and patient mortality at a local Pakistani hospital, Jinnah Postgraduate Medical Centre. In this study, we explored the outcomes of acute peritonitis, including cause-related mortality and duration of inflammation, within 24 hours, between 24 and 48 hours, and after 48 hours. Ultimately, this study sought to provide evidence-based knowledge and raise awareness among medical professionals to prevent acute peritonitis-related complications and minimize mortality rates.

Methodology

This Cross-sectional study was conducted in Ward 3 of Jinnah Postgraduate Medical Centre from September 2019 until March 2021 for 18 months with the ethical letter number NO.F.2-81/2019-GEN/36803/JPMC. Inclusion criteria were male or female patients over twelve years of age who presented with complaints of abdominal pain, fever, constipation and vomiting for multiple days. Patients were thoroughly examined immediately and assessed for hypoactive bowel sounds and air under the diaphragm by X-ray. Patients were resuscitated and vital monitoring was performed depending on the duration of peritoneal inflammation. Patients who presented late required more vigorous resuscitation.

A sample size of 136 achieves 88.733% power to detect a difference (P1-P0) of -0.0800 using a two-sided exact test with a significance level (alpha) of 0.050. These results assume that the population proportion under the null hypothesis (P0) is 0.9300.

Based on patients' laboratory investigations, exploratory laparotomy was performed. Operative findings and the duration of inflammation were recorded. Specifically, we assessed typhoid ileal perforation at the anti-mesenteric border (confirmed by blood cultures), duodenal, gastric, tumor, splenic/liver abscess, and tuberculous perforations (confirmed by histopathology); ruptured appendices; and rare cases such as rectal tears. Patients who presented within 24 hours subsequently underwent primary repair. Those who presented within 24–48 hours underwent primary repair or ileostomy depending on their age, comorbid conditions, and contamination of the gut. Patients who presented after 48 hours primarily underwent stoma formation. Duration of inflammation was defined as the time between peritonitis establishment and exploratory laparotomy. Establishment of peritonitis means when gut perforation occurred and abdominal pain became generalized and signs like tenderness, rebound tenderness and absent gut sounds appeared.

Postoperative complications such as burst abdomen, anastomotic leakage, intraperitoneal abscesses, and paralytic ileus were treated with tension suturing, re-exploration and ileostomy, re-exploration and wash out, and electrolyte and fluid balance, respectively. The mortality was recorded afterwards.

Results

One hundred thirty six patients between the ages of 13 and 80 years old were included. 104 were males (76.5%) and 32 were females (23.5%). Specifically, 37 patients were between the ages of 13 and 20 (27.2%), 61 (44.8%) were between 21 and 40, 33 (24.3%) between 41–60, and 5 (3.7%) were older than 60.

Cause-related mortality shows that 41 patients (30.1%) exhibited typhoid ileal perforation, of which 1 patient died (2.4%); 33 patients (24.2%) exhibited duodenal perforation, of which 1 died (3.0%); 28 patients (20.5%) suffered from ruptured appendix, of which 1 died (3.5%); 14 patients (10.2%) exhibited tuberculous perforation, of which 2 patients expired 2 (14.2%); 6 patients (4.4%) showed tumor perforation, for which there were 2 (33.3%) mortalities; finally, 1 patient presented with liver abscess perforation who subsequently died. (Table I)

Mortality related to the duration of inflammation showed that no patients died within 24 hours, 2 patients (1.47%) died within 24–48 hours, and 6 patients (4.4%) died after 48 hours. (Table II)

Discussion

Acute diffuse peritonitis is a common surgical emergency worldwide and is a major contributor to non-trauma-related death.⁸ Despite current medical advances, secondary peritonitis remains a common, life-threatening condition with high mortality and morbidity.

Table II: Morbidity and Mortality due to the type of peritonitis-related complication(n=136)

Complications	No. of patients	%	95 % CI
Paralytic ileus	8	5.8%	2.8 - 10.8
Burst abdomen	8	5.8%	2.8 - 10.8
Wound Infection	4	2.90%	0.9 - 6.9
Intraperitoneal abscess	1	0.73%	0.03-3.6
Hernias	0	0%	--
Re-exploration	0	0%	--
Total Morbidity	21	15%	10.1 - 22.3
Total Mortality	8	5.80%	2.8 - 10.8

Although intraabdominal sepsis affects all age groups, it more severely impacts the elderly than it does younger populations. This study showed there is a predominance of the male gender being affected by peritonitis who were older, had greater mortality and morbidity, and had similar results in this study.⁹

Peritonitis presents with characteristic signs and symptoms, and it is therefore possible to make a rapid clinical diagnosis in most patients. Unfortunately, most patients present to the hospital too late, with well-established generalized peritonitis and varying degrees of septicemia. A loss of physiological reserve, together with concomitant systemic illnesses like metastasis, hypertension, diabetes mellitus, chronic kidney disease, and cirrhotic liver disease, compromises the patient's immune system and worsens their outcomes. Notably, elderly populations, who are immunocompromised and have various other comorbid conditions, are particularly susceptible to peritonitis, as their weakened immune

Table I: Outcome of Acute Causes-related Peritonitis

Cause of peritonitis	No. of patients (n=136)	Morbidity (95% CI)	Mortality (95% CI)	Uneventful (95% CI)
Typhoid ileal perforation	41 (30.1%) (22.9 - 38.2)	9(21.9%) (11.3 - 36.4)	1(2.4%) (0.1 - 11.4)	31(75.7%) (60.8 - 86.9)
Duodenal perforation	33 (24.2%) (17.6 - 32.0)	3(9.0%) (2.4 - 22.8)	1(3.0%) (0.1 - 14.0)	29(88.0%) (73.3 - 96.0)
Ruptured appendix	28 (20.5%) (14.4 - 28.0)	5(17.8%) (6.8 - 35.2)	1(3.6%) (0.2 - 16.4)	22(78.6%) (60.7 - 90.8)
Tuberculous intestine	14 (10%) (5.9 - 16.3)	0(0%) --	2(14.3%) (2.5 - 39.7)	12(85.7%) (60.3 - 97.5)
Gangrenous gut	7 (5.1%) ((2.3 - 9.9)	4(57.1%) (21.6 - 87.7)	0(0%) --	03(42.9%) (12.2 - 78.4)
Tumor perforation	6 (4.4%) (1.8 - 8.9)	0(0%) --	2(33.3%) (6.0 - 73.8)	4(66.7%) (26.2 - 94.0)
Liver abscess	3 (2.2%) (0.5 - 6.0)	0(0%) --	1(33.3%) (1.7 - 86.8)	2(66.7%) (13.2 - 98.3)
Gangrenous gall bladder	2 (1.4%) (0.2 - 4.8)	0(0%) --	0(0%) --	2(100.0%) (22.3 - 100.0)
Gastric perforation	1 (0.7 3%) (0.03 - 3.57)	0(0%) --	0(0%) --	1(100.0%) (5.0 - 100.0)
Rectal tear perforation	1 (0.7 3%) (0.03 - 3.57)	0(0%) --	0(0%) --	1(100.0%) (5.0 - 100.0)

systems do not eradicate infections from the body as efficiently.¹⁰

In this study, we found that the duration of peritoneal inflammation and its cause does affect clinical outcomes, as indicated by the comparison of peritonitis-related complications and mortality rate. The patients who died presented late, were older in age, and exhibited both gross contamination of gut and sepsis.^{11, 12}

This study revealed that the most common cause of acute peritonitis was typhoid ileal perforation, followed by duodenal perforation, ruptured appendix. Moreover, in this study, 5.7% patients expired due to benign causes of peritonitis. In contrast, other groups have found that the common causes of peritonitis were perforation due to colorectal cancers, with a rate of 77.27%, and *H. pylori*, with a rate of 77.77%.¹³ In comparison to another study, it depicted that developing world had more upper gastrointestinal perforation as compared to western world where lower gastrointestinal perforation was the predominant cause.¹⁴

The sample size was of 136 patients out of these 8 patients died with a mortality rate of (5.88%). In this study the mortality rate shows a clear picture of increased mortalities in patients who sorted medical help late. Other study showed that after 30 hours mortality is increased and might be a high risk for 30 days.¹⁴ Similarly, the case with the other study conducted in Hyderabad, India where the mortality rate was almost the same as ours. It's pretty evident that the patients who expired presented late and the adverse factors which were gross contamination of gut, old age and sepsis, seemed to be higher in non survivors in comparison with survivors.¹⁵ It was observed in another study that patients who presented late to the hospital ended up having increased rate of morbidity and mortality. Similarly, mortality was more in this study for the patients who presented late.¹⁶

Early surgical intervention can prevent various surgical complications like paralytic ileus, although prompt treatment, appropriate and adequate administration of fluids can also minimize this complication. Instilling proper surgical techniques, washing the abdominal cavity with adequate fluid, minimizing the use of gauze, and surgical drains can prevent complications like wound infections, burst abdomen, intra-adhesionial collection, and postoperative collection, abscess, and adhesions.¹⁷

In this study, there were 107 patients who were uneventful (78.6%). In total, 21 patients experienced

complications (15.4%). In contrast to the findings in the study by Batra and colleagues (26.25%)¹⁸, our study reported fewer complications.

We found that the two major complications were burst abdomen and paralytic ileus. Burst abdomen is a severe postoperative complication defined as the separation of abdominal aponeurotic layers and is recognized within days after surgery. Risk factors for wound dehiscence include emergency surgery, intra-abdominal infection, malnutrition, advanced age, and pre-existing systemic diseases.¹⁹ When considering treatments for burst abdomen, dynamic techniques should be prioritized over the use of static closure techniques, like component separation and skin grafting.²⁰

Paralytic ileus, which is a normal physiological response to abdominal surgery, was another common complication in our study, although the timeframe was not given nor was it consistent. Nevertheless, when the ileum is extended beyond its normal physiological range it can lead to severe discomfort and must be differentiated from other potential complications.²¹ Though the complication rate can be lowered by early surgical intervention, timely administration of antibiotics, safer anesthesia, better preoperative resuscitation, good postoperative care, proper nutrition, and early mobilization of the patient are usually helpful.^{22, 23} Despite taking all the above measures, surgical complications may still occur in cases where the predominant risk factors are advanced age, immunocompromised patients, delay in treatment due to late presentation in the hospital, gross contamination of gut, and origin of perforation.

Among the limitations in this study, a key limitation is exclusion of children younger than 12 years of age, patients with cardiomyopathies, and those with chronic liver and kidney diseases.

Conclusion

Our study revealed several risk indicators for peritonitis-related complications and mortality, which were more common in patients presenting late (i.e., after 48 hours) with gross contamination of the gut. Typhoid ileal perforation was identified as the major cause of peritonitis, and paralytic ileus and burst abdomen were the most common complications, contributing to the mortality rate and complications.

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