

ORIGINAL RESEARCH

To determine the clinical investigation of patients with acute peritonitis

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ABSTRACT

Aim: To determine the clinical investigation of patients with acute peritonitis. **Materials and Methods:** This clinical study was designed to investigate acute peritonitis in 50 patients admitted to our institution. Data collection was conducted using a pre-tested proforma, which included detailed history-taking, clinical examination, relevant investigations, and treatment protocols. Patients were included in the study based on specific inclusion and exclusion criteria. Inclusion criteria comprised patients provisionally diagnosed with acute peritonitis who underwent relevant investigations and surgical intervention. Exclusion criteria included patients who were ruled out for peritonitis after investigations, pediatric patients under 15 years of age, patients treated conservatively without surgery, those who refused surgical intervention, and those deemed unfit for surgery. **Results:** Abdominal pain was a universal symptom among all patients. Fever was present in 80%, vomiting in 70%, guarding/rigidity in 90%, and rebound tenderness in 84% of cases. Free air on X-ray erect abdomen, indicative of gastrointestinal perforation, was found in 60% of the patients. Positive peritoneal fluid culture was seen in 50% of the cases, while elevated serum amylase levels (indicative of pancreatitis) and positive Widal tests (indicative of enteric fever) were observed in 20% and 10% of patients, respectively. The culture of peritoneal fluid showed that 50% of the samples were positive for bacterial growth. *E. coli* was the most common pathogen, found in 20% of the cases, followed by *Klebsiella* spp. (10%), *Streptococcus* spp. (10%), *Pseudomonas* spp. (6%), and other bacteria (4%). The remaining 50% of cultures were negative, possibly due to prior antibiotic administration or non-bacterial causes of peritonitis. Local postoperative complications included surgical site infections in 20% of the patients, intra-abdominal abscesses in 10%, wound dehiscence in 6%, fistula formation in 4%, and persistent drainage in 4%. Notably, 56% of the patients did not experience any local complications, indicating successful surgical and postoperative management in the majority of cases. **Conclusion:** The most prevalent symptom of acute peritonitis is abdominal pain, with a higher incidence in males. The preferred therapy was an appendectomy.

Keywords: Duodenal perforation, acute peritonitis, exploratory laparotomy

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INTRODUCTION

Acute peritonitis is a life-threatening condition characterized by inflammation of the peritoneum, the thin membrane lining the abdominal cavity and covering the abdominal organs. This condition requires prompt medical intervention due to its rapid progression and potential for severe complications. Peritonitis can be classified into primary, secondary, and tertiary forms, with secondary peritonitis being the most common, typically resulting from the perforation of a hollow viscus such as the stomach, intestine, or gallbladder. The etiology of acute peritonitis is diverse, encompassing a wide range of gastrointestinal disorders, infections, and traumatic events. Perforated peptic ulcers, appendicitis, diverticulitis, and bowel obstruction are among the

leading causes of secondary peritonitis. The introduction of bacteria, digestive enzymes, or bile into the sterile peritoneal cavity leads to a robust inflammatory response, characterized by the release of cytokines and other inflammatory mediators. This results in the clinical manifestations of acute peritonitis, including severe abdominal pain, tenderness, rigidity, fever, and signs of systemic infection such as tachycardia and hypotension.¹ The pathophysiology of acute peritonitis involves a complex interplay between microbial invasion, immune response, and the subsequent systemic effects. The initial insult, whether microbial or chemical, triggers an inflammatory cascade that leads to vasodilation, increased capillary permeability, and recruitment of immune cells to the peritoneal cavity.

This inflammatory response aims to contain the infection but can also contribute to tissue damage and organ dysfunction. In severe cases, the systemic inflammatory response syndrome (SIRS) may develop, potentially progressing to sepsis, multiple organ failure, and death if not promptly managed.² Diagnosis of acute peritonitis is primarily clinical, supported by laboratory and imaging studies. A thorough history and physical examination are crucial, with attention to signs of peritoneal irritation such as rebound tenderness and guarding. Laboratory tests, including complete blood count (CBC), blood urea nitrogen (BUN), serum creatinine, and liver function tests (LFTs), can provide supportive evidence of infection and organ function. Imaging studies, particularly abdominal X-rays, ultrasound, and computed tomography (CT) scans, are essential for identifying the underlying cause of peritonitis, such as perforation or abscess formation.³ Management of acute peritonitis requires a multifaceted approach, including prompt surgical intervention, antimicrobial therapy, and supportive care. The primary objective of surgery is to address the source of contamination, which may involve procedures such as appendectomy, repair of perforated ulcers, resection of necrotic bowel segments, or drainage of abscesses. Laparotomy remains the standard approach, although laparoscopic techniques are increasingly employed, particularly in less severe cases. Antibiotic therapy should be broad-spectrum initially, targeting both aerobic and anaerobic organisms, and subsequently tailored based on culture and sensitivity results. Supportive care plays a critical role in the management of acute peritonitis. Fluid resuscitation, correction of electrolyte imbalances, and maintenance of adequate organ perfusion are essential to stabilize patients and prevent complications such as acute kidney injury and shock. Pain management, nutritional support, and careful monitoring for signs of systemic infection or organ dysfunction are also integral components of postoperative care.^{4,5} The prognosis of acute peritonitis depends on several factors, including the etiology and severity of the condition, the patient's age and comorbidities, and the timeliness and effectiveness of medical intervention. Early diagnosis and prompt surgical management are crucial for improving outcomes and reducing mortality. However, despite advances in surgical techniques and critical care, acute peritonitis remains associated with significant morbidity and mortality, particularly in elderly patients and those with severe underlying conditions.

MATERIALS AND METHODS

This clinical study was designed to investigate acute peritonitis in 50 patients admitted to our institution. Data collection was conducted using a pre-tested proforma, which included detailed history-taking, clinical examination, relevant investigations, and treatment protocols. Patients were included in the

study based on specific inclusion and exclusion criteria. Inclusion criteria comprised patients provisionally diagnosed with acute peritonitis who underwent relevant investigations and surgical intervention. Exclusion criteria included patients who were ruled out for peritonitis after investigations, pediatric patients under 15 years of age, patients treated conservatively without surgery, those who refused surgical intervention, and those deemed unfit for surgery.

Methodology

Clinical Evaluation and Investigations Patients suspected of having acute peritonitis underwent a thorough clinical evaluation, including detailed history and physical examination. Investigations included an X-ray of the erect abdomen to detect free air under the diaphragm, complete blood count (CBC) to assess white blood cell count, hemoglobin levels, and platelets, blood urea and serum creatinine levels to evaluate renal function, and routine urine analysis and microscopy to rule out urinary tract involvement. Serum amylase levels were measured if pancreatitis was suspected, and a Widal test was conducted in cases where enteric fever was a differential diagnosis. Peritoneal aspirate, Results of culture of peritoneal fluid, Operative Procedure adopted and Postoperative complications-local were also studied. **Surgical Intervention** Upon confirmation of the diagnosis and stabilization of patients, surgical intervention was undertaken. Laparotomy was performed under general anesthesia or epidural anesthesia based on the patient's condition and surgeon's preference. Detailed documentation of the surgical findings, including the source of peritonitis, extent of infection, and any complications, was maintained. **Postoperative Care and Follow-Up** Postoperatively, patients were closely monitored in the hospital until discharge. Follow-up visits were scheduled in the outpatient department (OPD) for one month post-discharge to monitor recovery and identify any late complications. Postoperative care included routine monitoring of vital signs, wound care, and management of any complications. **Outcome Measures** The primary outcome measure was mortality, defined as death occurring during the same hospital admission as the episode of peritonitis. Secondary outcome measures included the duration of hospital stay, postoperative complications, and recovery time.

Data Analysis

Data analysis was performed using descriptive statistical tools. Continuous variables were expressed as mean \pm standard deviation, while categorical variables were presented as percentages. Statistical comparisons were made using appropriate tests, with a p-value of less than 0.05 considered statistically significant.

RESULTS

Demographic Data

The demographic distribution showed that the majority of patients (40%) were aged between 30-49 years, followed by 30% aged 50-69 years, 16% under 30 years, and 14% aged 70 years and above. The gender distribution revealed that 60% of the patients were male, while 40% were female. This demographic spread suggests a higher prevalence of acute peritonitis in middle-aged males.

Preoperative Laboratory Parameters

Preoperative laboratory parameters indicated an elevated white blood cell count (mean $12.8 \pm 3.4 \times 10^9/L$) compared to the normal range of $4.0-11.0 \times 10^9/L$, signifying an inflammatory response. The mean hemoglobin level was slightly lower than the normal range for men (12.1 ± 1.5 g/dL), possibly indicating anemia or blood loss. Blood urea levels were elevated (mean 45.2 ± 10.6 mg/dL), suggesting renal involvement or dehydration. Serum creatinine levels were within the normal range (mean 1.0 ± 0.3 mg/dL). Serum amylase (mean 65.3 ± 20.5 U/L) and serum bilirubin (mean 1.2 ± 0.4 mg/dL) levels were also measured to identify pancreatic or hepatic involvement, respectively.

Clinical Presentation and Diagnostic Findings

Abdominal pain was a universal symptom among all patients. Fever was present in 80%, vomiting in 70%, guarding/rigidity in 90%, and rebound tenderness in 84% of cases. Free air on X-ray erect abdomen, indicative of gastrointestinal perforation, was found in 60% of the patients. Positive peritoneal fluid culture was seen in 50% of the cases, while elevated serum amylase levels (indicative of pancreatitis) and positive Widal tests (indicative of enteric fever) were observed in 20% and 10% of patients, respectively.

Peritoneal Aspirate Findings

Peritoneal aspirate findings revealed that 70% of the patients had turbid fluid, suggesting infection or inflammation. Pus was present in 20%, bile in 6%,

and feculent material in 4% of the cases. These findings correlate with the severity and nature of the infection or perforation.

Results of Culture of Peritoneal Fluid

The culture of peritoneal fluid showed that 50% of the samples were positive for bacterial growth. *E. coli* was the most common pathogen, found in 20% of the cases, followed by *Klebsiella* spp. (10%), *Streptococcus* spp. (10%), *Pseudomonas* spp. (6%), and other bacteria (4%). The remaining 50% of cultures were negative, possibly due to prior antibiotic administration or non-bacterial causes of peritonitis.

Operative Procedures Adopted

Appendectomy was the most frequently performed procedure (40%), followed by repair of perforated ulcers (20%), cholecystectomy (16%), resection of bowel segments (10%), and drainage of abscesses (10%). Other less common procedures accounted for 4% of the cases. This distribution reflects the varied etiology of acute peritonitis, with appendicitis being a leading cause.

Postoperative Complications (Local)

Local postoperative complications included surgical site infections in 20% of the patients, intra-abdominal abscesses in 10%, wound dehiscence in 6%, fistula formation in 4%, and persistent drainage in 4%. Notably, 56% of the patients did not experience any local complications, indicating successful surgical and postoperative management in the majority of cases.

Postoperative Complications (Systemic)

Systemic complications were observed in 40% of the patients. Respiratory complications were the most common (16%), followed by sepsis (12%), cardiovascular complications (8%), and renal failure (4%). However, 60% of the patients did not develop any systemic complications, highlighting the importance of vigilant postoperative care to prevent these potentially life-threatening issues.

Table 1: Demographic Data

| Variable | Frequency (n=50) | Percentage (%) |
|-------------|------------------|----------------|
| Age (years) | | |
| - <30 | 8 | 16% |
| - 30-49 | 20 | 40% |
| - 50-69 | 15 | 30% |
| - ≥ 70 | 7 | 14% |
| Gender | | |
| - Male | 30 | 60% |
| - Female | 20 | 40% |

Table 2: Preoperative Laboratory Parameters

| Parameter | Mean \pm SD | Normal Range |
|--|-----------------|-------------------------------------|
| Hemoglobin (g/dL) | 12.1 ± 1.5 | 13.5-17.5 (men) / 12.0-15.5 (women) |
| White Blood Cell Count ($\times 10^9/L$) | 12.8 ± 3.4 | 4.0-11.0 |
| Blood Urea (mg/dL) | 45.2 ± 10.6 | 7-20 |

| | | |
|--------------------------|-------------|---------|
| Serum Creatinine (mg/dL) | 1.0 ± 0.3 | 0.6-1.2 |
| Serum Amylase (U/L) | 65.3 ± 20.5 | 30-110 |
| Serum Bilirubin (mg/dL) | 1.2 ± 0.4 | 0.1-1.2 |

Table 3: Clinical Presentation and Diagnostic Findings

| Clinical Presentation | Frequency (n=50) | Percentage (%) |
|--|------------------|----------------|
| Abdominal Pain | 50 | 100% |
| Fever | 40 | 80% |
| Vomiting | 35 | 70% |
| Guarding/Rigidity | 45 | 90% |
| Rebound Tenderness | 42 | 84% |
| Free Air on X-ray Erect Abdomen | 30 | 60% |
| Positive Peritoneal Fluid Culture | 25 | 50% |
| Elevated Serum Amylase (if pancreatitis suspected) | 10 | 20% |
| Positive Widal Test (if enteric fever suspected) | 5 | 10% |

Table 4: Peritoneal Aspirate Findings

| Finding | Frequency (n=50) | Percentage (%) |
|-------------------|------------------|----------------|
| Turbid Fluid | 35 | 70% |
| Pus | 10 | 20% |
| Bile | 3 | 6% |
| Feculent Material | 2 | 4% |

Table 5: Results of Culture of Peritoneal Fluid

| Culture Result | Frequency (n=50) | Percentage (%) |
|-----------------------|------------------|----------------|
| Positive for Bacteria | 25 | 50% |
| - E. coli | 10 | 20% |
| - Klebsiella spp. | 5 | 10% |
| - Streptococcus spp. | 5 | 10% |
| - Pseudomonas spp. | 3 | 6% |
| - Others | 2 | 4% |
| Negative | 25 | 50% |

Table 6: Operative Procedures Adopted

| Operative Procedure | Frequency (n=50) | Percentage (%) |
|----------------------------|------------------|----------------|
| Appendectomy | 20 | 40% |
| Repair of Perforated Ulcer | 10 | 20% |
| Cholecystectomy | 8 | 16% |
| Resection of Bowel Segment | 5 | 10% |
| Drainage of Abscess | 5 | 10% |
| Others | 2 | 4% |

Table 7: Postoperative Complications (Local)

| Complication | Frequency (n=50) | Percentage (%) |
|-------------------------|------------------|----------------|
| Surgical Site Infection | 10 | 20% |
| Intra-abdominal Abscess | 5 | 10% |
| Wound Dehiscence | 3 | 6% |
| Fistula Formation | 2 | 4% |
| Persistent Drainage | 2 | 4% |
| No Local Complications | 28 | 56% |

Table 8: Postoperative Complications (Systemic)

| Complication | Frequency (n=50) | Percentage (%) |
|------------------------------|------------------|----------------|
| Respiratory Complications | 8 | 16% |
| Sepsis | 6 | 12% |
| Cardiovascular Complications | 4 | 8% |
| Renal Failure | 2 | 4% |
| No Systemic Complications | 30 | 60% |

DISCUSSION

The demographic distribution in this study showed that the majority of patients with acute peritonitis were middle-aged males, with 40% of patients aged between 30-49 years and 60% being male. This finding aligns with previous studies which suggest that acute peritonitis is more common in middle-aged males due to higher incidences of risk factors like perforated peptic ulcers and appendicitis in this demographic. In comparison, studies by Schein et al. and Testini et al. also reported a higher prevalence in middle-aged males, supporting the generalizability of our findings.^{6,7} The elevated white blood cell count (mean $12.8 \pm 3.4 \times 10^9/L$) observed in our study is indicative of an acute inflammatory response, a common finding in acute peritonitis as reported in other studies. The slightly lower mean hemoglobin level (12.1 ± 1.5 g/dL) suggests anemia or blood loss, which can occur due to gastrointestinal perforations or chronic inflammation. Elevated blood urea levels (mean 45.2 ± 10.6 mg/dL) suggest renal involvement or dehydration, findings that are consistent with studies by Kumar et al. and Biondo et al., which also noted similar biochemical alterations in peritonitis patients.^{8,9}

Abdominal pain was present in all patients, consistent with the universal symptomatology of peritonitis. The high incidence of fever (80%), vomiting (70%), guarding/rigidity (90%), and rebound tenderness (84%) are in line with classical presentations of acute peritonitis. Free air under the diaphragm, detected in 60% of cases, is a critical diagnostic indicator of gastrointestinal perforation, corroborating findings from investigations by van Ruler et al. and Svanes et al.^{10,11} The 50% positivity rate for peritoneal fluid culture underscores the importance of bacterial infections in peritonitis, with pathogens such as *E. coli* and *Klebsiella* spp. frequently identified, similar to reports by Wittmann et al.¹² Peritoneal aspirate findings showing turbid fluid in 70% of cases and pus in 20% reflect severe infection or inflammation, which are significant indicators of the severity of peritonitis. The presence of bile and feculent material, though less common, indicates biliary or gastrointestinal perforations, aligning with studies by Schein et al.⁶ The 50% positivity rate for bacterial cultures, with *E. coli* being the most common pathogen, is consistent with findings from previous studies which identify Enterobacteriaceae as frequent culprits in peritoneal infections. The negative culture results in the remaining cases could be attributed to prior antibiotic use or non-bacterial causes of peritonitis, a factor also noted in studies by Meakins et al.¹³ Appendectomy was the most frequently performed procedure (40%), followed by repair of perforated ulcers (20%), cholecystectomy (16%), resection of bowel segments (10%), and drainage of abscesses (10%). This distribution reflects the varied etiology of acute peritonitis, with appendicitis being a leading cause. These findings are consistent with

studies by Biondo et al. and Kumar et al., which also report appendectomy and ulcer repair as common interventions in peritonitis cases.^{8,9} Local postoperative complications such as surgical site infections (20%), intra-abdominal abscesses (10%), and wound dehiscence (6%) were within expected ranges, similar to complication rates reported by Schein et al. and Wittmann et al.⁶ The overall success in managing these complications is reflected in the 56% of patients who did not experience any local complications. Systemic complications were noted in 40% of patients, with respiratory complications (16%) and sepsis (12%) being the most common. This is in line with findings from van Ruler et al. and Svanes et al., who also identified respiratory issues and sepsis as significant postoperative challenges in peritonitis patients.^{10,11} The absence of systemic complications in 60% of patients underscores the importance of effective perioperative care and monitoring to mitigate these risks.

CONCLUSION

The most prevalent symptom of acute peritonitis is abdominal pain, with a higher incidence in males. The preferred therapy was an appendectomy.

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