

Original Research Article

A prospective study to assess clinical profile and golden period for operative intervention in patients with perforation peritonitis

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ABSTRACT

Background: Perforation peritonitis constitutes one of the most common surgical emergencies encountered by surgeons. Even with modern treatment, diffuse peritonitis carries a high morbidity and mortality rate.

Methods: The prospective study was conducted at department of surgery on 50 patients of perforation peritonitis admitted in emergency department of hospital. Detailed history, clinical examination and investigations were carried out. Patients were operated upon and findings were noted. Comparisons were done for postoperative ICU stay, morbidity/ mortality, oral feed and total hospital stay between the patients who reported within 24 hours and after 24 hours of onset of symptoms to determine golden period for operative intervention.

Results: Out of total 50 patients, 21(42%) patients presented within 24 hrs of onset of first symptom of perforation while 29(58%) patients presented after 24 hours. Postoperative ICU stay, morbidity/ mortality, delay in oral feed and total hospital stay was statistically more in patients presenting after 24 hours.

Conclusions: It can be concluded that the golden period of 24 hrs between the onset of symptom and start of treatment is the most important factor to determine the outcome.

Keywords: Hospital stay, Morbidity, Mortality, Perforation peritonitis

INTRODUCTION

Perforation peritonitis constitutes one of the most common surgical emergencies encountered by surgeons.¹⁻³

Despite advances in diagnosis, antibiotics, surgical intervention and intensive care support, it is still an important cause of mortality in surgical patients and data from India regarding this is in paucity.⁴ Even with modern treatment, diffuse peritonitis carries a mortality rate of about 10% and there can be number of systemic complications like burst, leak, wound infection, fistula, shock and multisystem failure.⁵

Peritonitis is the inflammation of peritoneum and is most commonly caused by localized or generalized infection.⁶

Peritonitis can be of primary, secondary or tertiary types. Acute, primary or spontaneous peritonitis results from bacterial, chlamydial, fungal, or mycobacterial infection in the absence of perforation of gastrointestinal (GI) tract. Whereas, secondary peritonitis occurs in setting of GI perforations amenable to surgical therapy, and tertiary peritonitis develops following treatment of secondary peritonitis either due to failure of host inflammatory response or due to super infection.⁷

The spectrum of perforation peritonitis in India differs significantly from its western counterparts with duodenal ulcer perforation, perforating appendicitis, typhoid perforation and tubercular perforation being the major causes of generalized peritonitis.⁸

Till date various investigations are available for early diagnosis and management of patients. Diagnosis of perforation peritonitis may be confirmed by radiograph/X-ray of the abdomen showing the presence of dilated gas filled loops of bowel (consistent with a paralytic ileus) or showing free gas, the later is best shown on an erect chest radiograph.

Ultrasound and computerized tomography (CT) scanning are increasingly used to identify the cause of peritonitis. Such knowledge may influence management decisions. Diagnostic peritoneal aspiration may be helpful but is usually unnecessary. Bile stained fluid indicates a perforated peptic ulcer or gall bladder and presence of pus indicate a bacterial peritonitis.⁵

Treatment of peritonitis and intra-abdominal sepsis always begins with general care i.e. volume resuscitation, correction of potential electrolyte and coagulation abnormalities, and empiric broad spectrum parenteral antibiotic coverage.⁹ Antibiotic therapy is used to prevent local and haematogenous spread of infection and to reduce late complications.¹⁰ However, the specific treatment usually involves surgery to repair the perforation or resection of a small part of intestine and a temporary colostomy or ileostomy may be needed. The proposed surgical procedure depends on the anatomical site of infection, the degree of peritoneal inflammation, the generalized septic response, the patient's underlying condition, and the available resources at the treatment centre.¹⁰ Death is usually rapid in peritonitis and could be due to sepsis, cascade of infection and multi system organ failure. The role of early detection of severe sepsis and prompt aggressive treatment of the underlying organ dysfunction to prevent global tissue hypoxia and multiorgan failure has been emphasized. However, the method of its early detection remains limited at many centers in the Indian sub-continent.¹¹ Treatment delay can cause a statistically significant increase in mortality.¹²

Time of presentation to hospital for definitive management is the most important factor for the morbidity and mortality associated with these patients.¹³ It has been well reported that majority of patients of perforation peritonitis present late in our subcontinent, usually with well-established generalized peritonitis with purulent or faecal contamination and septicemia.¹³ End points of optimization measures in these group of patients still remains a grey area as regards to evidence based approach. Recently, the World Society of Emergency Surgery (WSES) has published evidence-based recommendations for management of patients with intra-abdominal infections. It has been reiterated that any source of infection for intra-abdominal sepsis should be managed at the earliest.¹¹

Although perforation peritonitis is a surgical emergency but, we need to rigorously evaluate evidence-based guidelines concerning the need for an emergent procedure in a haemodynamically unstable patient.¹⁴ So present

study is being undertaken to know the full spectrum of perforation peritonitis and to determine golden period for operative intervention.

METHODS

The prospective study was conducted at department of surgery at Guru Gobind Singh Medical College and hospital, Faridkot, Punjab. The study population included 50 patients of perforation peritonitis admitted in emergency department of hospital. Detailed history was taken prior to initiation of any surgical management. Patients also enquired about the reason for delay in presentation. Clinical signs like guarding, rigidity, obliteration of liver dullness, abdominal distension and signs of shock (low urinary output, cold and clammy extremities) were noted. All patients underwent routine investigations including X-Ray chest in erect position (in moribund patients lateral decubitus radiogram was done) and ultrasound abdomen.

Any patient with primary or tertiary peritonitis, with perforation of oesophagus, biliary tract, gall bladder, urinary bladder and reproductive organs or with known case of malignancy was excluded from the study.

All included patients were resuscitated till the clinical condition was deemed satisfactory to undergo surgery. The criteria for adequate resuscitation were adequate urine output and normal values of electrolytes.

Patients were subjected to emergency exploratory laprotomy after resuscitation. A standard midline incision was used, and peritoneal cavity was serially explored in all quadrants. The surgical procedure was carried out depending on etiology, site and pathology of perforation. A thorough wash of peritoneal cavity was carried out and drain was left in peritoneal cavity.

To evaluate golden period for initiating surgical management note was made of delay in presentation by the patients and any delay in treatment (in the hospital) in hours and the effect on the final outcome of the patients in terms of morbidity and mortality was noted. Total stay in hospital was noted and the patients were followed up during their hospital stay.

RESULTS

A total of 50 cases of gastrointestinal perforations were included in a prospective manner. In current study maximum number of patients presenting with perforation peritonitis belonged to the age group of 20 to 40 years and mean age was 35.02 ± 14.27 years (Table 1). The youngest patients were 10 years old girl and oldest was 85 years old women. In current study majority of cases were males (42) with male female ratio 5.25:1 (Table 1). Majority in present study 40 cases (80%) belonged to the low socioeconomic class while 8 cases (16%) belonged to middle class and 2 cases (4%) to the high class (Table 1).

Table 1: Demographic data.

Parameters(n= 50)	Observations
Age in years (mean±SD)	35.02 ±14.27
Gender (male/female)	42/8
Socioeconomic status (low/middle/high)	40/8/2

Majority of perforations were spontaneous i.e. 45 (90%) only 5 (10%) were traumatic (Table 2). Majority of patients had generalized peritonitis on presentation, 36(92%) cases and only 4(8%) cases were with localized peritonitis (Table 2). Distribution of time of presentation, seasonal variation of perforation and peritoneal fluid finding on laparotomy are also shown in table 2.

Table 2: Characteristics of perforation (n=50).

Characteristics	Observations
Time of presentation (<24hours/ >24hrs)	21/29
Etiology (spontaneous/ traumatic)	45/5
Type of perforation (localized/ generalized)	4/36
Seasonal variation (winters vs summers)	24/26
Peritoneal fluid on laparotomy (clear/ purulent/ faecal)	8/36/5

Table 3: Anatomical site of perforation.

Site of perforation	No. of cases	Percentage
Gastric	3	6
Duodenal	18	36
Ileal	17	34
Appendicular	5	10
Colonic	4	8
Rectal	1	2
Site not specified	2	4
Total	50	100

Distribution of clinical features- symptoms, examination finding, and radiological and laboratory findings are shown in table 4.

Comparison of with latency of presentation and requirement of intensive care unit (ICU) care, start of oral intake, post-operative morbidity and mortality and post op length of hospital stay is shown in table 7.

DISCUSSION

Perforation peritonitis is one of the most common surgical emergencies with high mortality.² Different approaches and scores have been applied to decrease morbidity and mortality. Various studies observed time period as an important factor affecting mortality. The present study was conducted to evaluate clinical profile

of patients with perforation peritonitis and to determine golden period to operate.

In the present study the mean age was 35.02 years and male to female ratio of 5.25:1 (Table 1). These observations were similar to studies of Bali RS showing mean age 37.8 years and male to female ratio of 2.1:1.¹⁵ Similarly, Malik P also showed mean age 32 years and male to female ratio 2.8:1.¹⁶

As many as 40 (80%) cases included in the present study, belonged to the low socioeconomic status (Table 1). This may be attributable to kind of population scattered at our centre and also, delay in treatment could also be attributable to their poor financial condition. Ayandipo in their study also observed people predisposed to perforation peritonitis were of low educational status (40.1%) and lower socioeconomic class (92.1%).¹⁷

It was observed in present study there was no major seasonal variation in incidence of perforation peritonitis, as 26 (52%) patients presented in summer (May to September) and 24(48%) reported during winter (Oct-April) season (Table 2). However, Jampani, in their analysis of 30 cases, showed that the maximum incidence of duodenal perforation was during June- Sept (53.2%) followed by Feb-May (26.6%).¹⁸ Hardy also observed perforated peptic ulcer being more common in winter season.¹⁹

In present study 21(42%) patients presented within 24 hrs of onset of first symptom of perforation while 29(58%) patients presented after 24 hours (Table 2). This was similar to the findings of Jhobta MS, Bali RS and Patil reporting 51%, 53%, 68.5% and 84% of cases getting admitted when already more than 24 hours had passed since they experienced the first symptom.^{8,15,20,21}

Majority of cases (92%) in present study showed features of generalized peritonitis on admission and only few (8%) had localized peritonitis (Table 2). All cases of localized peritonitis were of appendicular perforation and presented early. As many as 73% (36) patients were found to have purulent peritoneal contaminant on laparotomy (Table 2). Maximum these cases (24) were those who reported after 24 hrs of onset of symptoms. Dani T in their study reported 87% patients had diffuse peritonitis. They also reported purulent contaminant in 62% cases.²²

Most common perforation observed in present study was duodenal (36%) followed by ileal (34%) perforations (Table 3). These observations were found concurrent with literature. Patil, Bali RS and Soyemi also observed duodenal as most common perforation in 41%, 37.5% and 32% of cases respectively.^{15,21,23} Malik also reported similar results with perforations in duodenum in 35.8% and ileal in 27.6%.¹⁶

Pain abdomen was most common symptom in 48(96%) patients followed by vomiting in 46 (92%) patients in current study (Table 4). Most common examination findings were tenderness guarding and rigidity in 48 (96%) patients, absent bowel sound in 46 (92%). This data is concurrent with studies conducted by Bali who reported that 98% patients presented with the history of abdominal pain, 62.5% with altered bowel habit, 41.5% with nausea and vomiting.¹⁵

Table 4: Distribution of clinical features symptoms, examination and investigation finding.

Clinical features	No. of cases	Percentage
Symptoms		
Pain abdomen	48	96%
Vomitting	46	92 %
Constipation/obstipation	45	90 %
Fever	32	64 %
Diarrhea	5	10 %
Examination finding		
Tenderness	48	96 %
Guarding	48	96%
Rigidity	48	96%
Liver dullness	38	76%
Absent bowel sound	46	92 %
Abdominal distention	45	90 %
Tachycardia	25	50 %
Hypotension	6	12 %
Radiological and laboratory findings		
Air under diaphragm	43	86 %
Free fluid	45	90 %
Hyponatremia	15	30 %
Hypokalemia	6	12 %
Blood urea nitrogen >167	10	20 %
Serum creatinine >1.5	8	16 %

Ultrasound abdomen showing free fluid in peritoneal cavity was positive in 45 (90%) cases but 3 appendicular and one ileal perforation showed no or minimal free fluid (Table 4). One of the cases with perforation peritonitis was put on conservative treatment as there was minimal free fluid with no guarding and rigidity. Air under diaphragm in plain X-ray chest was seen in 43 (86%) cases (Table 4). So, gas under diaphragm may not be present in all cases of perforation peritonitis especially perforated appendix and hence importance of clinical examination is highlighted.¹⁵ Cases with no air under diaphragm were 3 appendicular, 2 colonic and 1 each of ileal and rectal perforation, these cases were diagnosed through other clinical and other modalities and were managed accordingly.

Hyponatremia was in 15 (30%) patients, hypokalemia in 6 (12%), BUN>167 in 10 (20%) and serum creatinine was raised >1.5 in 8 (16%) as shown in table 4. All these were cases presented very late and were severely

dehydrated. Bali¹⁵ et al reported that 79% patients had pneumoperitoneum on chest X-ray in erect posture. They also reported electrolyte imbalances including hyponatremia in 21%, hypokalaemia in 19% and elevated serum creatinine in 18% of patients. However, Patil and Malik observed air under diaphragm in 94% and 77% cases respectively.^{16,21}

Table 5: Management of the perforation.

Procedure	No. of cases	Percentage
Omental patch repair	20	40 %
Primary closure	10	20%
Ileostomy	14	28 %
Conservative	1	2 %
Drain insertion under local anaesthesia	1	2 %
Appendicectomy	4	8 %
Total	50	100 %

The most common operative procedure done in present study for gastric and duodenal perforation was omental patch repair in 20(40%) patients (Table 5). The other procedures done were primary closure of the perforation, Ileostomy with or without primary closure of ileal perforation and appendicectomy (table 5). Study by Patil et al also reported omental patch repair as most common procedure and was considered preferred surgical method of closure as it is easy to perform technically straightforward and gives comparable results to that of definitive surgery in peptic ulcer perforations.²¹ Bali et al also considered omental patch as most common procedure in 43% cases and ileostomy in 22% cases.¹⁵

Table 6: Distribution of post-operative morbidity and mortality observed.

Type of complication	No. of cases	Percentage
Wound infection	19	38
Renal failure	5	10
Electrolyte disturbances	8	16
Anastomotic leak	5	10
Burst abdomen	6	12
Pneumonia	12	24
Mortality	8	16
Total cases with complications	21	42

In the present study 21(42%) cases developed postoperative complication and the most common complication observed was wound infection - 19 (38%) patients, followed by post-operative pneumonia in 12 (24%) as shown in table 6. Other complications were electrolyte disturbances 8(16%), burst abdomen 6 (12%), renal failure and anastomotic leak in 5 (10%) each (Table 6). Bali reported wound infection in 31.25%, pneumonia in 16.75%, electrolyte disturbances in 21.75%, burst

abdomen in 13.75% and anastomotic leak in 1.5%.¹⁵ Jhobta, Patil and Malik reported wound infection in 25%, 30%, 31% and pneumonia in 28%, 10%, and 23% respectively.^{8,16,21} Desa and Mehta reported wound infection in 17, burst abdomen in 10, renal failure in 13 and anastomotic leaks in 11 of his series of 161 patients.²⁴ Out of total 50, 8(16%) patients died of perforation peritonitis in spite of the best management possible.

In present study ICU care for patients having latency of presentation >24 hr was required in 12(41.37%) patients while only 2(9.52%) patients with latency period of <24 hrs required ICU care and this difference was statistically highly significant (p value 0.013) (Table 7).

The delay in presentation was seen to be associated with greater morbidity and mortality (Table 7). All 21 patients presenting within 24 hours survived and had better prognosis. Only 1(2%) patient of total cases complicated was from <24 hr group and was of wound infection. However, patients who presented late >24 hrs of onset of symptoms developed complication in 20 (40%) cases (Table 7). There were some patients developing more than one complication. All the 8 mortalities were seen in >24 hours group (Table 7). The reasons attributed behind this high mortality or morbidity were development of septicemia due to the delay in presentation, hemodynamic instability leading to shock, electrolyte disturbance, renal failure and all of these attributing to more chances of leak.

Table 7: Association of latency of presentation with ICU stay, start of oral feed, morbidity and mortality and total hospital stay.

Parameters		Duration of perforation before surgery <24 hours (n=21)	Duration of perforation before surgery >24 hours (n=29, enrolled n=21, survived)	P value
Post-operative Care (n=50)	No of patients Shifted to ward	19 (90.47%)	17(58.6%)	0.013*
	No of patients Shifted to ICU	2(9.52%)	12(41.37%)	
Oral feeding (n=42, who survived)	No of patients started oral intake ≤5 days	20(95.2%)	7 out of 21 (33.3%)	<0.001**
	No of patients started oral intake >5 days	1(4.7%)	14 out of 21 (66.6%)	
Morbidity/mortality(n=50)	No of cases with morbidity	1(4.7%)	20(68.9%)	<0.001**
	No of cases with mortality	0	8(27.5%)	0.009*
Hospital stay (n=42, who survived)	No of patients with hospital stay ≤10 days	20(95.2%)	7(33.3%)	<0.001**
	No of patients with hospital stay >10 days	1(4.7%)	14(66.6%)	

*p<0.05; Significant; **p<0.001; Highly significant

The overall morbidity seen in the present study was in 21(42%) (Table 7). Morbidity reported by study of Chakma was 52.24%.²⁵ In the present study a mortality of 16% was noted (Table 7). The mortality reported for perforation peritonitis in the literature varies.^{24,26,27} Desa and Mehta reported a mortality of 24.8%, while Angelo Nespoli reported it to be 20.5%.^{24,26}

In the present study it was observed that as the time of presentation increased, the rate of morbidity and mortality also increased. Jampani reported that the mortality risk for a patient who is operated on more than 24 hours after the onset of acute symptoms is 4.9 times to that of a patient operated within 24 hours.¹⁸ Less than 24 hrs group with 21 patients showed minimum morbidity of 1(4.76%) patient and no mortality.

Early return of bowel function and short hospital stay was observed in cases with short latency period of presentation (Table 7). In patients who presented <24 hr

(n=21) only 1 case has nil per mouth phase >5 days and hospital stay >10 days (Table 7). So, it is evident that the latency period of presentation definitely affects the morbidity and mortality and the final outcome of the case.

Walgenbach S and Bernard C analysed the time interval between onset of acute symptom and surgery. In <24 hours, mortality rate was 12% and in >24 hours, the mortality rate was 22.1%.²⁸ The mortality risk for a patient who is operated on more than 24 hours after the onset of acute symptoms was 4.9 times to that of a patient operated within 24 hours.

In the present study, 29 (58%) patients reached the hospital when >24 hours after the onset of symptoms. Late presentation of these cases to the hospital in our setup can be attributed to the rural location, poor emergency transportation facility, low socioeconomic status and low education level. Factors for delay in treatment were attributed to poor nutrition, dehydration

and low urine output. Patients were first adequately resuscitated and then operated on priority basis. Tsugawa K reviewed that 3 risk factors pre-operative shock, delay to surgery over 24 hours and medical illness that led to increased morbidity and mortality in patients with perforation.²⁹

So, the present study highlights the importance of latency in presentation which is detrimental in postoperative morbidity and mortality, recovery of bowel function and length of hospital stay. However, a large size and multicentric study is needed to confirm the findings of the present study.

CONCLUSION

It can be concluded that the golden period of 24 hours between the onset of symptom and start of treatment is the most important factor to determine the outcome. Proper mass education and strong primary health care system, free provision of early transportation facility and improving socioeconomic status of the people can help a lot to reduce the morbidity and mortality.

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