

## MORTALITY AND MORBIDITY IN PERFORATIVE PERITONITIS AND ITS SIGNIFICANCE

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### ABSTRACT

“Early prognostic assessment of abdominal sepsis is necessary in order to identify high-risk patients for more aggressive therapeutic treatments, offer objective categorization of illness severity, and determine the best perioperative management techniques. Perforations of the proximal gastrointestinal tract were six times more common than perforations of the distal GI tract, according to previous studies from India, which contrasts sharply with studies from developed countries such as the United States<sup>(5)</sup> Greece, and Japan, which revealed that distal gastrointestinal tract perforations were more common. <sup>(6)</sup> The time of presentation to the hospital, early surgical intervention, and perioperative care all have a role in the outcome of perforated peritonitis.”

“The goal of the operating protocol is to repair the pathology while avoiding any significant mishaps and to use a surgical method with few consequences. Following initial resuscitation with high volumes of crystalloids and administration of wide spectrum antibiotics against gramme negative bacteria and anaerobes, laparotomy and peforation closure are frequently performed”.

### INTRODUCTION

“The mortality rate of perforation peritonitis is affected by age, gender, ulcer location, treatment delay, and treatment modality. Lower GI perforation mortality is substantially greater, and many are linked with malignancy”. <sup>(9-10)</sup> “The purpose of this clinical trial is to assess the outcome of perforation peritonitis. Hence the present study was conducted at a tertiary healthcare institute to study factors involved in perforative peritonitis and its significance to mortality and morbidity.”

### Objectives

1. “To analyse the etiopathogenesis of perforative peritonitis”
2. “To analyse the rate of mortality and morbidity in cases of perforative peritonitis”
3. “To assess different factors concerned with perforative peritonitis”

### Review of Literature

Perforated peptic ulcers as a disease entity has been known since 1670

1660: “Littre (England) first described gastric ulcer perforation as the cause of death of daughter of Charles-I of England”

1727: Christopher Rawlinson (England) first described a case of perforated peptic ulcer

1881: “Ludwig Rydygier performed a successful resection of a prepyloric peptic ulcer”

1886: “ Heineke did the first pyloroplasty”

1893: “Barling, of Great Britain, treated perforated ulcer by closure and vigorous lavage of peritoneal cavity with large quantity of saline”.

1899: “ Kently performed gastric resection for perforated peptic ulcer”

1985: “ Barry Marshall cultured Helicobacter pylori”

1996: “ Halkic N. Pescatore P.and Gilleton combined both laproscopic–endoscopicmethods using an omental plug for therapy gastroduodenal ulcer perforation”

1943: “ Dragsted and Owens introduced bilateral truncal vagotomy. 1948: Frank son of Stockholm first reported selective vagotomy. 1965: Erik Amdrup performed highly selective vagotomy”.

“Clinical observation suggests that the mortality from peritonitis is reduced in patients placed in the semi upright position – probably decreases bacterial absorption via the diaphragm. The second clearance mechanism is by phagocytosis by resident peritoneal macrophages”.<sup>18</sup>

### **Local Reponse to peritoneal Infection**

The inflammatory response that occurs within the peritoneal cavity, characterized by hyperemia, the influx of fluid, recruitment of phagocytic cells and fibrin deposition.

### **“Systemic response to peritoneal infection:**

The systemic response to peritoneal infection emulates the response of the body to other forms of injury such as trauma or surgery. The development of hypovolaemia is a phenomenon central to the systemic response and probably results from the fluid influx occurring in the peritoneal cavity. The subsequent intravascular volume change leads to a reduction in venous return and cardiac output. Systemic hypotension also may be the result of the secretion of TNF, IL-1, platelet activating factor and nitric oxide.”<sup>19,20</sup>

“Diminished urine flow develops as a result of the effects of increased aldosterone and anti diuretic hormone secretion, reduced cardiac output and renal shunting of blood. This is the setting that has been dubbed as ‘warm’ septic shock, characterized by tachycardia, fever, oliguria, hypotension and warm extremities.”

### **Crohn’s disease**

“Crohn’s colitis is grossly characterized by a thickened colonic wall and a mucosal appearance of deep, indolent, linear ulcers, cobble stoning, friability, structuring and aphthoid ulceration. Single or multiple strictures may be present in boththe colon and small bowel.”

“Microscopically, there is transmural inflammation, sub mucosal edema, lymphoid aggregation, granulomas and ultimately fibrosis. The pathognomic microscopic feature are the noncaseating granuloma consisting of localized, well-formed aggregate of epithelioid histiocytes surrounded by lymphocytes and giantcells”.

### **Clinical features of perforative peritonitis :61**

“The signs and symptoms produced by the perforation vary according to the time that has elapsed since the rupture occurred. There are three stages in the pathological process that can be recognized.” The symptoms of each stage can be enumerated:

#### **Early (within the first two hours)**

- “Severe and generalized abdominal pain”
- “Hypothermia”
- “Pulse low and weak.”
- “Shallow respiration.”
- “Retching or vomiting (slight).”
- “Pain on top of one or both shoulders.”

#### **Resuscitation:**

“It is an axiom that in all cases of peritonitis, some degree of hypovolemia is present. The plasma volume must be restored and the plasma electrolyte concentration corrected. Fluid administered must contain both crystalloids and colloids. The effectiveness of fluid replacement can be judged by the normalization of pulse rate, blood pressure and mental status. Placement of a urinary drainage catheter is essential since restoration of urine output is a reliable indicator of adequate fluid resuscitation. Placement of central venous line is imperative for monitoring accurate fluid replacement.”

“Supplemental oxygen may be necessary and in more extreme circumstances, endotracheal intubation and mechanical ventilation may be needed to preserve oxygenation. Nasogastric decompression should be used in the presence of an ileus to prevent pulmonary aspiration and reduce abdominal distention.”

### **Conservative Management:72,73**

“Most patients with peptic ulcer perforation require operative therapy on rare occasions, conservative management of perforation can be beneficial particularly in those patients who have concomitant medical illness, perforation of more than 24 hrs, systolic pressure less than 100 mm Hg at the time of admission. These risk factors have definitive bearing on mortality rate. If one risk factor is present mortality is about 10%, if two factors are present mortality is about 40%, if three factors are present mortality is about 87%. These patients require close monitoring in intensive care unit as they may deteriorate and need operative therapy. If abdominal findings donot improve in 12 hours then operation is indicated”.

#### **Contraindications for non-operative treatment**

- Age > 70 years
- Steroid use
- Gastric perforation

#### **Simple closure Vs Definitive operation:**

“Simple closure was first suggested for patients with gastric ulcer perforation in 1894 and later was popularized by Roscoe Graham in perforated duodenal ulcer in 1937. Long-term follow up of these patients with simple closure has significantly influenced operative management in the past 10-15 years. Simple closure will lead to satisfactory result in 1/3rd of patients. The remaining 2/3rd of patients will need acid suppression therapy or definitive operation for complications.<sup>74</sup> According to Boey and Wong,

complications occurred in 52% of these patients (28% had bleeding, 15% had pyloric obstruction, 9% had reoperation). In this group of patients, 40% required reoperation. Ralph I George followed up 75 patients of simple closure for 5-10 yrs, 14 of these patients were on ulcerogenic drugs; 7% of them had recurrence while 6% patients who did not take ulcerogenic drugs had recurrence rate of 77%, proving that their ulcer diathesis was virulent enough to need definitive surgery. Boey and associates compared simple closure and closure with vagotomy in 78 patients with acute perforation, recurrence rate was 34% at 36 months after simple closure, reoperation was required in 43% of this group.<sup>76</sup> The higher reoperation rate in this group may be due to ethnic and geographic variation.”

#### **Perforation associated with hemorrhage:**

“When perforation of a duodenal ulcer is accompanied by overt gastrointestinal bleeding, a concomitant posterior ulcer should be suspected. Duodenum is opened through the anterior perforation for suture control of the posterior bleeding ulcer. An acid reductive procedure is mandatory – two alternatives being truncal vagotomy or proximal gastric vagotomy”.

#### **Definitive operations:**

**Truncal Vagotomy with pyloroplasty:** It has been used as definitive operation for perforated duodenal ulcer.

Advantages:

- The lesion is removed
- Pyloric stenosis is avoided.
- Length of operation is only slightly prolonged.

“The transverse closure of gastroduodenostomy is performed using an interrupted one-layer closure. Operative mortality of emergency truncal vagotomy with pyloroplasty for perforated ulcers varies from 0- 15% in four large series since with recurrence rate of 12-15%”.

#### **Proximal gastric vagotomy: 80**

“In 1973, Johnston and associates reported first clinical experience with this technique in addition to closure of perforation. Cumulative rate of recurrence was 63% after simple closure, 12% after truncal vagotomy with drainage and only 4% after proximal gastric vagotomy with simple closure in 60 patients over a period of seven years. Proximal gastric vagotomy should be avoided in patients with duodenal scarring. Jordan has suggested that all stable patients with perforated duodenal ulcer without risk factors should undergo Proximal gastric vagotomy with closure of perforation.”

#### **Perforated gastric ulcer**

“The mortality rate of gastric ulcer perforation is higher as it occurs in older patients and is usually associated with more contamination. A biopsy should always be taken from the gastric ulcer or a partial gastrectomy performed. However, if the patient’s general condition is poor, then a simple omental patch closure along with a biopsy may be adequate. Juxta pyloric ulcers behave like duodenal ulcers clinically and are treated by truncal vagotomy and pyloroplasty or by truncal vagotomy and resection. Benign ulcers in unstable or elderly patients may be treated with excision and closure or closure with omental patch. An Ulcer high on the lesser curvature should be excised and closed. If excision is not possible, the ulcer margin should be biopsied before closure with omental patch.”

### **Perforation of small intestine:**

“If one is dealing with perforation and associated peritonitis that precludes safe primary anastomosis, a proximal stoma and distal mucous fistula are constructed in close proximity to each other but not so close as to prevent placement of a proper fitting appliance. Once the patient is back to a normal state of health, both stoma and mucous fistula are taken down through an abdominal incision connecting both ends of the bowel. The latter are mobilized and an anastomosis is performed outside the peritoneal cavity. The bowel is then replaced in the peritoneal cavity, the fascia closed, and the skin and subcutaneous tissue left open.”

### **Appendicular perforation:**

“Generalized peritonitis following perforative appendicitis is the major cause of continuing mortality from appendicitis. This entity requires vigorous treatment. Appendectomy must be performed in children whether the peritonitis is diffuse or not, since the other course is associated with a prohibitive mortality. But the management of this problem in adults remains a controversy. In patients with diffuse peritonitis after perforative appendicitis appendectomy is the treatment, as the perforation remains a continuing source of peritoneal contamination. At operation for free perforation, visualization of all peritoneal surfaces is essential. All purulent and feculent material should be removed and dependent collection of pus should be aspirated, the peritoneal cavity should be repeatedly rinsed with warm saline solution”.

### **Intestinal Perforation in Tuberculosis**

Surgery is the treatment of choice. Early surgery and anti-tubercular treatment are lifesaving.

- (a) “Simple closure of perforation: It may be done in two layers using nonabsorbable sutures. As tuberculosis strictures are short, it is a quicker treatment for those who are critically ill. Oval excision of the perforated area with transverse closure, reinforced by an omental patch may also be done. It is contraindicated when the stiches are liable to cut due to much of granulation tissue and caseation, or there is a distal stricture”
- (b) “Simple closure with bypass of strictures: Simple closure and the bypass of Strictures by ileoileostomy or ileotransverse colostomy safeguard the closure against a blowout. Even when bypass is added, fistula formation frequently occurs. Resection of perforated segment: If the disease is limited to a short segment and the patient is fit, the most effective treatment is the resection of the diseased segment. The segment is resected and continuity restored by end to end anastomosis.”
- (c) “Perforation at the ileo-caecal region: Here closure with ileotransverse anastomosis is the preferred treatment but if the patient is fit a local ileo-caecal resection can be performed”

In a study by Talwar et al., “the mortality rate was 29.3%. Adverse prognostic factors were operation beyond 36 hours, multiple perforations and faecal fistula formation. Mortality was least with early resection and end – end anastomosis of the perforated bowel segment.”

### **Material and Methods**

**STUDY DESIGN:** Prospective Observational Study

**STUDY DURATION:** 18 months

**STUDY SITE:** Department of General Surgery, KIMSUDU, Karad

**STUDY POPULATION:** Patients presenting in emergency room of Krishna Institute of Medical

Sciences and Research Centre, Karad, between any age group, with symptoms of acute pain in abdomen with gas under diaphragm seen on either chest radiograph or x-ray erect abdomen.

**INCLUSION CRITERIA**

1. Patients of either sex all age groups willing to participate in the study with valid consent.
2. Patients presenting with acute abdomen with pneumoperitoneum on X-rays and/or CT scan, USG.
3. Patient presenting with acute abdomen and perforation diagnosed intraoperative.

**EXCLUSION CRITERIA**

1. Iatrogenic perforations
2. Pregnancy and lactation.
3. Patients with perforative peritonitis not willing to participate in the study.

**SAMPLE SIZE ESTIMATION**

According to articles the prevalence rate of perforated peritonitis patients was 5% to10%. Sample size formula used was:

$$n = Z^2Pq/L^2$$

$$n \approx 124$$

$$n = 130$$

L= allowable error (3)P= prevalence (5)

Q= 100-P (95)

By given formula and reference article, I will study a total of 130 cases.

**STUDY TOOLS**

**Mannheim Peritonitis Index**

**Results**

**Age distribution**

In the present study we assessed the Age distribution among the study subjects. We observed that majority of the study subjects belonged to the age group of 46 to 55 years (31.54%), followed by 36 to 45 years (24.62%), more than 66 years among 29.69% study subjects.

**Table: Age distribution**

Age distribution	Number of subjects	Percentage
Less than 25 years	6	4.62
26 to 35 years	15	11.54
36 to 45 years	32	24.62
46 to 55 years	41	31.54
More than 56 years	36	27.69
Total	130	100.00

Age distribution	Number of subjects	Percentage
Less than 50	58	44.62
More than 50	72	55.38
Total	130	100.00

### Clinical presentation

In the present study we assessed the Clinical presentation among the study subjects. We observed that Fever was noted among 36.92% study subjects, Vomiting was noted among 9.23% study subjects, Pain was noted among 100.00% study subjects, Distension was noted among 60.77% study subjects, Guarding and Rigidity was noted among 67.69% study subjects, Bowel Sound was noted among 11.54% study subjects, Free fluid was noted among 63.08% study subjects.

### Diagnosis

In the present study we assessed the Diagnosis among the study subjects. We observed that Duodenal ulcer perforation was diagnosed among 26.92% study subjects, Gastric ulcer perforation was diagnosed among 34.62% study subjects, Appendicular perforation was diagnosed among 23.08% study subjects, Ileal perforation was diagnosed among 8.46% study subjects, Large intestinal perforation was diagnosed among 6.92% study subjects.

**Table: Diagnosis**

Diagnosis	Number of subjects	Percentage
Duodenal ulcer perforation	35	26.92
Gastric ulcer perforation	45	34.62
Appendicular perforation	30	23.08
Ileal perforation	11	8.46
Large intestinal perforation	9	6.92
Total	130	100.00

### Discussion

“Perforation peritonitis is a common surgical emergency in tropical nations such as India, affecting mostly young men in their prime, as opposed to studies in the West, where it is growing increasingly common among the elderly. The majority of patients arrive at the hospital with well-established widespread peritonitis, purulent or faecal contamination, and variable degrees of septicemia. The signs and symptoms are common, and all patients may be clinically diagnosed with peritonitis.”<sup>1-2</sup>

### Age Distribution

“In the present study we assessed the Age distribution among the study subjects. We observed that majority of the study subjects belonged to the age group of 46 to 55 years (31.54%), followed by 36 to 45 years (24.62%), more than 66 years among 29.69% study subjects. Peptic ulcer perforation was noticed in increased frequency among the older age group in this study and same was noticed by Strang C et al.<sup>87</sup>”

Savnes C et al has reported that the lethality is higher in the elderly reported that age of a patient, rather than the type of surgery which influences the mortality in perforation peritonitis.<sup>88</sup>

“In the present study we assessed the Gender wise distribution among the study subjects. We observed

that majority of the subjects were males (73.85%), and 26.15% were females. The male: female ratio in the current study was 2.82:1.”

“This is in agreement with studies by **Bohemen and Delinger et al.** who found difference in mortality in different groups as above not statistically significant. To illustrate our point, we further regrouped these into  $\leq 50$ ,  $> 50$  to estimate the significance. We observed that 55.38% subjects had age more than 50 years”.<sup>2</sup>

### Clinical Presentation

**Sujit Chakma et al** in their study observed that “Abdominal tenderness was the commonest clinical finding and was present in all patients. Abdominal guarding was present in 97.14% patients followed by diminished or absent bowel sound (57.14%), shock (54.29%), tachycardia (54.28%), dehydration (52.85%) and obliteration of liver dullness (48.57%)”.<sup>91</sup>

**Sudershan Kapoor et al** in their study observed that, “acute abdominal pain (100% cases) was the most common symptom of perforation peritonitis; other symptoms were abdominal distension (92%), vomiting (88%) constipation (78%) and fever (77%). All the patients (100%) were presented to the hospital with signs of abdominal tenderness, rigidity and guarding, other signs were tachycardia (96%), obliteration of liver dullness (85%), shock (32%) and absence of bowel sounds (80%)”.<sup>97</sup>

### Site of perforation

**Sudershan Kapoor et al** in their study observed that “most common anatomical site for perforation was terminal ileum (55%) the next common site was stomach (20%), followed by appendix (8%), duodenum (7%), caecum (5%), jejunum (2%) and Meckel’s diverticulum (1%). In 2% cases site was not identified due to severe adhesions between gut loops”.<sup>97</sup>

### Diagnosis

**Sudershan Kapoor et al** in their study observed that “most common etiology of perforation peritonitis was Enteric fever (42%) followed by peptic ulcer perforations (27%), tubercular perforations (15%), appendicular perforations (8%), intestinal obstruction (4%), traumatic perforations(3%) and Meckel’s diverticular perforation (1%)”.<sup>97</sup>

“This study matches with the study of Khanna AK et al<sup>98</sup> (108 out of 204 cases were of typhoid Etiology), but differs with several other previous studies (Jhobta et al<sup>92</sup>, Vagholkar<sup>99</sup>, Gupta et al<sup>100</sup>, Sharma et al<sup>101</sup> in their studies peptic perforations were the most common etiology and typhoid perforations were 2nd most common etiology)”.

### Summary and Conclusions

In the present study Various factors affecting both mortality and morbidity in peritonitis patients were studied. Majority of the study subjects belonged to the age group of 46 to 55 years (31.54%), followed by 36 to 45 years (24.62%), more than 66 years among 29.69% study subjects. The male: female ratio in the current study was 2.82:1. Extremes of age ( $\leq 20$  yrs,  $>50$  yrs) seem to have adverse effect on the outcome.

Fever was noted among 36.92% study subjects, Vomiting was noted among 9.23% study subjects, Pain was noted among 100.00% study subjects, Distension was noted among 60.77% study subjects, Guarding and Rigidity was noted among 67.69% study subjects, Bowel Sound was noted among 11.54% study



subjects, Free fluid was noted among 63.08% study subjects. Stomach was the commonest site of perforation (34.62%), followed by duodenum (26.92%), appendix (23.08%). Ileum (8.46%) and Large intestine (6.92%) was also involved rarely.

Majority of the study subjects had MPI score between 21 to 29 (52.31%), followed by 29.23% subjects had MPI score more than 29, while 18.46% study subjects had MPI score less than 21.

In the present study “we assessed the Operative procedures among the study subjects. We observed that open appendectomy was performed among 23.08% study subjects, open perforation closure was performed among 26.92% study subjects, resection and anastomosis was performed among 8.46% study subjects, resection anastomosis and Stomy was performed among 6.92% study subjects, simple closure was performed among 34.62% study subjects.”

“All the MPI parameters: extension of peritonitis, presence of organ failure, time of presentation, type of exudates, presence of malignancy, age, found to be associated with severity of peritonitis. Cases of peritonitis carry a high mortality which can be reduced by early diagnosis, risk stratification, appropriate treatment based on risk score.”

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