

To determine the role of risk factors for increased morbidity and mortality in perforated peptic ulcer in Western area of Rajasthan

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ABSTRACT

Aim: To determine the role of risk factors for increased morbidity and mortality in perforated peptic ulcer

Methods and materials: All patients aged 18 and above who had abdominal surgery for PPU were included in this research. Intravenous fluids, nasogastric suction, and intravenous antibiotics were then administered to the patients. After proper resuscitation, the perforation site was located and a laparotomy was performed via a midline incision. The hole was simply closed and reinforced with a pedicle omental patch. Peritoneal lavage with 4 to 5 litres of normal saline was performed. An intraperitoneal drain is placed at the discretion of the operating surgeon. All patients were placed on a double antibiotic regimen that included Ceftriaxone (1gm bid), Metronidazole (500 mg tid), and Omeprazole (20 mg bid). Patients were monitored for up to six months following surgery. The research covered morbidity and mortality during the hospital stay as well as the following 6-month follow-up.

Results: Of the 100 patients included in this research, 88 (88%) were male and 12 (12%) were female (M: F 7.33:1). The average age of the presenters was 30.52 years. A total of 50 complications were seen in 30(30%) patients. The leading early complications were pneumonia, (13%), followed by surgical wound infection (10%), intra-abdominal abscess (8%), patch failure (6%), ARF (6%), postoperative ileus (4%), complete wound dehiscence 3(3%) and entero-cutaneous fistula, (1%). In the logistic regression models, the duration of illness, deranged V/S, and the size of perforation was identified to have a significant association with morbidity (Complications). Those patients who presented after > 24 hours of

illness were 5x more likely to develop complication [COR (95%CI) =5.2 (1.9-13.8)], and those patients who presented with low deranged V/S had 6x more likely to develop complication [COR (95%CI) =6.3(1.7-23.7)]. The logistic regression model showed that deranged V/S and age were identified to be significantly associated with mortality. Age \geq 50 years had 20x the risk of dying compared to age less than fifty years [COR (95%CI) =19.7 (3-124)].

Conclusion: In conclusion, PPU is a common clinical condition in our culture, mostly affecting young boys who have no history of PUD. The increased prevalence of risk variables such as frequent intake of chat, alcohol, and cigarettes among PPU patients might be linked to it. Despite patients' late presentation, simple closure of PPU with omental patch followed by Helicobacter pylori eradication therapy was proven to be successful with outstanding outcomes at our institution.

Keywords: Risk factors, Morbidity, Mortality, Perforated Peptic Ulcer

Introduction

One of the most frequent surgical emergencies in South India is a perforated peptic ulcer.¹ Peptic ulcers develop as a result of mucosal injury and subsequent ulceration as a result of increased aggressive factors, reduced protective ones, or both.^{2,3} In the Western population, the estimated prevalence of peptic ulcer disease varies from 5 to 15%, with a lifetime incidence of about 10%.² The development of H₂ receptor antagonists and proton pump inhibitors has drastically reduced the prevalence of elective surgery for peptic ulcer (PU) illness, while complications of PU disease like as perforation and bleeding have remained fairly consistent.⁴ However, the epidemiology of perforated peptic ulcer in the West has changed dramatically during the past two decades. According to Daniel TD, the three most frequent consequences of peptic ulcer disease are bleeding, perforation, and obstruction, in decreasing order of frequency.^{5,6}

Perforation is still a serious life-threatening condition. Surgical repair is the current therapy for a perforated peptic ulcer. It has the greatest fatality rate of any ulcer disease consequence.^{2,6} As a result, early identification of patients with perforated peptic ulcers who are at high risk of unfavourable outcomes after surgery is critical for clinical decision-making. This may help with risk classification and triage, such as the time and scope of pre-operative respiratory and circulatory stabilisation, post-operative admission to a high dependency unit (HDU), the degree and scope of monitoring, and participation in specialised perioperative care protocols.^{1,4,7,8} Peptic ulcer perforations are caused by duodenal, antral, and gastric body ulcers, which

account for 60%, 20%, and 20% of all ulcers, respectively.⁹ Following a perforated peptic ulcer (PPU), mortality and morbidity are significant, with death rates of up to 25- 30% recorded in population-based studies.⁷

Methods and materials

All patients aged 18 and above who had abdominal surgery for PPU were included in this research. Surgery is only available to people above the age of 18. All patients were examined using a history, physical examination, pertinent laboratory and imaging assays, and imaging studies. Before surgery, all patients or their guardians provided informed permission if the diagnosis was confirmed. Intravenous fluids, nasogastric suction, and intravenous antibiotics were then administered to the patients. After proper resuscitation, the perforation site was located and a laparotomy was performed via a midline incision. The hole was simply closed and reinforced with a pedicle omental patch. Peritoneal lavage with 4 to 5 litres of normal saline was performed. An intraperitoneal drain is placed at the discretion of the operating surgeon. A senior resident or a consultant surgeon conducted the surgeries. All patients were placed on a double antibiotic regimen that included Ceftriaxone (1gm bid), Metronidazole (500 mg tid), and Omeprazole (20 mg bid). Patients were monitored for up to six months following surgery. The research covered morbidity and mortality during the hospital stay as well as the following 6-month follow-up.

Structured formats were utilised to gather pertinent data. Data on the dependent variable (morbidity and mortality) and the independent variables of the patients' demographic data (age, sex), exposure risk and other clinical variables such as duration of illness before surgical intervention, comorbid illness (Hypertension, Diabetes mellitus, HIV infection, Known cardiac and respiratory illness, and others) were collected from the patients' chart.

Statistical investigation

SPSS version 25.0 software was used for statistical analysis. The mean, standard deviation, median, and ranges of continuous variables were computed. To summarise categorical variables, proportions and frequency tables were utilised. The multiple logistic regression model includes all variables that were significant in binary analysis at the level of p-value 0.20. To prevent multicollinearity, the model was developed via backward elimination. In the final model, P-values less than 0.05 were deemed statistically significant.

Results

Of the 100 patients included in this research, 88 (88%) were male and 12 (12%) were female (M: F 7.33:1). The average age of the presenters was 30.52 years. The majority of patients (56%), were under the age of 30. The median average length of symptoms before to arrival

was 48 hours, with a 72-hour interquartile range. Patients referred from other healthcare institutions arrived an average of 23 hours later than usual. Only 31 (31% of patients) arrived at the hospital within 24 hours after the commencement of symptoms.

The most prevalent symptoms were 94% abrupt onset of diffuse abdominal pain, 87% nausea/vomiting, 54% abdominal distension, 22% constipation, 9% diarrhoea, and 6% fever. In 3% of individuals, right lower quadrant discomfort mimicked appendicitis symptoms. In 94% of patients, there was abdominal discomfort and symptoms of peritonitis, and 12% had disturbed V/S. 77% of patients reported no prior PUD symptoms or treatment. Among those who had a prior history, 23% experienced symptoms and received occasional therapy for a period ranging from 1 to 13 years. In this research, 20 patients (20%) had related comorbidities, which included hypertension, diabetes, COPD, HIV, pulmonary TB, significant depression, alcohol dependence, malnutrition, and other medical conditions (Table 1).

The average haemoglobin level was 14.9 2.5 mg/dl, and no anaemia was found. Leukocytosis was found in 57 (57%) of the individuals. For 20% albumin, a mean value of 3.0 1.1 mg/dl was discovered. H. pylori testing was performed on 20 individuals, with 6 (30%) testing positive. Plain abdomen and chest radiographs revealed air beneath the diaphragm in 70 (70%) of the research subjects.

Patients were operated on in an average of 5.23.4 hours after arriving at the hospital. Gas ejection was observed in all patients during surgery. An average of 600ml of GI material was pulled out of the general peritoneum, with an IQR of 1200ml. The anterior duodenum had the most holes (84%), whereas the antral region of the stomach had 13%. The ratio of duodenal to gastric ulcer perforation was 6.5:1. All patients had a single perforation, and there was no recurrence. Following a stoma ulcer after a gastrojejunostomy, one patient experienced perforation. Three (3%) instances had a small (5mm) puncture that was spontaneously sealed with omentum. Peritoneal lavage with warm saline alone was performed on individuals with sealed perforations. One of the three patients later died of MOF after developing intra-abdominal sepsis. In terms of perforation size, 64(64%) were little (less than 10mm) and 36(36%) were large (more than 10mm). The peritoneal fluid was bilious in 23 patients (23%), purulent in 24 patients (24%), and mixed in 52 patients (52%). A histological study of stomach tissue from seven individuals found no evidence of cancer.

Pedicle omentum patching (Cellan Johns treatment) was performed on 93 (93%) patients, whereas patching and biopsy were performed on 6 (6%). There was one iatrogenic rectal injury during the procedure for which a de-functional colostomy was performed. In virtually all instances, a sub-hepatic drain was left in place. The average duration of stay in the hospital was 8.2 days. Only 77% of patients got H. pylori eradication medication after discharge.

Table 1 Demographic profile of the patients

Gender	Number	%
Male	88	88
Female	12	12
Age		
below 30	56	56
30-50	14	14
50-70	22	22
above 70	8	8
Clinical Presentation		
Severe abdominal pain	94	94
Vomiting	87	87
Abdominal distension	54	54
Constipation	22	22
Diarrhea	9	9
Fever	6	6
Right lower quadrant pain	3	3
Abdominal tenderness and signs of peritonitis	94	94
Deranged Vital sign	12	12

Co morbidity		
Hypertension	6	6
Diabetes Mellitus	4	4
HIV infection	5	5
COPD	3	3
Others	2	2

A total of 50 complications were seen in 30(30%) patients. The leading early complications were pneumonia, (13%), followed by surgical wound infection (10%), intra-abdominal abscess (8%), patch failure (6%), ARF (6%), postoperative ileus (4%), complete wound dehiscence 3(3%) and entero-cutaneous fistula, (1%).

In the logistic regression models, the duration of illness, deranged V/S, and the size of perforation was identified to have a significant association with morbidity (Complications). Those patients who presented after > 24 hours of illness were 5x more likely to develop complication [COR (95%CI) =5.2 (1.9-13.8)], and those patients who presented with low deranged V/S had 6x more likely to develop complication [COR (95%CI) =6.3(1.7-23.7)]. Similarly, patients with larger perforation (10-30mm) were 3.5x more likely to develop a complication.

The logistic regression model showed that deranged V/S and age were identified to be significantly associated with mortality. Age \geq 50 years had 20x the risk of dying compared to age less than fifty years [COR (95%CI) =19.7 (3-124)]. Patients who presented with

deranged V/S were 10x more likely to die compared to those who presented without it [COR (95%CI=9.9(1.8-58)].

Type 2. Complications encountered following surgery for perforated PUD patients

Complications	Number	%
Pneumonia	13	13
Wound infection	10	10
Intra-abdominal abscess	8	8
ARF	6	6
Patch failure	6	6
Postoperative ileus	4	4
Wound Dehiscence	3	3
Entero-cutaneous fistula	1	1

Table 3: Factors that were associated with the morbidity of Perforated PUD patients

Predictors		Morbidity		COR	95%	CI	P-value
		Yes	No				
Age	≥50 years	5	25	3.27	0.95	11.4	0.051
	<50 years	25	45	1	-	-	-
Comorbidity	Yes	8	12	2.27	0.76	6.79	-
	No	22	58	1.1	-	-	-

Sex	Male	24	64	0.40	0.2	1.5	0.13
	Female	6	6	1.1	-	-	-
Duration of illness	≤ 24 hours	10	55	1.1	-	-	-
	> 24 hours	20	15	5.2	1.9	13.8	0.003
Systolic BP	≥90mmhg	22	66	1.1	-	-	-
	<90mmhg	8	4	6.3	1.7	23.7	0.008
Pulse rate	≥100bpm	18	42	1.02	0.35	2.6	0.89
	<100bpm	12	28	1.1	-	-	-
Site of perforation	Duodenal	21	61	1.1	-	-	-
	Stomach	9	9	3.0	0.9	9.1	0.08
Size of perforation	<10mm	12	50	1.1	-	-	-
	10 to 30mm	18	20	3.6	1.4	9.3	0.02
Type of fluid sucked out	Bilious	10	15	1.1	-	-	-
	Purulent	5	15	0.6	0.13	2.1	0.4
	Mixed	15	40	0.8	0.4	2.1	0.6

Table 4: Factors that were associated with mortality of Perforated PUD patients

		Morbidity=8		COR	95%	CI	P-value
Age	≥50 years	5	25	19.7	3.1	126	0.003
	<50 years	3	67	1.1			
Comorbidity	Yes	3	17	2.5	0.5	15	0.35
	No	5	75	1.1	-	-	-
Sex	Male	5	83	4.4	0.8	28	0.2
	Female	3	9	1.1	-	-	-
Duration of illness	≤ 24 hours	2	63	1.1	-	-	-
	> 24 hours	6	29	7.1	0.9	64	0.09
Systolic BP	≥90mmhg	4	84	1.1	-	-	-
	<90mmhg	4	8	9.9	1.8	58	0.02
Pulse rate	≥100bpm	3	57	2.8	0.6	15	0.28
	<100bpm	5	35	1.1	-	-	-

Site of perforation	Duodenum	5	77	1.1	-	-	-
	Stomach	3	15	0.5	0.2	2.1	0.4
Size of perforation	<10mm	2	60	1.1	-	-	-
	10-30mm	6	32	0.14	0.2	1.3	0.08
Type of fluid sucked out	GI content	2	23	1.1	-	-	-
	Pus	2	18	0.5	0.04	5.1	0.6
	Pus and GI content	4	51	0.7	0.07	6.7	0.8

Discussion

This research found that PPU is a common emergency surgical condition that mostly affects young boys with no history of PUD symptoms or therapy. Similar to previous research conducted in Ethiopia and neighbouring countries. The majority of our patients presented after 24 hours, and such delays, as well as the existence of preoperative abnormal V/S, were revealed to be important predictors of problems. The age of 50 was also shown to be strongly linked with increased mortality.¹⁰⁻¹⁶

During the study period, 100 individuals were operated on. This conclusion is consistent with comparable studies done in Ethiopia^{10,11}, and it was significantly larger than what Moses et al.¹² from Liberia, Ugochukwu et al.¹³ from Nigeria, Phillippo et al.¹⁴ from Tanzania, Schein et al.¹⁷ and Mieny et al.¹⁸ from South Africa reported. These disparities may reflect inequalities in the prevalence of PPU risk factors.

Males predominated in our research, with a male to female ratio of 7.33:1, which is consistent with previous studies from underdeveloped nations, where the male to female ratio ranges from 1.3: 1 to 9:1.¹³⁻¹⁹ According to reports from industrialised nations, the prevalence is greater among older ladies using ulcerogenic medicines.^{20,21} Only 10% of those in our study had a history of NSAID use. The increased prevalence of PPU among our community's young boys might be due to excessive use of Chat (Katha Edulis), smoking, and drinking. Smoking is known to impede pancreatic bicarbonate secretions, which tend to counteract acid production, predisposing to increased acidity in the duodenum. It also causes a delay in the healing of duodenal ulcers.²² Alcohol, on the other hand, causes stomach ulcers by stimulating gastric acid output and increasing gastrin release.²³ Chronic Chat consumption predisposes to gastritis and duodenitis, although the cause-effect link in PPU has yet to be demonstrated.²⁴

More than two-thirds of our patients came within 24 hours after the commencement of acute symptoms. This might be due to a lack of patient awareness, inadequate transportation networks, and a failure to diagnose and refer patients at an early stage. Patients referred from other healthcare institutions arrived 23 hours later on average than other patients. A similar delay resulted in increased morbidity. Similarly, Svanes C.²⁵ found that when the wait exceeded 12 hours, the likelihood of poor consequences rose significantly. In comparison to a delay of 6 hours or less, a delay of more than 24 hours increased lethality seven to eightfold, complication rate three to fourfold, and duration of hospital stay twofold.

Similar to prior studies, establishing the diagnosis of PPU was mostly based on plain radiographs of the abdomen/chest, which were shown to be accurate in 75% of instances.

²³⁻²⁶ According to the literature, basic erect abdomen or chest x-rays may identify 80-90% of PPU patients. During a tough situation, a CT-scan with an oral contrast study is regarded a gold standard that may identify minor pneumoperitoneum. Abdominal ultrasonography has also been shown to be more accurate than conventional radiography in detecting free intraperitoneal air. None of these additional imaging tests were utilised to diagnose PPU in our research.^{27,28}

The duodenal to stomach ulcer ratio in our research was found to be 6.5:2. Kenya (11.5:1), Tanzania (12.7:1), and Sudan all reported greater ratios (25:1).²⁷⁻²⁹ Developed nations reported a lower ratio of 3:1 to 4:1. Gastric perforation was shown to be more common in Ghana.²⁹ In Africa, gastric ulcers are considered an uncommon condition, occurring 6-30 times less often than duodenal ulcers. When investigating the impact of the perforation location on unfavourable outcomes, some studies found a greater death rate with PPU of stomach origin, which was not seen in our investigation.³⁰⁻³⁸

PPU may be treated using a variety of surgical procedures. The most popular procedures for treating PPU are primary closure by interrupted sutures, secondary closure by interrupted sutures covered with a pedicle omentum on top of the repair (Cellan- Jones repair), and sealing the perforation with a free omental plug (Graham patch). Cellan-Jones repair was performed on 93 (93%) of the patients in this research. A similar selection technique was also described in another series.³⁵ The findings of a laparotomy vary according on the length, location, and size of the hole. Unlike Dodiya-Manuel A et al.¹⁹ and Nuhu et al.³⁹, who found major perforations in 88.9% and 82.7% of patients, respectively, we found significant perforations in only 35.5% of cases. According to several research, when the perforation width in PPU was more than 0.5 cm, morbidity and death were dramatically increased.³⁴ The perforation diameter had no effect on morbidity in this investigation.

In our investigation, sub-hepatic drain was left in virtually all instances (95%). There is, however, no evidence that leaving a drain lessens the frequency of intra-abdominal collections. On the contrary, it may cause drain site infection and raise the risk of intestinal blockage.

Our discovery of 50 problems occurred in 30 instances of study participants, resulting in a 30% complication rate. This conclusion is consistent with the findings of SoroKounteleGona et al from Côte d'Ivoire³⁶ and Phillipop et al from Tanzania.¹⁶ with complications of 27.5% and 29.8%, respectively. However, it is modest when compared to KIMS Hospital's report from India, which has a complication rate of 72.1%, and Nigeria, which has a complication rate of 63.2%. 6 patients had patch failure, five of whom died, for an 83.33% case fatality rate.

Without an H. pylori test, 76% of study participants were given eradication medication upon discharge, whereas 24% were not and remain at risk of recurrence. According to current research, omeprazole and triple therapy treatment after simple PPU closure greatly lowers the risk of recurrent ulcer rates.⁴⁰ As a result, we propose that an intravenous proton pump inhibitor be used for 72-96 hours following surgery, followed by oral triple treatment when oral intake is commenced. After completing medical therapy, a urea breath test should be performed to confirm H. pylori eradication.

Conclusion

In conclusion, PPU is a common clinical condition in our culture, mostly affecting young boys who have no history of PUD. The increased prevalence of risk variables such as frequent intake of chat, alcohol, and cigarettes among PPU patients might be linked to it. Despite patients' late presentation, simple closure of PPU with omental patch followed by Helicobacter pylori eradication therapy was proven to be successful with outstanding outcomes at our institution.

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