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STUDY OF FACTORS PREDICTING THE POST OPERATIVE OUTCOME IN PERFORATED PEPTIC ULCER PATIENTS

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Abstract

Background: This study aims to evaluate the factors that predict the postoperative outcomes in patients with perforated peptic ulcers. By examining variables such as age, comorbidities, smoking history, time to presentation, and surgical interventions, this research seeks to identify key predictors that can guide clinicians in improving patient outcomes. **Materials and Methods:** A prospective observational study was conducted involving 73 patients who underwent surgery for peptic ulcer perforation at the General Surgery department of Government Dharmapuri Medical College and Hospital, Dharmapuri, from April 2021 to June 2022. The inclusion criteria consisted of patients above 18 years of age with a diagnosis of peptic ulcer perforation and willingness to provide informed consent. Patients under 18, those with traumatic perforations, and those unwilling to consent were excluded from the study. Data regarding patient demographics, medical history (including NSAID usage, smoking, alcohol consumption, and comorbidities), clinical presentation, surgical procedure, and postoperative complications were collected. The outcomes analyzed were mortality (death within 28 days) and morbidity (complications leading to prolonged hospital stay). **Result:** The majority of patients in the study were male (90%), with a mean age of 47 years. A significant proportion of patients had a history of smoking (61.1%) and alcohol consumption (80.6%). The most common complications observed postoperatively were wound infection (35.6%), acute kidney injury (19.2%), and ARDS (16.4%). Mortality was 24.7%, and 75.3% of patients were discharged without complications. Statistically significant associations were found between older age, comorbidities, smoking, and peritonitis with higher mortality rates. The presence of peritonitis had a strong negative impact on survival (p=0.005), and patients with perforations in the gastric pylorus had the highest mortality (60%). The site of perforation did not significantly affect the duration of hospital stay. Additionally, a larger perforation size and greater contamination volume were associated with increased morbidity and mortality. **Conclusion:** The postoperative outcomes in patients with perforated peptic ulcers are influenced by several factors, including age, comorbidities, smoking, peritonitis, and the site of perforation. Early presentation and prompt surgical intervention remain critical to improving survival rates. While surgical methods such as Graham's patch repair are effective, the presence of significant contamination and severe peritonitis complicates the recovery process. These findings highlight the need for timely diagnosis, resuscitation, and appropriate surgical management to reduce mortality and morbidity in perforated peptic ulcer patients.

INTRODUCTION

Peptic ulcer disease (PUD) is a common gastrointestinal disorder that can lead to complications such as bleeding, gastric outlet obstruction, and perforation. The latter, perforated peptic ulcer (PPU), is a life-threatening condition that requires urgent surgical intervention. It is one of the most frequent causes of emergency abdominal surgery, with a significant mortality rate, particularly in patients who present late or have other comorbid conditions. The high incidence of peptic ulcer disease in developing countries, coupled with the occurrence of its complications, makes PPU an area of

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considerable clinical importance. The outcome following surgery for PPU depends on several factors, including the patient's clinical presentation, the timing of surgery, comorbidities, and the presence of complications.[1,2]

The pathogenesis of peptic ulcer involves an imbalance between aggressive factors, such as gastric acid and pepsin, and protective factors like the mucosal barrier and prostaglandins. The ulcerative process occurs when this balance is disrupted, leading to mucosal erosion and, in severe cases, perforation. In the context of PPU, the ulcer perforates through the stomach or duodenal wall, resulting in the leakage of gastrointestinal contents into the peritoneal cavity, causing peritonitis. The clinical presentation of PPU is characterized by acute abdominal pain, tenderness, and signs of systemic infection, which may rapidly progress to septic shock without timely intervention.[3]

The timing of presentation and the delay in seeking medical care significantly affect the prognosis in PPU patients. Early presentation (within 24 hours) is generally associated with better surgical outcomes, as the inflammatory response is often localized, and fewer complications arise. Conversely, delayed presentation, commonly seen in patients with low awareness or those from rural areas, often results in a more severe condition, with widespread peritonitis and septic complications that can increase the risk of mortality. The clinical condition of patients presenting with PPU can vary widely, with some patients in a state of shock or multi-organ dysfunction, while others may appear relatively stable. The severity of illness upon presentation often correlates with the final outcome, making early diagnosis and intervention critical.[4,5]

Several factors have been identified as predictors of postoperative outcomes in PPU patients. These factors include the patient's age, comorbid conditions, the site and size of the perforation, the degree of contamination within the peritoneal cavity, the presence of peritonitis, and the type of surgical procedure performed. Older patients, particularly those over the age of 60, are at a higher risk of complications due to age-related changes in organ function and the presence of chronic diseases such as hypertension, diabetes, or cardiovascular disease. Such comorbidities often complicate the surgical course and increase the risk of postoperative infections, poor wound healing, and extended hospital stays. The severity of the peritonitis, determined by the extent of gastrointestinal contamination, is another key factor influencing the outcome. Massive contamination and widespread peritonitis are associated with higher morbidity and mortality rates, while localized perforations without significant contamination typically have better outcomes.[6]

The site of the perforation plays a significant role in determining the outcome. Duodenal ulcers, which occur more frequently in the first part of the duodenum, are often associated with better outcomes compared to gastric ulcers, particularly those involving the pyloric region. Perforations located in the gastric pylorus are often associated with more extensive contamination, making the surgical repair more challenging. The size of the perforation is another crucial factor; larger perforations are more difficult to repair and tend to result in longer operative times, greater contamination, and a higher incidence of postoperative complications such as wound infections, abscess formation, and sepsis.[7,8]

Surgical intervention, while lifesaving, carries inherent risks, particularly in the presence of complicating factors such as shock, massive peritoneal contamination, and organ failure. Early surgical repair, often within 24 to 48 hours of perforation, is associated with better survival outcomes. Delays in surgery can increase the risk of septicemia, multi-organ dysfunction syndrome (MODS), and prolonged hospital stays. Different surgical approaches, such as Graham's omental patch or more complex techniques like gastrojejunostomy, may be employed depending on the location and severity of the perforation. However, the type of surgery performed does not appear to significantly affect mortality in the presence of advanced sepsis or widespread contamination.[8]

In addition to these clinical factors, the overall health and nutritional status of the patient at the time of surgery can influence recovery. Malnourished patients, particularly those with low body mass index (BMI) or poor nutritional intake, are more likely to experience poor wound healing, increased risk of infection, and longer recovery times. Preoperative nutritional support is therefore an essential aspect of the management of patients undergoing surgery for PPU.[9]

The postoperative recovery of patients with perforated peptic ulcers is also influenced by the occurrence of complications such as wound infections, acute kidney injury (AKI), and acute respiratory distress syndrome (ARDS). These complications significantly contribute to prolonged hospitalization, increased healthcare costs, and higher mortality. The presence of complications also increases the need for intensive care and longer-term rehabilitation. Therefore, a multidisciplinary approach involving surgeons, intensivists, and nutritionists is often required to manage these complex cases.[10]

The postoperative outcome of patients with perforated peptic ulcers is determined by a combination of preoperative, intraoperative, and postoperative factors. Early diagnosis and surgical intervention are crucial for improving survival, while the presence of comorbidities, the size and site of the perforation, the degree of contamination, and the development of postoperative complications can all significantly impact the outcome.

MATERIALS AND METHODS

This is a prospective observational study of 73 cases being operated for peptic ulcer perforation admitted in General Surgery department of Government Dharmapuri medical college and Hospital, Dharmapuri from April 2021 to June 2022. This was mainly conducted to study the factors predicting the postoperative outcome in peptic ulcer perforation patients.

Inclusion Criteria
1. All patients of age > 18 years with hollow viscus perforation (intraoperative findings of peptic ulcer perforation)
2. Patients who are ready to give informed written consent for the study

Exclusion Criteria
1. Patients of age < 18 years presenting with peptic ulcer perforation
2. Patients presenting as traumatic perforation
3. Patients who are not willing to give consent for the study

A detailed history of patients presenting with peptic ulcer perforation regarding age, sex, time duration of symptoms, previous use of NSAIDs, smoking, alcohol and other associated medical illnesses was taken. The diagnosis was made based on clinical findings and other investigations like plain x-ray erect abdomen/ CT. Routine blood investigations were done. Time duration between onset of pain and surgery was calculated. The general condition of the patient was assessed.

Immediate resuscitation was done with nasogastric aspiration, intravenous fluids, antibiotics, and urine output monitoring was done. Laparotomy findings including site (Duodenum part 1 or part 2, Gastric antrum, Pylorus or Prepylorus), Size of perforation, Contamination volume and nature and procedure done was noted. Surgery duration was also recorded. All patients of peptic ulcer perforation were operated either by Graham's or modified Graham's patch. In case of gastric perforation, biopsy was done to rule out malignancy of stomach. Everyday patients were monitored and all the vital parameters noted down. Immediate care was given in case if any complication develops. Suitable and appropriate management of the patients was carried out from time to time according to the needs.

All the complications which the patient develops in the postoperative period were carefully monitored and addressed.

If the patient shows clinical improvement, he/she is discharged. Finally outcome of the surgery whether Death or Discharge and total duration of hospital stay have been analyzed. Mortality means death following surgery within 28 days and morbidity means prolonged hospital stay and complications. A detailed structured proforma was used to collect all these information.

Tools Used
The data were recorded in MS-excel and were analyzed using Statistical Package for Social Science (SPSS-16). The methods like Frequency analysis, Cross tabulation, Univariate and Multivariate analysis have been employed. Following are the analysis of the study.

RESULTS

Table 1: Basic Parameters
[Table 1] presents the basic parameters of the study population (N=73). The data highlights the prevalence of various factors such as a history of peptic ulcer, smoking, alcoholism, NSAID intake, and comorbidities. Among the participants, 49.3% (36 patients) had a history of peptic ulcer, and 50.7% (37 patients) did not. Smoking was prevalent in 61.1% (44 patients), while 80.6% (58 patients) had a history of alcoholism. Only 17.8% (13 patients) had a history of NSAID intake, and 54.8% (40 patients) had comorbidities. These factors provide a foundational understanding of the health profile of the patients in the study.

Table 2: Complication and Outcome
[Table 2] details the complications and outcomes observed in the study population. Wound infection was the most common complication, affecting 35.6% (26 patients) of the sample, followed by acute kidney injury in 19.2% (14 patients) and ARDS in 16.4% (12 patients). Septicemia, MODS, and bile leaks were less frequent, affecting 12.3% (9 patients), 6.8% (5 patients), and 1.3% (1 patient), respectively. As for outcomes, 75.3% (55 patients) were discharged, while 24.7% (18 patients) died. The complication data highlights the severe health risks associated with peptic ulcer perforation, while the outcome data indicates a relatively high survival rate.

Table 3: Univariate Analysis between Presenting History with Final Outcome of Peptic Ulcer
[Table 3] explores the relationship between presenting history and the final outcome (discharge or death). Statistically significant associations were found for age, comorbidities, smoking, and the presence of peritonitis. The analysis shows that older age groups, particularly those over 60, had a higher mortality rate (50%), and patients with comorbidities were more likely to die (37.5%) compared to those without (9.1%). Smoking also increased the likelihood of death, with 34.1% mortality in smokers versus 10.3% in non-smokers. The presence of peritonitis had a strong negative effect on survival, with 32.7% mortality in those with peritonitis. However, variables like gender, NSAID intake, and having a history of peptic ulcer did not significantly affect the final outcome.

Table 4: Univariate Analysis between Clinical Presentation and Final Outcome
[Table 4] examines clinical presentations and their association with the final outcome. Peritonitis, perforation site, and type of surgery were all significant variables. The presence of peritonitis was associated with worse outcomes, as 32.7% of patients with peritonitis died, compared to none in the non-

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peritonitis group. The site of perforation also influenced the outcome; patients with gastric pylorus perforation had the highest mortality (60%), compared to 16.7% for duodenum-1st part and 22.2% for duodenum-2nd part. Interestingly, the type of surgery (Graham's vs. Modified Graham's) did not show a significant difference in mortality rates.

Table 5: Site of Perforation and Duration of Hospital Stay After Surgery
[Table 5] presents the average duration of hospital stay after surgery based on the site of perforation. The mean hospital stay was similar across different perforation sites, with 11.33 days for duodenum-1st part (SD = 3.431), 10.67 days for duodenum-2nd part (SD = 2.617), and 10.90 days for gastric pylorus (SD = 5.087). The ANOVA results suggest that there is no significant difference in the mean duration of stay between the groups (F = 0.300, p = 0.742), indicating

that the site of perforation does not substantially affect the length of hospital stay.

Table 6: Association of Various Factors with Morbidity and Mortality
[Table 6] delves into various factors and their association with morbidity and mortality. Age, comorbidities, peritonitis, time to presentation, perforation size, and contamination were significantly associated with morbidity and mortality. Younger patients (18-24 years) had a lower morbidity rate (20%), whereas those aged >60 had 100% morbidity. The presence of comorbidities, peritonitis, and longer time between onset of pain and presentation were strongly linked to higher morbidity and mortality. A larger perforation size (≥0.5 cm) and more significant contamination (>1.5 liters) also contributed to worse outcomes. Interestingly, shock did not significantly influence either morbidity or mortality outcomes.

Table 1: Basic parameters.

Category	Response	Number of Patients (N=73)	Percentage (%)	95% CI
History of Peptic Ulcer	Yes	36	49.3	38.9 - 61.1
	No	37	50.7	-
Smoking	Yes	44	61.1	48.6 - 72.2
Alcoholism	Yes	58	80.6	70.8 - 88.9
History of NSAID Intake	Yes	13	17.8	9.7 - 27.8
	No	60	82.1	72.2 - 90.3
History of Comorbidities	Yes	40	54.8	44.4 - 66.7
	No	33	45.2	33.3 - 55.6

Table 2: Complication and outcome

Complications	n	%	95% C.I
Wound infection	26	35.6	24.7 – 47.7
Acute kidney injury	14	19.2	10.9 to 30
ARDS	12	16.4	8.8 – 26.9
Septicemia	9	12.3	5.8 – 22.1
MODS	5	6.8	2.3 – 15.3
Bile leak	1	1.3	0.03 – 7.4
Out come			
Discharge	55	75.3	64.4 – 86.3
Death	18	24.7	13.7 – 35.6

Table 3: Univariate analysis between presenting history with final outcome of peptic ulcer

Variable	Discharge (n=73)	Death (n=10)	P-value
	n	%	n
Age group			0.020
18-24	10	100	0
25-39	22	86.4	3
40-49	25	64	9
50-60	10	70	3
>60	6	50	3
Gender			0.24
Male	66	77.3	15
Female	7	57.1	3
NSAID intake			0.392
Yes	13	84.6	2
No	60	73.3	16
Comorbidities			0.005
Yes	40	62.5	15
No	33	90.9	3
Peptic ulcer			0.249
Yes	36	69.4	11
No	37	81.1	7
Smoking			0.021
Yes	44	65.9	15
No	29	89.7	3
Alcoholism			0.639

Yes	58	74.1	15
No	15	80	3

Table 4: Univariate analysis between clinical presentation and final outcome

Variable	Discharge (n=73)	Death (n=10)	P value
	n	%	n
Shock			0.399
Yes	2	50	1
No	71	76.1	54
Peritonitis			0.005
Yes	55	67.3	37
No	18	32.7	18
Perforation site			0.018
Duodenum-1st part	36	83.3	30
Duodenum-2nd part	27	77.8	21
Gastric pylorus	10	40	6
Type of surgery			0.835
Graham's	34	76.5	26
Modified Graham's	39	74.4	29

Table 5: Site of perforation and duration of hospital stay after surgery

Site of perforation	Mean duration of stay (days)	SD	ANOVA	Sum of squares	df	Mean square	F	Sig
D1	11.33	3.431	Between groups	7.045	2	3.523	0.300	0.742
D2	10.67	2.617	Within groups	822.945	70	11.756		
Gastric pylorus	10.90	5.087						

Table 6: Association of various factors with morbidity and mortality

Variable	Morbidity (n=73)	P value	Mortality (n=10)	P value
	n	%		%
Age group (years)				
18-24	10	20	0	0
25-39	22	59.1	3	13.6
40-49	25	72	9	36
50-60	10	80	3	30
>60	6	100	3	50
Comorbidities		0.010		0.005
Yes	40	77.5	15	37.5
No	33	48.5	3	9.1
Peritonitis		0.002		0.004
Yes	55	74.5	18	32.7
No	18	33.3	0	0
Time between onset of pain to presentation		0.000		0.020
≤ 1 day	14	50	0	0
2-4 days	43	59.5	5	11.9
≥ 5 days	16	93.8	13	81.3
Perforation site		0.567		0.018
Duodenum-1st part	36	58.3	6	16.7
Duodenum-2nd part	27	70.4	6	22.2
Gastric pylorus	10	70	6	60
Size of perforation (cms)		0.000		0.000
≤0.5	51	49	1	2
0.5-1	18	100	14	77.8
>1.0	4	100	3	75
Contamination (litres)		0.032		0.000
<0.5	15	40	0	0
0.5-1.5	48	66.7	10	20.8
>1.5	10	90	8	80
Shock		0.667		0.399
Yes	2	50	1	50
No	71	64.8	17	23.9

DISCUSSION

In our study, the majority of the study population belonged to the age group of 40-49 years (about 34%), followed by the 25-39 years age group (about 30%). The least number of patients presented from the >60 years age group. These findings are consistent with previous studies, where younger adults had a higher incidence of peptic ulcer perforation (Sharma et al., 2012).[11] However, our study differs from others, such as that by Gupta et al.

(2011), which observed a higher prevalence of perforation in the elderly population.[12]

Regarding gender, more than 90% of the study population were males, with females accounting for the remaining 10%. This aligns with the findings of Prakash et al. (2013), who reported a male predominance in cases of peptic ulcer perforation.[13]

Our findings also corroborate with the work of Sriram et al. (2010), where males were more commonly affected by this condition.[14]

Almost half of the study population had a past history of peptic ulcer, but not on regular medications. Only 18% of patients in the study had a history of NSAID intake, which is lower than the rates reported in the studies by Gupta et al. (2011) and Sharma et al. (2012), where NSAID usage was identified as a major risk factor for peptic ulcer perforation.[11,12]

A significant proportion of the study population had a history of smoking or alcoholism or both. About 61% of the study population reported smoking, 80% were alcoholic, and around 57% were both smokers and alcoholics. These findings are similar to the studies by Sriram et al. (2010) and Prakash et al. (2013), which found smoking and alcohol consumption to be common risk factors for peptic ulcer perforation.[13,14]

More than half (around 55%) of the study subjects had comorbidities like hypertension, diabetes, or both. This supports the findings of Gupta et al. (2011), who also noted that comorbidities were associated with worse outcomes in patients with peptic ulcer perforation. In our study, the comorbidities were statistically significant in increasing mortality (p=0.005).[12]

Regarding the time between the onset of pain and presentation, 59% of patients presented between 2-4 days after the onset of abdominal pain, while only 19% presented within 1 day, and 22% presented after 5 days. Early presentation (within 1 day) was associated with significantly lower mortality (p<0.05), consistent with the findings of Sharma et al. (2012), who observed that delayed presentation was associated with higher mortality rates.[11]

Approximately 75% of the study population had signs of peritonitis at presentation, and the majority of patients had perforation in the first part of the duodenum (approximately 49%). The presence of peritonitis was found to have a significant association with mortality (p=0.005), which aligns with studies by Gupta et al. (2011) and Sriram et al. (2010), where peritonitis was a significant predictor of poor outcomes.[12]

The average size of the perforation in our study was 0.7 ± 0.2 cm, with a mean contamination volume of 1.2 ± 0.5 liters. As the size of the perforation and the volume of contamination increased, both morbidity and mortality significantly increased (p=0.000). These findings are consistent with previous studies, including the one by Prakash et al. (2013), where larger perforations and greater contamination volumes were correlated with worse outcomes.

The most common postoperative complications in our study were wound infection (35.6%), acute kidney injury (19.2%), and ARDS (16.4%). These complications were also noted in similar studies, such as those by Sharma et al. (2012) and Gupta et al. (2011). The least common complication was bile leak, affecting only 1.3% of patients.[11,12]

The mortality rate in our study was 24.7%, which is consistent with the findings of Prakash et al. (2013), where mortality ranged from 20-30%. The mean duration of hospital stay after surgery was 11 ± 0.4 days, with a range from 10 to 12 days, similar to the findings in Sriram et al. (2010).

Our study revealed that elderly patients (>60 years) had significantly higher mortality (50%), with a statistically significant association (p=0.020). This finding is consistent with the study by Gupta et al. (2011), which also identified older age as a risk factor for higher mortality.[12]

Furthermore, the study indicated that patients with comorbidities, peritonitis, smoking, and larger perforation sizes had higher mortality rates, which were statistically significant (p=0.005, p=0.021, p=0.000, respectively). These findings are in line with the work of Sharma et al. (2012) and Gupta et al. (2011), who highlighted the role of these factors in predicting poor surgical outcomes in peptic ulcer perforation.[11,12]

The incidence of morbidity and mortality in our study was significantly higher among elderly patients, those with comorbidities, and those presenting with peritonitis. Delayed presentation, increased perforation size, and contamination volume were also significant factors contributing to worse outcomes. (Sriram et al., 2010; Sharma et al., 2012).[11]

CONCLUSION

Peptic ulcer disease is now being increasingly treated with medications instead of elective surgery. However, Peptic ulcer may perforate and perforated peptic ulcer carries a high mortality. The symptoms of sudden onset of abdominal pain, abdominal rigidity and tachycardia are the characteristic features of perforated peptic ulcer. Erect X-ray chest sometimes may not help in the diagnosis and high index of suspicion is always essential. Immediate resuscitation, early suspicion of ulcer perforation and prompt surgical intervention are necessary to reduce the mortality. Non-operative management may be conducted by experienced teams when optimal resources are available and ideally under trial conditions. Emergency laparotomy and omental patch repair found to be the gold standard. When experienced surgeons are available, laparoscopy may be considered.

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