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Pre-Operative Factors Affecting Outcome in Cases of Peptic Perforation

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Abstract: ***Peptic Perforation is one of the common emergencies in surgery department and its repair by surgery is common operation performed. In this study I have tried to enumerate pre-operative factors like age/sex, addictions, comorbidities, previous surgery or peptic ulcer disease, etc. that affect the outcome of patient after surgery or if patient managed conservatively. It is study of 35 patients performed during period of September 2012 to June 2014***

Keywords: Importance of preoperative factors in peptic perforation, factors affecting graham's live omentopexy, post-operative complications after peptic perforation repair, NSAIDS smoking and alcohol affecting peptic perforation surgery outcome

1. Introduction

Peptic ulcers are focal defects in the gastric or duodenal mucosa that extend into submucosa or deeper. They may be acute or chronic and Ultimately are caused by an imbalance between mucosal defences and acid/peptic injury. Common sites for peptic ulcers are the first part of the duodenum and thelesser curve of the stomach, but they also occur on the stoma following gastric surgery, the oesophagus and even in a Meckel's diverticulum, which contains ectopic gastric epithelium .In general, the ulcer occurs at a junction between different types of epithelium, the ulcer occurring in the epithelium least resistant to acid damage. It is now widely accepted that infection with *H. pylori* is the most important factor in the development of peptic ulceration. The other factor of major importance at present is ingestion of NSAIDs. Cigarette smoking and other factors like physical and mental stress also contribute.

Indications for operative intervention have changed over past 20 years with the virtual elimination of elective operations. Operative intervention is now reserved for the treatment of complicated ulcer disease. The three most common complications of peptic ulcer include bleeding, perforation and obstruction. For peptic perforation surgery is almost always indicated , although occasionally non surgical treatment can be used in the stable patient without peritonitis in whom radiologic studies document a sealed perforation. Perforation peritonitis is the most common surgical emergency in India and duodenal ulcer perforation remains leading cause. Hence, we have made an attempt to analyze the various pre-operative factors, which affect the morbidity/mortality of patients with peptic ulcer perforations.

2. Materials and Methods

This is a prospective study of 35 cases operated for peptic perforation admitted in Civil hospital, Ahmedabad from September 2012 to June2014. This study was mainly conducted to analyze the pre-operative factors which can predict morbidity and mortality in patients of peptic perforation operated in emergency.

Inclusion criteria:
1. Age> 20 years
2. Patients with duodenal or gastric perforation of peptic ulcer origin.

Exclusion criteria:
1) Iatrogenic gastroduodenal perforation.
2) Malignant gastroduodenal perforation.
3) Traumatic gastroduodenal perforation.

A detailed history of suspected patients of peptic ulcer perforation regarding age, sex, previous use of NSAIDs, smoking and other associated illnesses was taken. The diagnosis was made on clinical findings of peritonitis supported by investigations like plain x-ray chest and erect abdomen. Immediate resuscitation was done with nasogastric suction, intravenous fluids, antibiotics, and urine output monitoring. . Relevant investigations were performed on the patient. Diagnosed patients of peptic ulcer perforation were operated by emergency exploratory laparotomy and simple closure with Graham's omental patch.Ulcer biopsy was done to rule out perforations due to malignancy. Patients were followed up every day with continuous bedside monitoring of vital data in the immediate post operative period. Due attention was paid to note the development of any complication. Suitable and appropriate treatment was instituted from time to time according to the needs of the patients. Postoperative complications like wound infection, wound dehiscence, leak from closed perforation site, pleural effusion, paralytic ileus, septicemia, residual intra abdominal abscess, fistula, respiratory infections and renal failure were assessed. After satisfactory improvement, patients were discharged from the hospital with advice regarding diet, anti-ulcer drugs and quitting of smoking/alcohol etc.

All the patients were instructed to come for regular follow-up at 1 month, 3 months and 6 months. And during follow-up were assessed for wound infection, scar related complications or evidence of hernia. A detailed structured proforma was used to collect this information. The results were discussed and compared with available published literature in the form of tables and charts.

3. Results and discussions

3.1 Age and Sex wise incidence

Age and sex wise incidence in study group was found to be as follow:

Age (years)	Males		Females		Total	
	NO.	%	NO.	%	NO	%
21-30	8	24.24	1	50	9	25.71
31-40	11	33.33	0	0	11	31.42
41-50	2	6.06	0	0	2	5.71
51-60	6	18.18	0	0	6	17.14
61-70	6	18.18	1	50	7	20
TOTAL	33	100	2	100	35	100
Mean ± SD	45.27±10.4 8		45.75±11.74		45.26 ± 10.52	

The highest incidence was observed in Third decade of life. The youngest patient was 23 years old and oldest was 67 years old.

Perforation was more common in males compared to females, the ratio being 17.5:1. Out of 35 cases 33 were males. The mean age (SD) of the patients was 45.26 years. The mean ages (SD) were, for males 45.27 years and for females 45.75 years. Peptic ulcer perforation is common in second and third decade. Mean age of patients with peptic ulcer perforation in study by Kocer et al. (2007) was 43 years and in the study by J. C. Dakubo et al. (2009) it was 41 years. However Sharma et al. (2006) another Indian study showed mean age of 33 years. Study by Irvin (1989) showed older age group patients (mean age 70 years) were commonly affected.

Present study matches with studies by Kocer et al. (2007) and J. C. Dakubo et al. (2009). Peptic ulcer perforation was common in the age group of 30-50 years with mean age 44.2 years in our study. But age is no bar for perforation to occur. It has also been reported in 4 years old child (Bhatacharya, 1969).

3.2 Age related morbidity and mortality

Age group (In years)	*No.of Patients*	*Good recovery*	*Morbidity*	*Mortality*
21-30	9	5	3	1
31-40	11	8	1	2
41-50	2	2	0	0
51-60	6	4	0	2
61-70	7	2	2	3

Morbidity is increased in age group of 61-70 , 3 patients expired in the age group of 61-70. This shows morbidity as well as mortality increases as the age advances.

3.3 History of use of NSAIDs, Smoking, Alcohol, Associated illnesses.

Parameter		Total	Morbidity	Mortality
NSAID use	Present	9	1	5
	Absent	26	5	3
Corticosteroid use	Present	1	0	1
	Absent	34	6	7
H/o Smoking	Present	17	3	4
	Absent	18	3	4
H/o Alcohol	Present	13	3	4
	Absent	22	3	4
H/o Peptic ulcer disease	Present	6	1	1
	Absent	29	5	7
Associated illness	Present	8	2	3
	Absent	27	4	5

In this study 9 (25.71%) patients had history of regular ingestion of NSAIDs and 1(2.85%) patient had history of ingestion of corticosteroid. History of regular smoking was present in 17 (48.57%) patients. Among these, 4(14.81%) patients developed morbidity and 10 (37.03%) patients expired in postoperative period. History of regular alcohol consumption was present in 13(37.14%) patients, 3 (23.07%) patients developed morbidity and 4 (30.76%) patient expired in postoperative period.

A previous history of dyspepsia or peptic ulcer symptoms was present in 6 (17.14%) out of 35 patients. 1(16.66%) developed morbidity and 1(16.66%) patient expired. 8 (22.85%) patients had associated co-morbid conditions. Hypertension was present in 4 patients, COPD was present in 1, 1 was diabetic, 2 had Ischemic Heart Disease (IHD). 2 (25%) patients developed morbidity and 3 (37.5%) patients expired in postoperative period.

In a study by Kocer et al. in 2007, 8.9% patients had history of regular ingestion of NSAIDs whereas in study by J. C. Dakubo et al. in 2009, it was 28.22%. In our study 14% patients were chronic NSAIDs users.

In a study by Kocer et al. in 2007, 73.2% patients had history of regular smoking whereas in study by J. C. Dakubo in 2009, it was 9.81%. In our study 48.57% patients were chronic smokers.

In a study by Kocer et al. in 2007, 12.3% patients had history of regular alcohol consumption whereas in study by J. C. Dakubo in 2009, it was 38.03%. In our study 37.14% patients were chronic alcoholics.

3.4 Shock on admission and Time of surgery

Parameter		Total	Morbidity	Mortality
Pre-operative shock	Present	3	1	2
	Absent	32	5	6
Time of surgery	<24 hrs	12	1	1
	>24 hrs	23	5	7

23 (65.71%) patients underwent surgery after 24 hours of perforation, the rest were seen before 24 hours. 5 (21.73%)

patients who underwent surgery after 24 hours developed morbidity and 7 (30.43%) patients expired.

At the time of admission, shock (systolic BP less than 100) was present in 6 (17.14%) patients. 1 (16.66%) patient developed morbidity and 2(33.33%) patients expired in postoperative period.

In study by Kocer et al. in 2007, patients older than 65 years had a higher morbidity rate (56.6% vs 16.2%) and mortality rate (37.7% vs 1.4%) when compared to younger patients.

In study by J. C. Dakubo et al. in 2009, patients older than 65 years had a higher mortality rate (19.81% vs 6.8%) when compared to younger patients. Factors like age above 60 years, excessive alcohol intake were statistically significant in predicting postoperative complications and/or mortality in their study.

In our study, patients older than 65 years had a higher mortality (100 % vs 20.58 %). Hence age 65 years is significant in predicting postoperative mortality in our study.

3.5 Pre-operative hemoglobin predicting the morbidity and mortality in patients with peptic perforation

Pre operative Hb	Total no. of patients	Morbidity	Mortality
<11	14	1	5
>11	21	5	3
Total	35	6	8

Hb<11 was present in 14(40%) patients, 1(7.14%) patient developed morbidity and 5 (35.71%) patients expired in postoperative period. Hb>11 was present in 21(60%) patients, 5(23.8%) patients developed morbidity and 3 (14.28%) patients expired in postoperative period.

3.5 Site of Perforation predicting the morbidity and mortality in patients with peptic perforation

Site	*Total*	*Morbidity*	*Mortality*
Gastric	25	3	5
Duodenal	10	3	3
Total	35	6	8

10(28.57%) patients had duodenal perforation. 3(30%) developed morbidity and 3 (30%) expired. 25 (71.42%) patients had gastric perforation out of which 3(12%) developed morbidity and 5(20%) expired**.** In our study morbidity is 30% in case of duodenal perforation and 12% in case of gastric perforation. Morbidity in case of patients with gastric and duodenal perforations are compared with study conducted by Noguiera et al and Eduardo et al59.

Study conducted by Noguiera et al shows morbidity is 60% in case of duodenal perforation and 42%in case of gastric perforation. Study conducted by (Eduardo etal59) shows morbidity is 24.6% in case of duodenal perforation and 38% in case of gastric perforation. Comparable to Noguiera et al our study has more morbidity in patients with duodenal perforation than gastric perforation.

In our study mortality is 30% in case of duodenal perforation and 20% ingastric perforation.

Study conducted by to Eduardo et al 59 shows mortality 19% in patients with duodenal perforation and 17.6% in gastric perforation. Study conducted by Noguiera et al(34) shows mortality 13.2% in patients with duodenal perforation and 10.6% in gastric perforation. Similarly our study shows that duodenal perforation has higher mortality compared to gastric perforation.

3.6 Size of perforation predicting mortality and morbidity

Size of perforation	Total	Morbidity	Mortality
<0.5 cm	18	2	3
0.6-1 cm	10	2	3
>1 cm	7	2	2

In 18 (51.42%) patients the size of perforation was < 0.5 cm in which 2 (11.11%) patients developed post operative complications and 3(16.66) died. In 10 (28.57%) patients the size of perforation was 0.6-1 cm in which 2 (20%) patients developed post operative complications and 3 (30%) died. In 7 (20%) patients the size of perforation was >1 cm in which 2(28.57%) patients developed morbidity and 2 (28.57%) died.

Morbidity is increased as the size of perforation increases. In our study patients with size of perforation is <0.5 cm morbidity was 11.11%, in the size of perforation between 0.5-1 cm morbidity was 20% and if the > 1cm it was 28.57% In the study conducted by Kocer et al morbidity was 71% in patients with size of perforation <0.5 cm, 21.9% in patient with size of perforation 0.5-1 cm and 7.1% size is more than 1 cm. Our study shows increased morbidity directly proportional to increase in size of perforation.

3.7 Type of peritoneal contamination predicting the morbidity and mortality in patients with peptic perforation

	Grade	*Total no. of patients*	*Morbidity*	*Mortality*
Grades of Peritoneal Contamination	0	3	0	0
	1	16	2	0
	2	3	3	0
	3	3	0	2
	4	9	1	6
Total		35	6	8

On exploration, 3 (8.57%) of the patients had grade 0 peritoneal contamination, 16 (45.71%) had grade 1 peritoneal contamination, 4 (11.42%) had grade 2 peritoneal contamination, 3 (8.57%) had grade 3 peritoneal contamination and 9 (25.71%) had grade 4 peritoneal contamination.

On exploration, 16 (45.71%) of the patients had grade 1 peritoneal contamination, 4 (11.42%) had grade 2 peritoneal contamination, 3(8.57%) had grade 3 peritoneal contamination 9 (25.71%) had grade 4 peritoneal

contamination. All patients were treatedsurgically by simpleomental patch closure of the perforation and good peritoneal wash was given.

The morbidity percentages are compared with other studies (Goudar et al)58 in which grade 3 and 4 shows 26% morbidity due to purulent peritoneal contamination. In our study grade 3 and grade 4 peritoneal contamination shows 0% and 11.11% morbidity and 66.66% and 66.66% mortality respectively. This concludes patient with purulent peritoneal contamination mortality will be increased.

3.8 Postoperative complications:

Complications	No.	%
Paralytic ileus	4	11.42
Pleural effusion	5	14.28
Wound infection	3	8.57
Wound dehiscence	2	5.71
Renal failure	1	2.85
Multi organ failure	1	2.85
Septicemia	1	2.85
Leak	1	2.85
Death	8	22.85

14(40%) patients had postoperative complications. Among 35 patients, most common postoperative complication was death in about 8(22.85%) patients followed by pleural effusion in 5 patients (14.28%), , 4(11.42%) patients had prolonged paralytic ileus, 3 (8.57%) patients had septicemia, 2 (5.71%) patients had wound dehiscence, 1(2.85%) had renal failure, 1(2.85%) developed multi organ failure.

3.9 Various factors predicting the morbidity in patients with peptic perforation

Parameter		NO.	Morbidity	%	p-Value
Age	<65	34	6	17.64	0.64
	>65	1	0	0	
Sex	Males	33	6	18.18	0.51
	Females	2	0	0	
NSAID use	Present	9	1	11.11	0.58
	Absent	26	5	19.23	
Corticosteroid use	Present	1	0	0	0.65
	Absent	34	6	17.64	
H/O smoking	Present	17	3	17.64	0.94
	Absent	18	3	16.66	
H/O alcohol	Present	13	3	23.07	0.47
	Absent	22	3	13.63	
Associated illness	Present	8	2	25	0.5
	Absent	27	4	14.81	
Pre-operative shock	Present	3	1	33.33	0.43
	Absent	32	5	15.62	
H/O PUD	Present	6	1	16.6	0.97
	Absent	29	5	17.24	
Hb	<11	14	1	7.14	0.19
	>11	21	5	23.8	
Time of surgery	<24 hrs	12	1	8.33	0.31
	>24hrs	23	5	21.73	
Site	Duodenal	10	3	30	0.2
	Gastric	25	3	12	

In the analysis of 35 patients, there is no statistically significant predictor of morbidity.

3.10 Various factors predicting the mortality in patients with peptic perforation

Parameter		NO.	Mortality	%	p-Value
Age	<65	34	7	20.58	0.06
	>65	1	1	100	
Sex	Males	33	8	24.24	0.42
	Females	2	0	0	
NSAID use	Present	9	5	55.55	0.006
	Absent	26	3	11.53	
Corticosteroid Use	Present	1	1	100	0.06
	Absent	34	7	20.58	
H/O smoking	Present	17	4	23.52	0.92
	Absent	18	4	22.22	
H/O alcohol	Present	13	4	30.76	0.39
	Absent	22	4	18.18	
Associated Illness	Present	8	3	37.5	0.26
	Absent	27	5	18.51	
Pre-operative Shock	Present	3	2	66.66	0.06
	Absent	32	6	18.75	
H/O PUD	Present	6	1	16.66	0.82
	Absent	29	7	24.13	
Hb	<11	14	5	35.71	0.13
	>11	21	3	14.28	
Time of surgery	<24 hrs	12	1	8.33	0.13
	>24hrs	23	7	30.43	
Site	Duodenal	10	3	30	0.52
	Gastric	25	5	20	

In the analysis of 35 patients, NSAID's use (p-value <0.05) was statistically significant predictor of mortality.

According to study by Kocer et al. in 2007, a total 108 postoperative complications were seen in 65 (24.2%) patients. Respiratory failure (37.04%) was commonest complication followed by wound infections (18.52%), renal failure (9.25%) and sepsis (8.34%). A total of 23 patients died (8.5%). The most frequent causes of death were myocardial failure and sepsis.55
According to study by J. C. Dakubo et al. in 2009, seventy three (27.7%) patients developed postoperative complications. Chest infection, septicaemia, and abdominal wound infection were the most common complications followed by leakage of the closed perforation and intra abdominal sepsis. There were 36 (11%) deaths.56

In our study, morbidity was seen in 14(40%) patients. Most common complication was pleural effusion in 5 patients (14.28%). 4(11.42%) patients had prolonged paralytic ileus, 3 (8.57%) patients had septicemia, 2 (5.71%) patients had wound dehiscence, 1(2.85%) had renal failure, 1(2.85%) developed multi organ failure. Death occurred in 8(22.85%) patients.

4. Summary

1. Morbidity rate in our study is 17.14% and mortality rate 22.85%.
2. Peptic ulcer perforation was common in the age group of 30-50 years with mean age 44.2 years. Elderly patients (≥ 65 years) had increased mortality. Peptic ulcer perforation was common in males than females in ratio of 17.5:1.

3. Smoking (48.57%) had less significant effect in postoperative morbidity and mortality whereas alcohol consumption (37.14%) slightly increased morbidity as well as mortality. Regular ingestion of NSAID's was an important risk factor in causation of peptic ulcer perforation. Use of NSAID's (pvalue= 0.006) was also a significant risk factor in postoperative mortality.
4. Previous history of peptic ulcer disease was not an important risk factor in causation peptic ulcer perforation, as sizeable number of patients did not give positive history of dyspepsia or peptic ulcer symptoms. It was also not a significant risk factor in postoperative mortality and morbidity.
5. Out of 35 patients, 8 (22.85%) patients had associated co-morbid conditions and these conditions increased postoperative mortality and morbidity.
6. Shock on admission was a determinant of morbidity and mortality in peptic ulcer perforation. In this study shock on admission was a risk factor for morbidity in peptic ulcer perforation. 66% of 77 patients with pre-operative shock died. Shock is a correctable variable that must be treated before surgery to minimize morbidityand mortality rate.
7. Among 23 patients who underwent surgery, 24 hours after the onset of symptoms, 5 (21.73%) developed morbidity and 7 (30.43%) died. So delayed surgery (> 24 hours) is associated with increased morbidity and mortality in postoperative period.
8. There were 14 patients with Hb < 11. Out of them 1 (7.14 %) developed morbidity and 5 (35.71 %) died.
9. Duodenal perforation was associated with increased mortality (30%) as compared to gastric perforation (20%). Size of perforation > 1cm was associated with increased morbidity(28.57 %) as well as mortality (28.57 %).
10. Purulent peritoneal contamination (Grade 3 & 4) was another risk factor for morbidity in peptic perforation. Postoperative morbidity was seen in 11.11% of patients and grade 3 and 4 accounted for 100% of mortality.
11. Among 35 patients, most common postoperative complication was death in about 8(22.85%) patients followed by pleural effusion in 5 patients (14.28%), , 4(11.42%) patients had prolonged paralytic ileus, 3 (8.57%) patients had septicemia, 2 (5.71%) patients had wound dehiscence, 1(2.85%) had renal failure, 1(2.85%) developed multi organ failure.
12. Risk factors for morbidity and mortality in perforated peptic ulcer were age 65 years, associated medical illness, alcohol consumption, NSAID's use , duration of perforation more than 24 hours before surgery, presence of shock on admission and purulent peritoneal collection (Grade 3 & 4). No evidence of malignancy or presence of H. pylori was noted on histopathology report.

5. Conclusions

1. From present study following conclusions can be drawn based on various observations and its analysis.
2. Peptic perforation is common in the age group of 30-50 years. It is more common in males.
3. Age more than 65 years and associated medical illness increase morbidity and mortality in patients with peptic perforation.
4. Prolonged use of drug like NSAID's is a statistically significant predictor of outcome in terms of mortality. Similarly use of corticosteroids also causes increase in mortality.
5. The duration of perforation more than 24 hours and presence of shock on admission are associated with an increased rate of post-operative complications.
6. Site and size of perforation and presence of purulent peritoneal contamination (grade III or grade IV) also have an adverse effect on outcome causing increased morbidity and mortality in patients with peptic perforation.
7. Early diagnosis, prompt management of shock and septicemia, decreasing delay in surgery and definitive surgical treatment is needed to improve overall results.

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