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Predictors of Mortality in Gastroduodenal Ulcer Perforation: A Single Tertiary Care Center Study

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Abstract

Background: Gastroduodenal ulcer perforation (GDUP) is one of the most common emergencies which requires surgery. Even with the introduction of H_2 receptor antagonists and proton pump inhibitors, the incidence of elective surgery for peptic ulcer diseases have been decreased, although complications of peptic ulcer remained fairly constant and perforation of peptic ulcer associated with significant morbidity and mortality.

Aims and Objectives: The purpose of this study was to identify the risk factors that predict the mortality in Gastro duodenal ulcer perforation.

Methdology: 226 patients underwent surgery for GDUP in S Nijalingappa Medical College (SNMC) and HSK Hospital and Research Centre, Bagalkot were studied retrospectively from January 2015 to December 2019. The following factors were analysed: age; gender; associated medical illness; chronic ingestion of NSAIDs; pre-operative shock; delay in surgery (>24 hours); site and size of ulcer perforation and type of peritoneal contamination were relating to cause of mortality.

Results: Out of 226 patients, were 148 males and 78 were females. Gastric perforation was seen in 36 patients and duodenal perforation in 190.Postoperative death occurred in 15 patients, rest recovered well. In these 15 patients, onset of symptoms >24 hours, history of NSAIDS, pre-operative shock and treatment delay (>24hours), large perforated ulcer size in all these factors, the p value is significant ($p<0.05$). Use of corticosteroids and co morbidities seen in these patients were 73.3 and 80% respectively ($p<0.001$).

Conclusion: Elderly, delayed presentation, pre-operative shock, high grade peritoneal contamination, large perforated ulcer size, co-morbidities, long term use of steroids and NSAIDS are the main factors which increased the mortality.

Keywords: Gastro duodenal ulcer perforation; Mortality; Shock; Peptic ulcer; Peritoneal contamination; Omental patch.

Introduction

Gastroduodenal ulcer perforation is the most serious complication of ulcer disease. The first description on a perforated duodenal ulcer was made in 1688 by Murutto and reported by Lenepneau. After Mikulicz first sutured a perforated duodenal ulcer in 1887, Hansen achieved the first successful operation.[1] Hyperacidity is not a prerequisite for duodenal ulcers. Failure of mucosal defences against gastric acid and pepsin results in ulceration.[2] The sudden release of gastric or duodenal content into the peritoneal cavity through a perforation can lead to a sequence of events, which if not properly managed, is likely to cause death.[3-5] In GDUP, mortality is influenced by the patient's age[6], sex,site of ulcer, treatment delay, concurrent disease, pre-operative shock, type of anaesthesia and peritoneal contamination(grades of peritoneal contamination: 1- serous fluid, 2- turbid fluid, 3- frank pus, 4-flakes of pus).[7] However, many of the patients have more than one risk factors related mortality. So, in our article we have tried to establish relation between

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preoperative risk factors and mortality of the patient.

Methodology

It is a retrospective analysis of 226 cases who got operated for GDUP in SNMC, from January 2015 to December 2019. International disease code CDC 10, K 25.5 and 26.1 were included in this study. A detailed retrospective history was collected from hospital records as per the proforma: age, sex, previous history of ulcer disease; use of tobacco, alcohol, corticosteroid and NSAIDs; duration of symptoms suggestive of perforation; location, size of perforation and amount of peritoneal contamination. Risk factors were analysed. Haemodynamic instability at the time of presentation was defined as a systolic blood pressure less than 90 mmHg. Delay in treatment was defined as an interval of more than 24 hours until surgery from the suspected time of perforation. The diagnosis was made on clinical findings supported by blood and radiological investigations. All the Patients with GDUP who underwent simple closure with Graham's omental patch repair with peritoneal lavage as a standard operative procedure were included in this study. Iatrogenic GDUP, malignant GDUP, patients presenting with recurrent perforation or ulcer perforation caused by stomas were excluded from the study.

Sample size estimation was done using open epi software version 2.3.1, at 95% confidence level, and 80% power of the study. According to the study conducted by FatihCiftci,[8] The mortality rate in perforated peptic ulcer was 17.4=p. At 5%, Absolute precision, Sample size estimated is 221 =226.

Formula used n= [DEFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1)+p*(1-p)]. All the data were analysed using Chi square and multivariate analysis with a probability value of<0.05 as a statistically significant value.

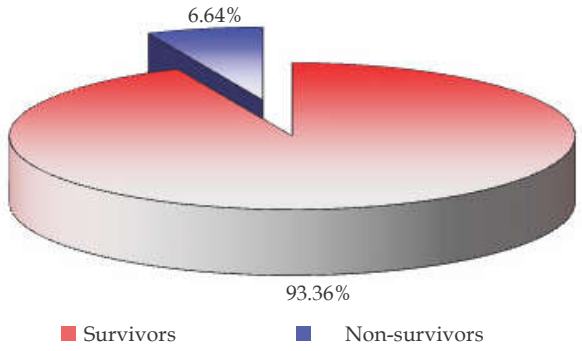
Results

In our study, 15 patients died out of 226 GDUP cases, which accounts for a death rate of 6.64% (Graph 1). The age of patients varied from 18 to 86 years. 54 patients were below the age of 30 years and had mortality of 3, 118 patients were of the age 30–60 years had mortality of 6,(Graph 2). 54 patients who were above the age of 61 years had a mortality of 6 (Graph 2). Only 48 patients presented to us within 24 hours, rest of the presented after 24 hours. 152 patients had the history of previous ulcer disease, only 19 had history of intake of corticosteroids, but 182 patients had history of intake of NSAIDs, comorbidities as risk factors was present in 180 patients. Preoperative haemodynamic instability was seen in 37 patients and among them 15 patients died postoperatively (Table 1). In 150 patients, the

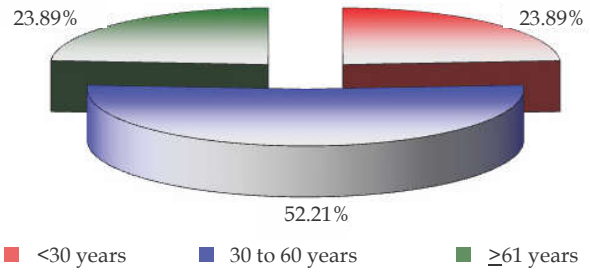
Table 1: Association of risk factors with outcome Association of risk factors with outcome.

	Risk factors	Outcome				P value
		Survivors (n=211)		Non survivors (n=15)		
		No	%	No	%	
1)	Age in years <30	51	24.17	3	20.00	
	<30 to 60	112	53.08	6	40.00	0.397
	>60	48	22.75	6	40.00	
2)	Previous history of ulcer disease	137	64.93	15	100.00	0.003
3)	History of use of corticosteroids	8	3.79	11	73.33	<0.001
4)	History of use of NSAIDs	167	79.15	15	100.00	0.047
5)	Comorbidities	168	79.62	12	80.00	1.000
6)	SBP < 90 mm Hg/Preoperative shock	174	82.46	15	100.00	0.139
7)	Treatment presentation ≥24 hours	163	77.25	15	100.00	0.045
8)	Size of perforation (1–2 cm)	32	88.63	8	100.00	
	(0.5–1 cm)	144	68.24	6	40.00	0.008
	(<0.5 cm)	35	16.58	1	6.66	
9)	Peritoneal Contamination - Grade 1	11	5.21	1	6.67	
	Grade 2	63	29.86	2	13.33	0.022
	Grade 3	95	45.02	4	26.67	
	Grade 4	42	19.91	8	53.33	
10)	Site of perforation – Duodenum	179	84.83	11	73.33	0.269
	Gastric	32	15.17	4	26.67	

intraoperative size of ulcer was 0.5–1 cm, 1–2 cm in 40 patients and < 0.5 cm in 36 patients. Peritoneal contamination was graded from 0 to 4; peritoneal contamination of grade 4 was seen in 30.09% and mortality was higher in contaminated cases.



Graph 1: Distribution of patients according to the outcome.



Graph 2: Distribution of patients according to the age.

Discussion

GDUP is a serious complication of peptic ulcer disease with potential risk of grave complications.[1] Duodenal perforation, complication of duodenal ulcer, is one of the commonest surgical emergencies requiring hospitalization and early management.[3] Perforated duodenal ulcer remains a surgical emergency but nowadays it rarely results in death.[4] According to Goudar et al., duodenum is the most common site of ulcer perforation (90.5%). Gastric ulcer perforation was associated with higher mortality 23% and morbidity than the duodenalulcer perforation 12%. Most of these patients were associated with older patient age, greater size of ulcerperforation, and extensive intra-abdominal contamination. It is also concluded that the size of perforation is more likely associated with higher mortality and morbidity due to increased peritoneal contamination (grade 4 in 8 patients and 2 died).[1,9] In our study, out of 226, 36 were gastric perforation and 190 were duodenal perforation. As far as risk factors are concerned, previous history of PUD, alcohol intake, smoking, corticosteroids and NSAIDs use emerged as important risk factors. According to Kosharyia et al. out of 124 patients in study, 22 patients with duodenal perforation, 102 patients with gastric perforation, 32 (38.23%) gave history of regular NSAIDs use; as compared with duodenal perforation where 31.81% (7 patients) out of the total 22 patients gave similar history, signifying that NSAIDs is an important etiological factor for both gastric and duodenal ulcer perforation.[5] In our study, 137 had previous history of PUD, 8 with history of usage of corticosteroids, 167 used NSAIDS, all these with significant p values. According to Kin Tong Chung et al.,[10-11] post-operative mortality for PPU is estimated to be 20%. Patients older than 65 years were associated with higher mortality rate when compared to younger patients (37.7 U/S 1.4). Henok Teshome et al[6] showed that, all of the patients with systolic BP<90mmHg and who had come after 24 hours of the onset of symptoms, 44% of them developed complications (P=0.019). 35% patients who presented after 24 hours of their illness developed postoperative complications as compared to only 9% of patients who presented within the first 24 hours (P=0.000). Two third (66.6%) of the deaths occurred on patients who presented after 24 hours of onset of symptoms. In our study 48 patients presented to us within 24 hours rest presented after 24 hours. 15 patients died out of 226 patients who presented after 24 hours of onset of symptoms, which accounts for a mortality rate of 6.64%. Most of our patients were referred from periphery hospitals so definitely by the time patient reaches the hospital, may delay the treatment (p =0.045). Sangita M Gavit et al.,[10,12,13] sizes of perforation ranging from 0.5–3 cm. Large size perforation may need additional procedure to reduce complication. Commonly found the size of perforation was < 0.5 cm seen in 25 cases (43.10%) followed by 0.6–1.5 cm size in 23 cases (39.65%) then 1.6–2.5 cm size seen in 7 cases (12.06%) and only 3 cases (5.17%) seen with > 2.5 cm size perforation.[10] In our study, size of the perforation <0.5cm seen in 36 cases, 0.5–1 cm in 150 cases and 1– 2 cm in 40 cases. Maximum mortality (8 patients) in 1–2 cm peroration size, which is statistically significant (p: 0.008).

During intraoperative period, the biopsy was taken from perforated ulcer edge in 19 cases of duodenal perforation (advanced age) and 36 patients of gastric ulcer perforation. All biopsy were negative for malignancy.[13]

Conclusion

Perforated peptic ulcer is a life-threatening disease

with high mortality. Mortality is associated with increasing age of the patient, hemodynamic instability, delayed presentation, high grade peritoneal contamination, long term use of steroid and NSAIDS, co-morbidities. Mortality could be reduced by early resuscitation and surgical intervention.[17]

Abbreviations

GDUP- Gastro-duodenal ulcer perforation

PPU- Perforated peptic ulcer

NSAIDS- Non-steroidal anti- inflammatory drug

NBM – Nil by mouth

PUD -Peptic ulcer disease

USG-Ultrasonography

CECT-Contrast enhanced Computed Tomography

Consent: Written and verbal informed consent was obtained from all the patient's attenders and patients for research and publication of this article and accompanying images.

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Ethical approval: The study was approved by the institutional ethics committee.

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