

Postoperative Outcome of Duodenal Ulcer (DU) Perforation in Rajshahi Medical College Hospital: A Study of 300 Cases

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Abstract

Original Research Article

Introduction: Peptic Ulcer Disease (PUD) is one of the most common causes of acute abdomen in Bangladesh. **Aim of the study:** The aim of the study is to find out the post-operative outcome (Mortality and Morbidity) and to correlate the outcome with the prognostic factors. **Method:** This study was carried out in the Department of surgery, Rajshahi Medical college Hospital, Rajshahi, Bangladesh during the period from Jan 2015 to Dec 2019 for five years with the aim to find out the surgical outcome and associated prognostic factors. In this study 300 cases of perforated duodenal ulcer were randomly selected. Both male and female patients of any age group diagnosed as duodenal ulcer perforation were included in this study but the patients having gastric ulcer perforation were excluded because the surgical modality and outcome variables of those patients are different. The diagnosis of peptic ulcer perforation was made by the history of sudden onset of severe abdominal pain with clinical signs of diffuse peritonitis and presence of radiological sign of pneumoperitoneum. Per operative finding of gastric ulcer perforation or any suspicion of malignancy were excluded from the study. Any patients with traumatic pneumoperitoneum were also excluded from the study. **Results:** Among the 300 cases, most of the patients were male (91%=273), from low socioeconomic family (77%=231) and from rural areas (81%=243). Many patients arrived at hospital with significant lapse of time of average 2 days delay ranging from 1 day to 9 days and many patients had significant hemodynamic and biochemical abnormalities with or without systemic sepsis and septicemia. A number of patients were presented with single or multiple co morbidities like DM, IHD, HTN, COPD etc. Among the 300 cases, 14 (4.7%) mortality was found, Wound infection (SSI) rate was 13.5% (41), Burst abdomen 08 (3%) and Chest infection was 31 10% in the form of pulmonary atelectasis or pneumonia. **Conclusion:** Mortality was found to have related with old age with limited physiological reserves due to multiple co morbidities, presence of profound shock and dehydration, presence of sepsis or septicemia and delay more than three days lapsed to reach in the hospital. Other post operative morbidities like wound infection (SSI) in the form of superficial, deep and organ space type along with the chest complications in the form of atelectasis and pneumonia were also studied here which were significantly related with the treatment cost and prolonged hospital stay.

Keywords: Postoperative Outcome, Duodenal Ulcer (DU) Perforation, Hospital stay.

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INTRODUCTION

Perforated gastric and duodenal ulcer is a common surgical emergency worldwide which is associated with high morbidity and mortality. Peptic ulcer disease (PUD) affects 4 million people around the world yearly out of which 10%-20% of these patients develop complications and 2%-14% of the ulcers perforate. Perforated peptic ulcer (PPU) is a life threatening disease and the mortality varies from 10% - 40% [1]. Moller et al showed that, Mortality and morbidity following perforated peptic ulcer (PPU) is

substantial, and mortality rates of 25–30% have been reported in different published studies [2, 3]. Globally the incidence of peptic ulcer disease is said to have fallen in recent years. Also recent advances have taken place in both diagnosis and management of peptic ulcer disease, namely improvements in endoscopic diagnostic and therapeutic facilities, the increased use of proton pump inhibitors and Helicobacter pylori eradication therapies. In spite of all these, peptic ulcer perforation rates have remained unchanged [4] and therefore remain a major health challenge. Elective peptic ulcer surgery

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was common before the discovery that peptic ulcer is caused by *H. pylori* and non-steroidal anti-inflammatory medications (NSAIDs) [5]. The discovery changed the management of the disease but still its complication could be seen as an emergency in the form of perforation or bleeding and stenosis [6]. A perforated ulcer can present early with chemical peritonitis or late with septic peritonitis. In late stage, it could cause severe sepsis which might lead to organ failure and mortality. Emergency surgical treatment is recommended for this condition [7]. The management trend of peptic ulcer disease has become changed over the last three decades, possibly because of the introduction of triple therapy management for these patients; nevertheless, the patients could still present with complications like perforation, bleeding or stenosis [8]. Surgery is most successful mode of treatment of perforated peptic ulcer peritonitis. Formal acid-reducing procedures like vagotomy with or without drainage procedures, which has historically been the mainstay of PPU therapy, are now being replaced by simpler procedures, such as omental patch primary closure of the perforation owing to better understanding of the pathophysiology of peptic ulcer and successful eradication of *H. pylori* treatment. Perforated duodenal ulcer treated by patch repair with a vascularized omental pedicle commonly referred to as a Graham patch or omentopexy. However, in cases of perforated gastric ulcer, either ulcer excision or repair of the defect or biopsy and omental patch is the most expeditious approach in the emergency setting [9]. Poor outcomes in PPU have been associated with increasing age, major medical illness, peri-operative hypotension and delay in diagnosis and management [10]. Surgical repair should not be delayed in patients with general peritonitis because every hour of delay increases the mortality risk [11]. Peptic ulcer disease is one of the most prevalent diseases of the gastrointestinal tract. The common complications of peptic ulcer disease are bleeding, perforation and obstruction. Perforation remains a major life threatening complication. Duodenal, antral and gastric body ulcers account for 60%, 20% and 20% ulcers among the peptic ulcer perforations respectively. The current treatment of perforated peptic ulcer is surgical repair [12]. In most cases of perforation, gastric and duodenal content spills into the peritoneal cavity. This content includes gastric and duodenal secretions, bile, ingested food, and swallowed bacteria. The leakage results in peritonitis, with an increased risk of infection and abscess formation. Subsequent third spacing of fluid in the peritoneal cavity due to perforation and peritonitis leads to inadequate circulatory volume, hypotension, and decreased urine output. In more severe cases, shock may ensue. Abdominal distention as a result of peritonitis and subsequent ileus may interfere with diaphragmatic movement, impairing expansion of lung bases. Eventually, atelectasis develops, which may compromise oxygenation of the blood, particularly in patients with co-existing lung disease [13]. The

incidence of mortality due to perforation is 5-10%. Mortality increases up to 50% if the perforation has been present > 24 hours. Surgical delay is a well-established negative prognostic factor and limiting surgical delay in patients with perforated peptic ulcers (PPU) seems of paramount importance. In men duodenal ulcers are more common than in females. The male-to-female ratio for duodenal ulcers is about 3:1 [14]. Mortality is influenced by a number of factors which include patients age, sex, site of the ulcer, treatment delay, concurrent disease, pre-operative shock, and type of anesthesia used [15]. A majority of the factors are interrelated, and for instance, the treatment delay is likely to increase the mortality rate. Despite a lot of evidence in the literature, the knowledge regarding factors influencing the mortality that occurs after peptic ulcer perforation is limited [4, 16]. The purpose of this study is to find the factors that influence the mortality and morbidity among operated cases of duodenal ulcer perforation. There are multiple numbers of factors affecting the mortality and morbidity which would be dealt with in this study [15, 14, 16].

OBJECTIVES

To find out the post-operative outcome (Mortality and Morbidity) and to correlate the outcome with the prognostic factors.

Inclusion Criteria

All non-malignant and non-traumatic duodenal ulcer perforation cases above the age of 20 years were included in the study.

Exclusion Criteria

Traumatic perforation and perforated malignant ulcers were excluded from the study.

METHODS

The following data were recorded in the data sheet such as age, sex, previous history of PUD, nonsteroidal anti-inflammatory drugs (NSAID) intake, duration of symptoms, time lapsed to start treatment, degree of dehydration, hemodynamic status on admission, co morbidities and the amount of peritoneal contamination at operation. Postoperatively the patients were kept under follow up for one month to see the complications like wound infection, burst abdomen, pulmonary atelectasis, pneumonia etc. All the postoperative follow up information were also recorded in the data sheet. A total of 315 cases of Perforated PUD were enrolled in the study over 05 years. All patients underwent laparotomy. Among them 15 cases were found to have perforation in the antral part of the stomach and treated by excision and repair with sending the excised tissue for histopathological evaluation and in remaining 300 cases the perforation was found in the anterior wall of the first part of the duodenum. The patients were treated with perforation closure with pedicled omental patch repair. All the patients were

continued treatment with anti- *Helicobacter pylori* regimen postoperatively.

RESULT

Table-1: Demographic characteristics of the study population (n=300)

	Frequency	Percentage
Age group		
20-39 yrs	72	24.0%
40-59 yrs	174	58.0%
60-69 yrs	39	13.0%
70 and above	15	05.0%
Sex		
Male	279	93.0%
Female	21	07.0%
Socio-economic status		
Low	231	77.0%
Middle	69	23.0%
Residence		
Rural	240	80.0%
Urban	60	20.0%

A total of 300 cases of Perforated PUD were enrolled to study the post operative outcome which include the operative mortality, wound infection, burst abdomen and different forms of post operative chest complications. Both male and female patients of all age

group ranging from 20 years to >80 years were included in this study. Among them 279 (93%) were male and only 21 (07%) were female. Most of the patients were from rural areas 240 (80.0%) and from low socioeconomic 231 (77.0%) group.

Table-2: Correlation between mortality and different prognostic factors

	Patients (n=300)	Number of death (n=33)	Mortality rate
Age group			
20-39 yrs	72	03	04.1%
40-59 yrs	174	18	10.3%
60-69 yrs	39	05	12.8%
70 and above	15	07	46.6%
H/O Concurrent Illness			
DM	42	15	35.7%
HTN	12	00	00.0%
COPD	21	06	28.6%
IHD	03	1	33.3%
Absent	222	12	5.4%
Duration of perforation			
<2 days	170	08	04.7%
03 days	75	05	06.7%
04 days	30	09	30.0%
05 Days	25	11	44.0%
Shock			
Mild	57	02	03.5%
Moderate	63	15	23.8%
Severe	27	13	48.1%
Absent	153	03	01.9%

In this study, operative mortality was 33 (11.0%). It was observed that mortality was increased with some co morbid conditions like old age (>70 yrs), concomitant illness like DM, COPD, IHD, delay to start treatment and presence of significant shock and dehydration. Over the age of 70 years the mortality was as high as 46.6% whereas in the early age group (60-69 yrs) mortality was only 12.8%. 42 patients were

diabetic and operative mortality was 35.7%. Among 21 COPD patients mortality was 28.6%. Whereas only 5.4% mortality was found in the patients without co morbidities. It was observed that Preoperative delay significantly increases the mortality. In case of pre operative delay of >4days, mortality was as high as 44.0% whereas that of <2days mortality was significantly less (04.7%).

Table-3: Association between complications and co-morbidities

Complications	DM (n=42)	COPD (n=21)	IHD (n=03)	Absent (n=222)	Total
Mortality	15 (35.7%)	06 (28.6%)	1 (33.3%)	12 (5.4%)	33 (11%)
Wound infection	30 (71.4%)	21 (100%)	1 (33.3%)	66 (29.7%)	117 (39%)
Burst abdomen	09 (21.4%)	12 (57.1%)	1 (33.3%)	21 (9.5%)	32 (10.6%)
Chest Infection	24 (57.1%)	18 (85.7%)	1 (33.3%)	24 (10.8%)	67 (22.3%)

Among the 300 study populations, 78 have got one or more co morbidities. Among them 42 were diabetic, 12 were hypertensive, 21 patients has got COPD and 03 patients had IHD. Among the diabetic patients, mortality rate was 35.7% (15). In COPD patients; mortality was 28.6% (06). In non co morbid patients (222), mortality was only 5.4% (12). Wound infection rate in the diabetic patients was 71.4%, in

COPD patients was 100%. 21.4% patient developed burst abdomen in the diabetic group. Burst abdomen rate in COPD patients was more that is 57.1% (12) but in non co morbid patients burst abdomen rate was only 9.5%. Chest infection rate was also high (57.1%) in diabetic and COPD patients 85.7% and that in the non co morbid patients was only 10.8%.

Table-4: Association between complications and Presence of shock

Complications	Presence of shock				Total
	Mild (n=57)	Moderate (n=63)	Severe (n=27)	Absent (n=153)	
Mortality	02 (3.5%)	15 (23.8%)	13 (48.1%)	03 (01.9%)	33 (11%)
Wound infection	24 (42.1%)	31 (49.2%)	14 (51.9%)	51 (33.3%)	120 (40%)
Burst abdomen	05 (8.8%)	20 (31.7%)	09 (33.3%)	11 (7.1%)	45 (15%)
Chest Infection	13 (22.8%)	17 (27.0%)	09 (33.3%)	30 (19.6%)	69 (23%)

Degree of shock and dehydration has got significant effect on post operative outcome even we had resuscitated every patient before operation. Severe shock (n=27) was associated with 48.1% mortality, 51.9 % wound infection, 33.3% burst abdomen and 33.3% Chest Infection. In patients with mild to moderate shock (n=63) mortality was found 23.8%, Wound infection was 49.2%, Burst abdomen was 31.7% and Chest Infection was 27.0%. The patients those who were presented early with mild shock (n=57) or no significant hemodynamic abnormality (n=153), post operative outcome of these patients were Mortality: 3.5% and 01.9% respectively, Wound infection: 42.1% and 33.3%, Burst abdomen: 8.8% and 7.1% and Chest Infection: 22.8% and 19.6% respectively.

DISCUSSION

A total of 300 cases of Perforated PUD were enrolled to study the post operative outcome which include the operative mortality, wound infection, burst abdomen and different forms of post operative chest complications. Both male and female patients of all age group ranging from 20 years to >80 years were included in this study. Among them 279 (93%) were male and only 21 (07%) were female. Most of the patients were from rural areas 240 (80.0%) and from low socioeconomic 231 (77.0%) group. In this study, operative mortality was 33 (11.0%). It was observed that mortality was increased with some co morbid conditions like old age (>70 yrs), concomitant illness like DM, COPD, IHD, delay to start treatment and presence of significant shock and dehydration. Over the age of 70 years the mortality was as high as 46.6% whereas in the early age group (60-69 yrs) mortality was only 12.8%. 42 patients were diabetic and operative mortality was 35.7%. Among 21 COPD patients

mortality was 28.6%. Whereas only 5.4% mortality was found in the patients without co morbidities. It was observed that Preoperative delay significantly increases the mortality. In case of pre operative delay of >4days, mortality was as high as 44.0% whereas that of <2days mortality was significantly less (04.7%). A study by Dellinger RP et al., have shown that Sepsis is frequently present and a leading cause of death in patients with perforated peptic ulcer (PPU). An estimated 30–35% of patients with PPU have sepsis on arrival at the operating theater, and sepsis is believed to account for 40–50% of fatalities. Within 30 days of surgery, >25% of the patients develop septic shock [7], which carries a mortality rate of 50–60%. Accordingly, investigation and interventions aimed at preventing, detecting, and treating sepsis in PPU patients may reduce mortality and morbidity. This can be accomplished by systematically assessing for the signs of sepsis and treating according to the principles of the surviving sepsis campaign, including fluid resuscitation, cultures, empirical broad-spectrum antibiotics, and source control [17]. A study conducted in Zambia by K. J. Sondashi et al., and found that, Death was the commonest complication arising postoperatively accounting for 37%. This high mortality rate could be attributed to diagnostic and treatment delay, as well as concomitant underlying medical illness, as noted with high rate of HIV infection in the study group [18]. D. L. Buck et al., shown where a total of 2668 patients were included. Their median age was 70.9 (range 16.2–104.2) years and 55.4 per cent (1478 of 2668) were female. Some 67.5 per cent of the patients (1800 of 2668) had atleast one of six co-morbid diseases and 45.6 per cent had an American Society of Anesthesiologists fitness grade of III or more. A total of 708 patients (26.5 per cent) died within 30 days of

surgery. Every hour of delay from admission to surgery was associated with an adjusted 2.4 per cent decreased probability of survival compared with the previous hour (adjusted RR 1.024, 95 per cent c.i. 1.011 to 1.037) [19]. Delayed operation is recognized as a contributor to adverse outcome in many areas of emergency surgery [20]. The primary cause in general surgery seems to be diagnostic delay [20]. Reasons behind delayed surgery for PPU are sparsely explored, but seem to be associated with out-of-hospital perforation, lack of peritoneal signs, late attendance by the surgeon, attendance by a non senior surgeon and lack of pulse oximetry [21]. Patients with out-of-hospital perforation are often unselected and it may take time to reach the diagnosis [20]. Those with atypical symptoms are often not prioritized, compared with patients with signs of an abdominal emergency. Previous studies have reported the strong negative prognostic impact of delayed surgery for PPU [22]. However, the evidence derives primarily from studies using unadjusted analyses, and with few patients [22], risking bias [23], and no study has assessed surgical delay as a continuous variable. A possible reason for the strong association between delay and adverse outcome could be the increased risk of developing severe sepsis. Longstanding perforation is associated with peritoneal contamination, positive peritoneal cultures, septic complications and development of postoperative abscesses [24]. Among the 300 study populations, 78 have got one or more co morbidities. Among them 42 were diabetic, 12 were hypertensive, 21 patients has got COPD and 03 patients had IHD. Among the diabetic patients, mortality rate was 35.7% (15). In COPD patients; mortality was 28.6% (06). In non co morbid patients (222), mortality was only 5.4% (12). Wound infection rate in the diabetic patients was 71.4%, in COPD patients was 100%. 21.4% patient developed burst abdomen in the diabetic group. Burst abdomen rate in COPD patients was more that is 57.1% (12) but in non co morbid patients burst abdomen rate was only 9.5%. Chest infection rate was also high (57.1%) in diabetic and COPD patients 85.7% and that in the non co morbid patients was only 10.8%. S Senthil Arumugam *et al.*, in Tamilnadu conducted a study on 50 cases of duodenal perforation. The patients were treated with perforation closure with live omental patch repair after initial resuscitation. They had shown that the patients aged >60 years and associated co morbid illness had the highest rate of wound infection. 17 patients had associated comorbid illness. Of the 8 patients who had wound infection, 6 patients had associated comorbid illness and 50% of them were above 50 years of age. Electrolyte imbalance included hyponatremia in 21% of patients, hypokalemia in 19% of patients, and elevated serum creatinine in 18% of patients. Mortality rate was 12%, of which 3 patients were treated with B/L flank drain because of the very poor general condition of the patient at the time of admission, and all these patients were above the 60 years age group; of the operated patients, 6% mortality is present, and in these patients,

there were associated comorbid illness and delay in presentation and amount of peritoneal contamination were all significantly present [25]. Degree of shock and dehydration has got significant effect on post operative outcome even we had resuscitated every patient before operation. Severe shock (n=27) was associated with 48.1% mortality, 51.9% wound infection, 33.3% burst abdomen and 33.3% Chest Infection. In patients with mild to moderate shock (n=63) mortality was found 23.8%, Wound infection was 49.2%, Burst abdomen was 31.7% and Chest Infection was 27.0%. The patients those who were presented early with mild shock (n=57) or no significant hemodynamic abnormality (n=153), post operative outcome of these patients were Mortality: 3.5% and 01.9% respectively, Wound infection: 42.1% and 33.3%, Burst abdomen: 8.8% and 7.1% and Chest Infection: 22.8% and 19.6% respectively. Mortality rates for peptic ulcers have remained stable over time in Europe [26] and were reported to be 10–30% in a 2011 systematic review [27]. However, mortality rates differ substantially between reports (ranging from 3% to 30%), mainly because of geographical variations in causes and patient inclusion, but also differences in method of data collection. Administrative data sources, such as the US National Inpatient Sample [28] and Health Insurance Claims Registry in Korea [29] report low mortality rates (around 3%). For the USA, such low mortality in administrative datasets contrasts with rates in other reports (mortality of 15%) from the same country [30]. In prospective, nationwide data collection, such as the Danish Clinical Register of Emergency Surgery, mortality is reported to be as high as 28%. Thus, in addition to geographical variation (Figure-1), method of data capture must be considered carefully when mortality rates are compared [31].

CONCLUSION

Perforated PUD is acute surgical emergency. Delay in surgery is associated with increased mortality and morbidity. Old age with limited physiological reserve eg. Reduced Cardiorespiratory reserve, DM, IHD, COPD, Heart failure etc is also associated with increased mortality and morbidity. Super added complication like sepsis and septicemia is important factor of bad outcome of surgery.

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