

Short-Term Outcome of Perforated Peptic Ulcer; Relation with Estimated Time from the Onset of the Abdominal Pain to Surgical Intervention

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ABSTRACT

Background and aim of the work: perforated peptic ulcer still remains as one of the most common surgical emergencies and the high incidence of postoperative complications necessitates the identification of the factors associated with this morbidity. The aim of this study is to evaluate the various perioperative factors in patients operated for PPU and how these factors may affect the operative outcome.

Methodology: Between January 2011 and November 2019, 68 patients who were operated emergently for PPU in our hospital were included in this study. Demographic and clinical data, surgical procedures, intraoperative findings, postoperative complications were collected and analyzed retrospectively.

Results: The mean age was 46.75 ± 14.05 years. Out of 68 cases there were 49 (72%) male patients and 19 (28%) female patients. The mean operation time was 81.32 ± 12.18 minutes. The mean hospital stay period was 8.5 ± 2.2 . Most of the cases (94%) presented without a warning of previous history of PUD, predominantly in older males. 50% of cases presented within first 24 hours and therefore favors the better outcome. The commonest sites of perforation encountered in our set up are the 1st part of duodenum (72%), followed by prepyloric region perforations (25%). The size of perforations in most of the cases ranged from 0.5 cm to 3cm with only two cases with size more than 3cm and they are treated with simple Graham's omental patch. Common complications encountered were abdominal collection (11.8%), followed by pleural effusion/pneumonia (10.2%) with a mortality rate of 7%. Half of the patients were discharged home within the first week after surgery. Comparing estimated time from the onset of the perforation symptoms to time of surgical intervention against the length of stays has shown that there was a statistically significant correlation. **Conclusion:** the earlier the presentation of PPU to the emergency department resulted in better outcome. Those patients with high risk of perforation need to be identified to be diagnosed and managed immediately as they reach the hospital.

Keywords: Perforated Peptic Ulcer (PPU), Duodenal ulcer, Perforation, Intraoperative findings, Outcome.

INTRODUCTION

The incidence of peptic ulcer disease (PUD) has decreased over the past decades. Although surgery for intractable ulcer disease is rarely needed due to effective treatment of proton pump inhibitors and *H. pylori* eradication therapy, the epidemiological pattern of the complications has changed little [1]. In emergency situation, perforated peptic ulcer (PPU) repair and its consequence still remains one of the most common surgical operations, especially in developing countries, in spite of the good achievement in medical therapy for PUD [2]. Morbidity associated with PUD reported between 10 to 20% including bleeding, perforation, and obstruction. Perforation is associated with increased mortality, comparing to other complications of PUD, accounting for more than 35% of all peptic ulcer-related deaths [3].

It has been well established that the main predisposing factors for peptic ulcer perforation are smoking, use of nonsteroidal anti-inflammatory drugs, chronic stress, *Helicobacter pylori* infection, and advanced age (>60 years) [4].

Nowadays surgery for PPU consists of laparotomy/laparoscopy with peritoneal lavage and closure of perforation which can be accomplished by primary closure with interrupted sutures; occluding the perforation with a pedicled omentoplasty (Cellan-Jones repair) [5]; placing a free omental patch (Graham patch) [6]; and performing a sutureless repair [7].

PPU presents with acute abdomen in a vague picture, leading to delay of intervention. In fact, time of intervention is one of the known prognostic values, known as the Boey score [8]. Bas *et al.* stated that a delay of more than 24 h in diagnosis and management greatly worsened predicted outcomes and increased post-operative complications [9]. However, other factors, such as concomitant diseases, shock on admission, delayed surgery, resection surgery, and postoperative abdominal and wound infections, have been associated with increased morbidity and mortality in perforated ulcer patients [10]. Many patients with PPU have more than one postoperative complication and each of these vary in its magnitude.

Indeed, analysis of these factors will expose possible relations to postoperative complications^[11, 12]. The aim of this study is to evaluate the various perioperative factors in patients operated for PPU and how these factors may affect the operative outcome.

METHODS

This is a retrospective study which includes all patients who underwent emergency laparotomy/laparoscopy for PPU in Al-Hada Military Hospital, Taif, Saudi Arabia, during the time period of January 2011 to November 2019. We included all patients over the age of 16 years old, with PPU (both gastric and duodenal) in the last 8 years. We excluded patients with malignancy and patients with perforation caused by caustic ingestion, trauma or ischemia. The electronic data base of all patients admitted or transferred to the hospital with a diagnosis and operated for PPU were revised and 68 patients had complete files and were included in the study. Data on relevant preoperative, intraoperative, and postoperative variables for all patients were collected using a pre-designed proforma and the following items were determined: demographics information, risk factors, comorbid diseases, clinical presentation, physical examination findings, pre-operative parameters, time of presentation of patients after onset of symptoms, time elapsed from the onset of symptoms to surgery, operative findings (site and size of perforation), management (surgical procedure), postoperative mortality, individual postoperative complications (such as wound infection, chest infection, renal failure, cardiac failure, septic shock, or need for mechanical ventilation during the same admission period), and length of hospital stay were taken as outcome variables. Statistical analysis was conducted using SPSS 16.0 software (SPSS, Chicago, Illinois, USA). The level of significance (*p* value) and confidence interval will be evaluated using Pearson's Chi-squared test. A *p* value less than 0.05 was considered statistically significant.

Ethical approval:

This retrospective study was conducted after approval of the ethics board of our hospital.

RESULTS

During the period of the study, 68 patients operated for duodenal and gastric ulcer perforation were collected. They were aged from 29 to 82 years, with an average of 55 years. The Sex Ratio female: male was estimated to be 1:2. Table 1.

Table 1: Demographic and clinical characteristics of the patients

Parameters		(n=68) %
Mean age \pm SD years		46.75 \pm 14.05
Gender (mean, %)	Male	49(72%)
	Female	19(29%)

By exploring the personal histories of our patients, 53 of them were smokers and 23 had used NSAIDs and/or corticosteroids (Table 2).

Table 3 shows the percentage of main presenting symptoms and signs.

Table 2: Co-relation of various co-morbidities

	N (%)
DM	27(39.7%)
HTN	20(29.4%)
Smoking	53(78%)
NSAIDs and/or corticoids use	23(33.8)

Table 3: Chief / Presenting complaints & general examination finding

	N (%)
Epigastric pain	68(100%)
followed by abdominal distention	59(87%)
Fever	15(22%)
Vomiting	42(62%)
Dehydration	57(84%)
Tachycardia	63(92%)
Shock	22 (32%)
Anemia	18(26%)
Renal impairment	7(10%)

Operative finding in our study revealed that Perforation of anterior wall of first part of Duodenum predominated (69 %), followed by perforation of prepyloric region of stomach (28 %) of cases, while in the body of stomach in (3%) of the cases. The average dimension of perforation was mostly less than 1 cm in 53 (79%) cases, 1-3cm in 11 (16%) cases and giant ulcers >3cm in 2 (3%) cases. Bilious peritoneal fluid found in 50 (73.5%) cases, while the nature of the fluid was pure pus in 6 (9%) cases. (Table 4). After reviving the wound and tissue sampling from its edges (if indicated), a simple surgical suture with omental patch was performed in all the patients: 10% of the patients had open repair, while most of the patients (83%) had laparoscopic repair of PDU and 7% had laparoscopic converted to open repair.

Table 4: Operative finding

Site of perforation	1st part of Duodenum	47
Duodenal/ Gastric	Prepyloric region	19
	Body of Stomach	2
Size of perforation	Up to 1 cm	53
	1-3 cm	11
	>3 cm	2
Peritoneal Fluid	Bilious	50
	Pus	6
	Bilious+ Pus	13
Mean operation time (minute)		81.32±12.18

In table 5, a summary of the most frequent postoperative complications with a morbidity rate of 11% and mortality of 7%.

Table 5: Postoperative complications following repair of perforated ulcer.

30-day Complication	Frequency (n)
Abdominal Collection	8
Pleural effusion/Pneumonia	7
Surgical site infection	6
Duodeno-cutaneous fistula	2
Septic shock	5
DVT	1
Ileus	4
Total Morbidity	16

*some of the patients had multiple complications

Table 6: Outcomes of patients undergoing surgery for perforation

Length of stay (days) the Mean	ICU	4.0 (2.0–7.0)
	Total	8.5 ± 2.2
Return to theatre		6%
Mortality in-hospital within 30 days		5(7%)
(Died in theatre)		0%

Table 7: operative time interval vs length of stay

onset of perforation to operation time interval(hours)	Number of patients	mean Hospital stay(days)
Less than 24 hours	18	5
24-48 hours	23	9
More than 48 hours	27	17

DISCUSSION

Perforation as a complication of PUD is one of the commonest surgical emergencies requiring early management and hospitalization^[1-3].

In our study; youngest patient was 29 years old and the oldest was 82 years old. It seems to be a disease of middle-aged groups, as patients' mean age was 46.75 ± 14.05 years. Similarly, **Ohene- Yeboah**^[13] reported 64.8 years of mean age in his study. While **Etonyeaku et al.**^[14] observed that; it seems to be a disease of middle and young age groups, as patients' where mean age was 39.7 years.

In the current study, males were in majority (72 %); which can be explained by the great difference in habits, social, economic and cultural activities between both genders. Similarly, **Unar et al.**^[15] reported that PPU were 60.0% in male patients. While in a study by **Bin-Taleb et al.** reported a female to male ratio of 1:8^[16], we reported 1:2 ratio. The male predominance in our study may be due to that male were more smokers as compared to female and facing more stress and strain of life style.

More than three quarter of the patients with PPU was smokers and multiple studies show that a strong association was found between smoking and prevalence of PPU (smoking is known to adversely effects on mucosal aggressive and protection factors)^[17].

The comorbidities in our study; 78% smokers, followed by diabetic 39.7%, NSAIDs and/or corticoids use 33.8%, while 29.4% is hypertensive and these comorbidities were significantly associated to high incidence of perforation. While in a study by **Unar et al.**^[18], 23.1% of cases were smokers, followed by hypertensive 8.2% of cases, diabetic 5.1% and obese patients were 3.6%. **Fathalah et al.** also reported that age, sex, Smoking, NSAIDs uses, and stress significantly contributed as risk factors for incidence in PPU and also had significant effect on treatment outcome^[19].

On admission all patients in our study generally describe a sudden and severe epigastric pain, which initially localized then rapidly become all over the abdomen, on examination Tachycardia presented in 63 (92.6%) of cases, Shock in 22 (32.3%), Dehydration in 57 (83.8%), Vomiting in 42 (61.7%) and Fever revealed in 15 (22%) of cases. Upon admission, in a study by **Lau et al.** ; they showed that patients generally presented with severe sudden epigastralgia, which initially localized then become widespread rapidly. Sometimes it is associated with symptoms of hypotension secondary to blood loss or Systemic Inflammatory Response Syndrome (SIRS)

[20]. However, the clinical presentations in patients with PPU in elderly patients are may be sometimes different and atypical or less specific compared to the younger patients [21].

In this series an interesting point noted is the large number of gastric perforations mostly prepyloric with a ratio of (1:3) to duodenal perforations nearly similar to study **Bali et al.** from India showed a ratio of 1:5. Other studies shows a sharp contrast to this ratio were **.Etonyeaku et al.** reported 1:10, **Seow et al.** found a 1:13 ratio [22, 23 , 24]. It is well known that the bigger the size of perforation and presence of pus in the peritoneal cavity indicate late presentation and bacterial peritonitis with higher risks of complications [25]. 78% of cases in present series the dimension of perforation was less than or equal to 1cm. The nature of intra-peritoneal fluid was pus mixed with bile in 19% cases, pus in only 7.3% of the cases.

Death in this study occurred in 5 patients with a mortality rate of 7%, which are quite acceptable compared to the data in other literature. Most of the patients died within the first week postoperatively with a mean of 4th day. Three patients died due to Septicemia and MODS and two patients died due to ARDS/Pneumonia. In a recent series by **Solonirina et al.** reported an overall mortality of 9.49% [26], While the 30-day mortality rate reported in a study by Hemmer ranges from 4 to 31% [27].

The most common complication reported by many authors is Wound related and Pulmonary complications. The commonest postoperative complication reported by **Vinod et al.** found that wound infection was (41.8%) followed by pulmonary complications (31.8%) [25]. Surgical site infection is a leading concern in a study by **Vats et al.** with a rate of 18%. There are less surgical site complications in our study (8.9%) which is less common complication in patients undergoing laparoscopic repair for PPU [28].

Nearly half of the patients in this study were discharged home in ≤ 7 days, 32.3% discharged home in the following week, and 14.7% in ≤ 21 days, 4.4% ≥ 21 days.

The surgical outcome depends on the individual patient presentation to the emergency department. Hospital stays and complications developed were the main surgical outcome factors, which were looked at in many previous studies. Late presentation of the patients was associated with prolonged morbidity and even mortality postoperatively.

With regard to mortality and the estimated time/ hours from the onset of the abdominal pain to surgical intervention, it has been statistically significant. No mortality occurred in patients with an onset of perforation to operation time interval < 48 hours, and the 5 deaths occurred for interval >48 hours.

Majority of the patients in this study had postoperative hospital stay duration of two weeks with a maximum hospital stay of 32 days. 3 patients had a hospital stay more than twenty-one days which caused by fistula in two cases and massive pleural effusion with intercostal drain in One case.

With regard to relationship between Hospital Stay and onset of perforation to operation time interval, the mean Hospital stay for patients with interval <24 hours was 5 days, 9 days for patients with interval between 24 – 48 hours and 17 days for interval >48 hours. It has been statistically significant that more the time Interval, lengthier the hospital stays. Test has been carried out using Chi-Square test which showed a p- value of 0.039 (P value <0.05). A statistically significant result has been reported by **Asma et al.** stated that the mean Hospital stay for patients with interval <24 hours was 8 days, 13 days with interval between 24 – 48 hours and 20 days for interval >48 hours [29]. Postoperative complications were more in patients presented to hospital after 72 hours of onset, these patients also had more mortality.

CONCLUSION

PPU still remains as one of the most common surgical emergencies and the morbidity associated with it especially in developing countries remains high in spite of the improvements in medical therapy. We concluded that the earlier the presentation of PPU to the emergency department resulted in better outcome. Those patients with high risk of perforation need to be identified to be diagnosed and managed immediately as they reach the hospital.

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