

Postoperative Complications in Surgically Treated Patients with Perforated Peptic Ulcer

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Abstract: Background: Surgical emergency due to a perforated peptic ulcer is associated with a significant postoperative morbidity and mortality. Therefore, identification of risk factors in these patients provides surgeons with an important tool to plan the management. Our aim was to assess the predictors of the postoperative complications in surgically treated patients with perforated peptic ulcer. **Patients and Methods:** This is a prospective study conducted in Baghdad Teaching Hospital from August 2009 until January 2011. During this period all patients with acute abdomen who proved to have a perforated peptic ulcer were included in the study. A data form for each patient included the demographic characteristics of patients, illness and physical examination at time of presentation, preoperative resuscitation, type of surgery, operative findings and postoperative complications. **Results:** 60 patients who proved to have perforated peptic ulcer and had emergency surgery were included in this study, 21 patients (35%) developed a total of 35 post operative complications that included one or more of the following: superficial wound infection (16)76%; respiratory complications (8)38%; burst abdomen (4)19%; hematemesis(4)19% ;postoperative fistula (2)9.5% and septicemia (1)5%. It was found that the risk of developing a postoperative complication was significantly influenced by the presence of a concomitant medical illness, abdominal distension and shock state on admission. **Conclusion:** Our study demonstrated that advanced age, abdominal distension, presence of concomitant medical illness and shock at presentation were the major and early clinical predictors of the postoperative complications in patients with perforated peptic ulcer, along with delayed presentation.

Keywords: Surgical Emergency, Postoperative Morbidity and Mortality, Management

INTRODUCTION

Peptic ulcer, also known as *ulcus pepticum*, PUD or peptic ulcer disease, (www.emedmag.com) is an ulcer (defined as mucosal erosions or defects that extend through the muscularis mucosa and equal to or greater than 0.5 cm) of an area of the gastrointestinal tract that is usually acidic and thus extremely painful. (Le, T. H. *et al.*, 2009)

Common sites for P.U are the 1st part of duodenum and the lesser curve of the stomach, but they also occur on the stoma following gastric surgery, the esophagus and even is a Meckel's diverticulum. The ulcer occurs at a junction between different types of epithelium, the ulcer occurs in the epithelium least resistant to acid damage. (Bailey, H. *et al.*, 2008) it is classified into gastric ulcer, duodenal ulcer, Oesophageal ulcer and Meckel's Diverticulum ulcer.

Historically, John Lykoudis, a general practitioner in Greece, treated patients for peptic ulcer disease with antibiotics, beginning in 1958, long before it was commonly recognized that bacteria were a dominant cause for the disease. (www. Wikipedia)

Helicobacter pylori was discovered in 1982 by two Australian scientists, Robin Warren and Barry J. Marshall as a causative factor for ulcers. In their original paper, Warren and Marshall contended that most stomach ulcers and gastritis were caused by colonization with this bacterium, not by stress

or spicy food as had been assumed before. (www. Wikipedia)

The *H. pylori* hypothesis was poorly received, so in an act of self-experimentation Marshall drank a Petri dish containing a culture of organisms extracted from a patient and soon developed gastritis. His symptoms disappeared after two weeks, but he took antibiotics to kill the remaining bacteria at the urging of his wife, since halitosis is one of the symptoms of infection. This experiment was published in 1984 in the Australian Medical Journal and is among the most cited articles from the journal. (www. Wikipedia)

In 1997, the Centers for Disease Control and Prevention, with other government agencies, academic institutions and industry, launched a national education campaign to inform health care providers and consumers about the link between *H. pylori* and ulcers. This campaign reinforced the news that ulcers are a curable infection, and that health can be greatly improved and money saved by spreading information about *H. pylori*. (www. Wikipedia)

Incidence and Epidemiology

There have been marked changes in the last two decades in the demography of patients presented with D.U; this is greatly due to two reasons 1st, the introduction of H₂-receptors antagonist 2nd, the

peak incidence is now in much older population although it's more common in men but the differences less marked. (Bailey, H. *et al.*, 2008) On the other hand population affected by gastric ulcer shows marked differences from those with D.U. 1st G.U is less common than D.U. 2nd the incidence is equal between the sexes and the population with G.U tends to be older. They are more prevalent in low socioeconomic groups and considerably more common in the developing world.³ these changes mirror the changes, at least in part, in the epidemiology of H. pylori infection. In summary, the lifetime risk for developing a peptic ulcer is approximately 10%⁵. In Western countries the prevalence of Helicobacter pylori infections roughly matches age (i.e., 20% at age 20, 30% at age 30, 80% at age 80 etc.). Prevalence is higher in third world countries. (www.Wikipedia)

Nowadays most of the elective operations for peptic ulcers are abandoned and mentioned for historical respect and this is because of the introduction of antisecretory drugs and eradication therapy, and most of the operations are done in the emergency setting to deal with the complication of the disease rather than the disease itself. (Bailey, H. *et al.*, 2008)

Complications

- Gastrointestinal bleeding is the most common complication. Sudden large bleeding can be life-threatening. (Cullen, D. J. *et al.*, 1996) It occurs when the ulcer erodes one of the blood vessels.
- Perforation (a hole in the wall) often leads to catastrophic consequences. Erosion of the gastro-intestinal wall by the ulcer leads to spillage of stomach or intestinal content into the abdominal cavity, which lead to chemical irritation of the peritoneal cavity (chemical acute peritonitis) which later on become infected causing bacterial peritonitis and this is seen when the perforation occurred in anterior wall of stomach or duodenum.
- Scarring and swelling due to ulcers cause narrowing in the duodenum and gastric outlet obstruction. Patient often presents with severe vomiting.
- Penetration is when the ulcer continues into adjacent organs such as the liver and pancreas. (www.merck.com).
- Cancer is included in the differential diagnosis (elucidated by biopsy), Helicobacter pylori is an important etiological factor for the

development of gastric carcinoma making it 3-6 times more likely to occur. (www.merck.com)

Perforated P.U is a common clinical problem and its postoperative complications are one of the issues that face the surgeon oftenly.

Emergency surgery for the complication of P.U is associated with high morbidity. (Kocer, B. *et al.*, 2007)

The aim of this study was to find what factors were associated with the postoperative complications of perforated P.U the outcome measures were: wound infection, burst abdomen, hematemesis, fistula formation, septicemia and respiratory complications.

PATIENTS AND METHODS

Sixty patients were included in this prospective study which was conducted in Baghdad Teaching Hospital from August 2009 until January 2011.

During this period all patients with acute abdomen who proved to have a perforated peptic ulcer were included in the study.

A data form for each patient included the demographic characteristics of patients, illness and physical examination at time of presentation, preoperative resuscitation, operative findings and postoperative complications within 3-month duration.

Blood examination (FBC, bl.urea, s.creatinine, s.electrolytes and RBS) and imaging including Chest X-ray, X ray abdomen and U/S in the some patients were done.

Patients were resuscitated with I.V fluid, N/G and foley's catheter was inserted.

Antibiotics were given -cefotaxime 1 gm x3 and metronidazole 500 mgX3 I.V. starting preoperatively.

Surgical technique

Under GA, ETT, supine position, midline incision done, peritoneum opened, peritoneal spillage was sucked out and the diagnosis of perforated P.U was confirmed.

The whole peritoneal cavity was thoroughly examined for other pathology.

The site of perforation was identified which was either in the stomach or the duodenum. If the perforation was in the duodenum then the closure was by Graham's omental patch only 3 patients

with perforated D.U in whom the perforation was larger than 2 cm and the edges were so friable that they could not held sutures securely, in these patients the stomach opened in the most depending part the pylorus closed from inside by non-absorbable suture and then gastrojejunostomy was performed.

If the perforation was in the stomach, then the edges were excised and send for histopathological study and then closure was undertaken with vicryl and silk.

Then the peritoneal cavity washed with two litters of warm normal saline, dry mopping was done, tube drain was inserted, one near the site of perforation and the other in the pelvis and the abdomen was closed. Tension suture was used in high-risk patients.

All patients postoperatively received I.V fluid N.G. tube aspiration, until normal bowel sounds were heard.

Postoperative complications that occurred within 90 days after operation were recorded.

In order to predict the postoperative morbidity and mortality we assessed the patients for the presence of 18 variables that could potentially influence the postoperative morbidity and mortality - 15 measured on admission and 3 measured operatively.

The variables measured on admission were:

1. Age.

2. Gender.
3. Time between onset of acute pain and surgery.
4. Vomiting.
5. Abdominal distension.
6. Presence of oliguria.
7. History of acid peptic ulcer.
8. Presence of shock.
9. Dehydration.
10. History of smoking.
11. Comorbid conditions.
12. Tenderness.
13. Presence of bowel sounds.
14. Guarding and rigidity.
15. Blood group.

The variables measured during operation

1. The amount peritoneal spillage.
2. The site of perforation.
3. The size of perforation.

The outcome measures were

1. Wound infection.
2. Burst abdomen.
3. Hematemesis.
4. Fistula.
5. Septicemia.
6. Respiratory complications.
7. Intra-abdominal abscess.

RESULTS

60 patients were included in the study. With a high male to female ratio (8:2), the range of age was (40-49) years and the mean age was (46) years as in figure1.

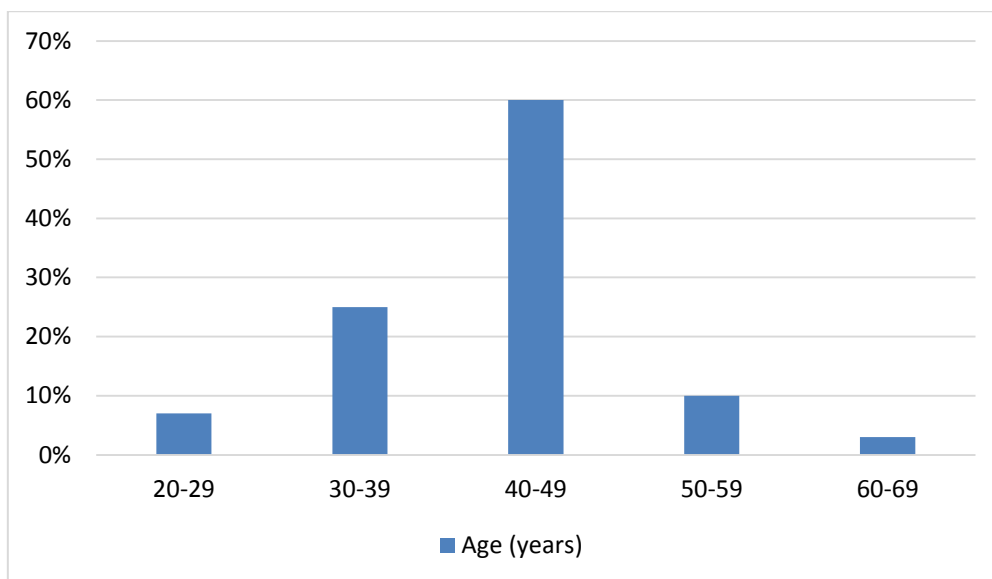


Figure:1- Age of patients

63% of the patients presented early (within 24 hours) after the onset of pain fig.2

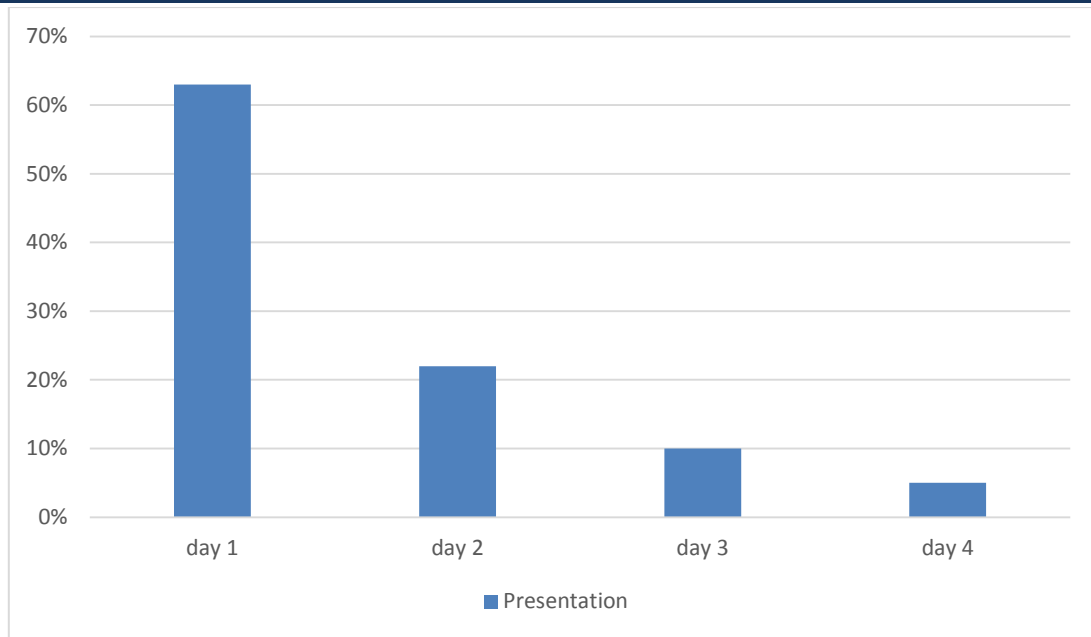


Fig:2- Presentation at day

About 62% of the patients were smoker while 47% with coexist medical disease, 25% with history of consuming NSAID and 15% with history of APD.

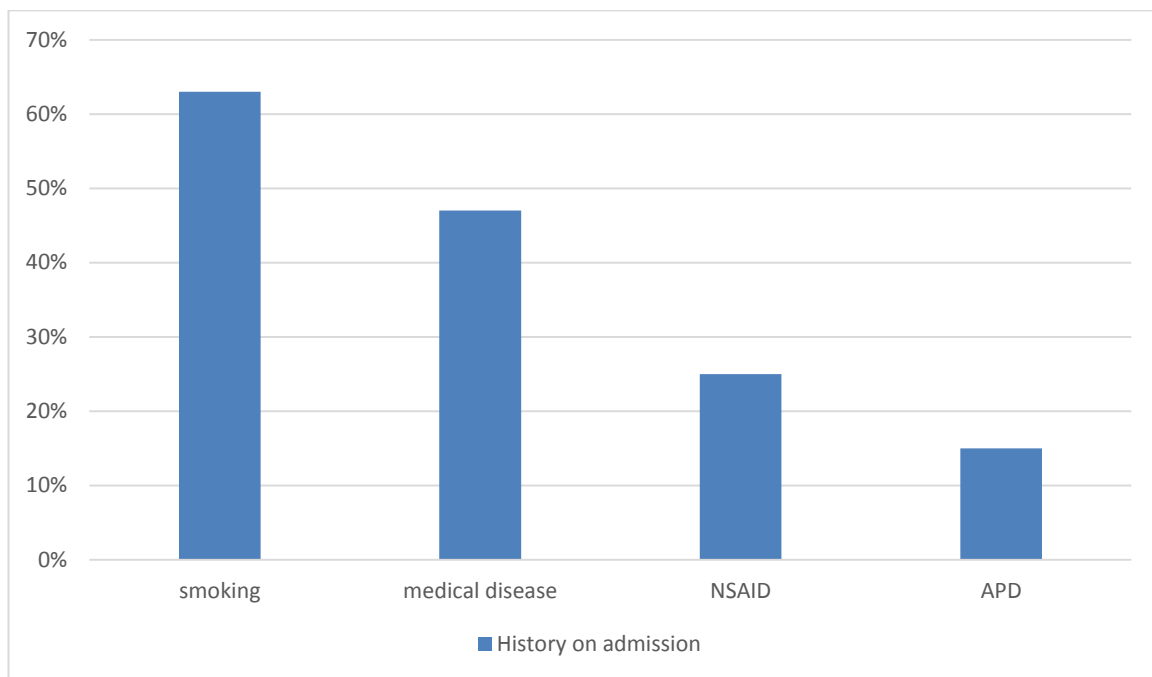


Figure:3- History on admission

20% of the patients had hypertension, followed by 13% with IHD, 53.3% had no medical disease

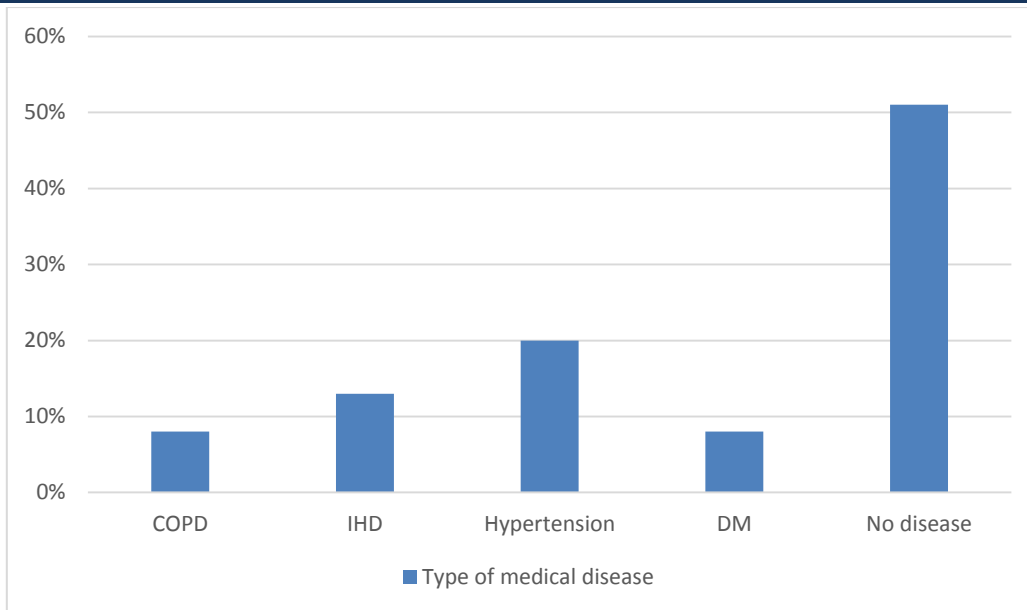


Fig:4- Types of Medical disease

The physical examination on admission reveals that all patients had tenderness and the next common presentation was vomiting 57%, negative

bowl sound 40%, abdominal distention 33% and dehydration 28%. fig5

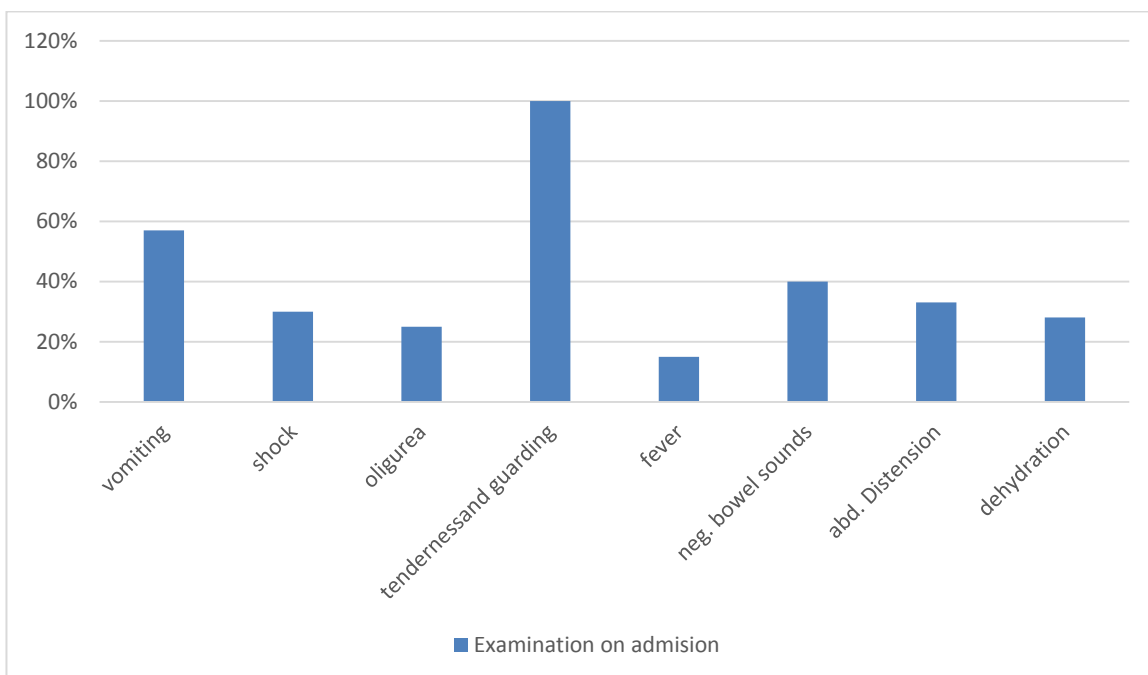


Fig 5- Examination on admission

During the emergency laparotomy, the amount of fluid which was found in the peritoneal cavity varied widely from absent to as large as 3 liters. The median was (750 ml) at the same time we found that the mean amount of spillage was significantly higher in patients with abdominal distention (1.19L) than without (0.32L). In the patients in whom the perforation was operatively confirmed, 20(33%) had a large perforation

(maximum diameter ≥ 1 cm) while 40patients (66.6%) had a small perforation (<1cm) as shown in fig.6. None of these 60patients had multiple perforations. 56 of these patients had the perforation located in the first part of duodenum, 2 patients had the perforation in the pyloric region while 2 patients had it in the prepyloric region as shown fig.7. In 57 (95%) patients the perforation was closed with Graham's patch, while in the

remaining three patients who had perforation larger than 2cm with friable edges that cannot be

sutured securely we used gastrojejunostomy with pyloric exclusion.

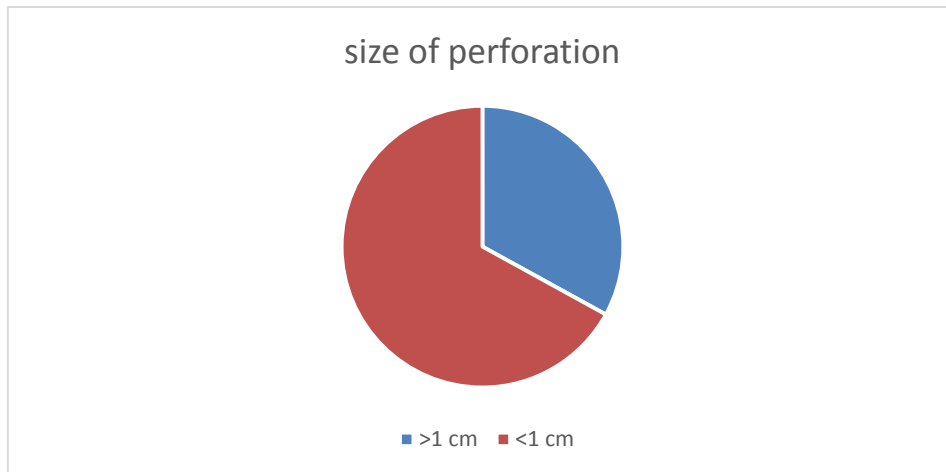


Figure 6- Size of perforation

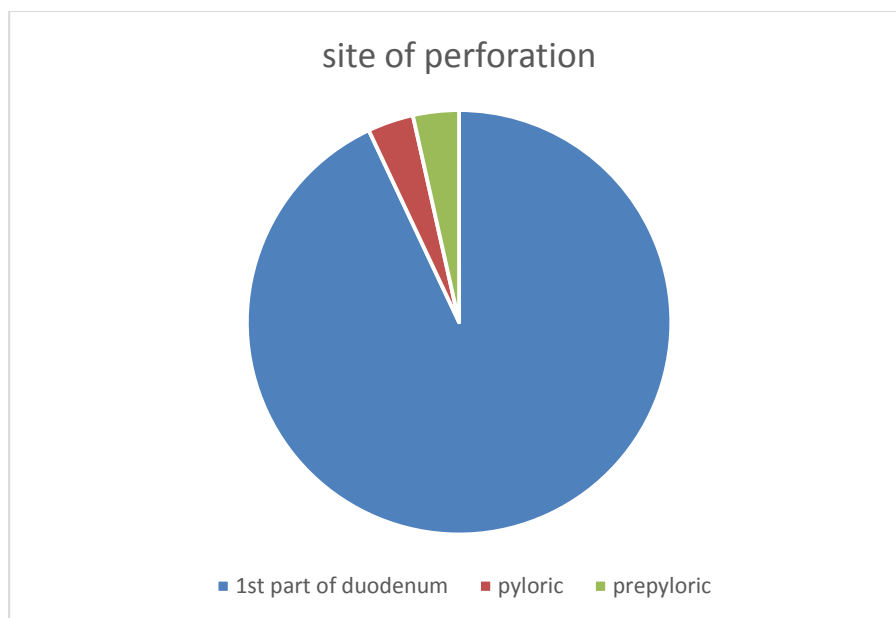


Figure 7- Site of perforation

Postoperative Complications

During their hospital stay, 21 (35%) patients developed a total of 35 events of postoperative complications that included one or more of the following: superficial wound infection (16); respiratory complications (8); burst abdomen (4);

hematemesis (4); postoperative fistula (2) and septicemia (1). One patient was died because of sepsis. In all, 13 patients developed only one complication, 8 patients developed more than one complication each and 65% of patients had no complications fig8

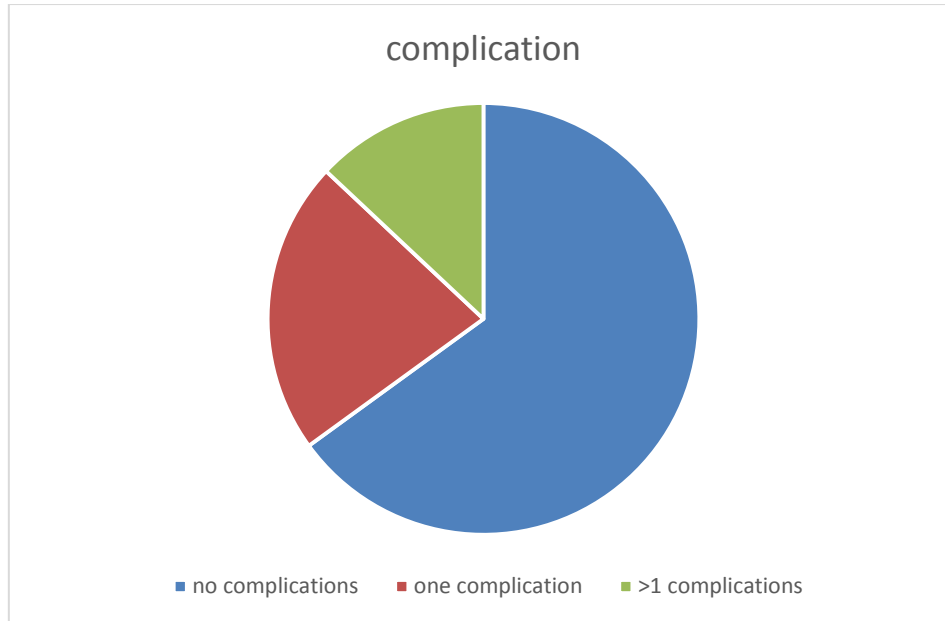


Figure 8- No. of Complications

The most common complication was wound infection 76% followed by respiratory complications 38% then hematemesis 19%

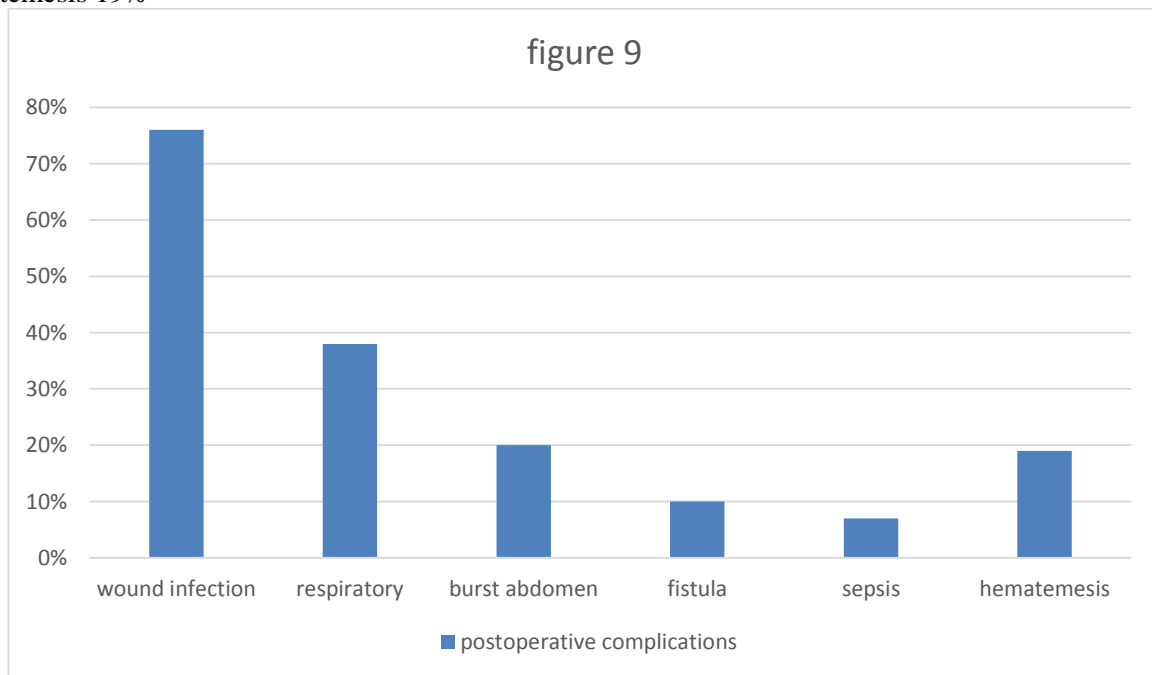


Fig 9- Postoperative complications

Most of the complications developed in the males old.93.8% of wound infection and 83.3% of who are more than 40 years hematemesis happened in patients older than 40 years old.

Table 1: Age and gender related to post-operative complications

	Wound infection n=16		Resp.comp. n=8		Burst abd. n=4		Hematemesis n=4		Fistula n=2		p-Value
	No.	%	No.	%	No.	%	No.	%	No.	%	
Age <40	1	6.3	-	-	-	-	1	16.7	-	-	0.00001
Age >40	15	93.8	8	100	4	100	3	83.3	2	100	
Male	14	87.5	5	62.5	4	100	4	100	2	100	0.0039
Female	2	12.5	3	37.5	-	-	-	-	-	-	

NSAIDs had no effect on the development of complication but co morbid condition and smoking had an effect on the complications rate as 68.8% of wound infection and 62.5% of respiratory

complications occur in patients with co morbid conditions 87.5% of respiratory complication and 100% of burst abdomen occur in patients who smoke.

Table 2: Comorbidity to post-operative complications

	Wound inf. n=16		Resp. n=8		Hematemesis n=4		Fistula n=2		Burst abd. n=4		p-value
	No.	%	No.	%	No.	%	No.	%	No.	%	
Medical conditions	11	68.8	5	62.5	3	75	1	50	2	50	0.00002
Smoking	4	25	7	87.5	3	75	1	50	4	100	0.038

Patients with abdominal distention preoperational had the largest no. of complications followed by

patients with shock. Patients who presented late were more susceptible for complications.

Table 3: Presentation to post-operative complications

	Wound inf. n=16		Resp. n=8		Hematemesis n=4		Fistula n=2		Burst abd. n=4		p-value
	No.	%	No.	%	No.	%	No.	%	No.	%	
Shock	10	62.5	5	62.5	4	100	-	-	2	50	0.00002
Vomiting	-	-	5	62.5	3	75	-	-	-	-	0.09
Oliguria	9	56.3	3	37.5	2	50	-	-	-	-	0.06
Abd. distension	15	93.8	6	75	4	100	1	50	1	25	0.00001
Tenderness	16	100	8	100	4	100	2	100	4	100	0.00001
Dehydration	3	18.8	-	-	-	-	-	-	-	-	0.41
Neg. bowel sounds	4	25	2	25	2	25	-	-	-	-	0.3
Duration >24h	14	87.5	8	100	4	100	2	100	4	100	0.00001
Duration <24h	2	12.5	-	-	-	-	-	-	-	-	

It was found that when the peritoneal fluid was >1L and size of perforation >1cm it was associated

with the development of complications while the site of perforation had no effect.

Table 4: operative findings to post-operative complications

	Wound Inf. n=16		Resp. n=8		Hematemesis n=4		Fistula n=2		Burst abd. n=4		p-Value
	No.	%	No.	%	No.	%	No.	%	No.	%	
Peritoneal fluid < 1L	4	25	5	62.5	2	50	-	-	-	-	0.001
Peritoneal fluid > 1L	12	75	3	37.5	2	50	2	100	4	100	
Perforation size < 1cm	5	31.3	4	50	-	-	-	-	1	25	0.00001
Perforation size > 1cm	11	68.8	4	50	4	100	2	100	3	75	
Perforation site Du	15	93.8	6	75	4	100	1	50	1	25	0.073
Perforation site Gu	1	6.3	2	25	-	-	1	50	3	75	

The percentage of complications (in patient who developed them) according to presentation. It was found that the presence of a concomitant medical illness; distension of abdomen on admission and the need for immediate postoperative blood

transfusion (shock) were significant predictors of the risk developing a postoperative complication (p value= 0.00002, 0.00001 and 0.00002 respectively as mentioned in table 3), this is shown in fig10.

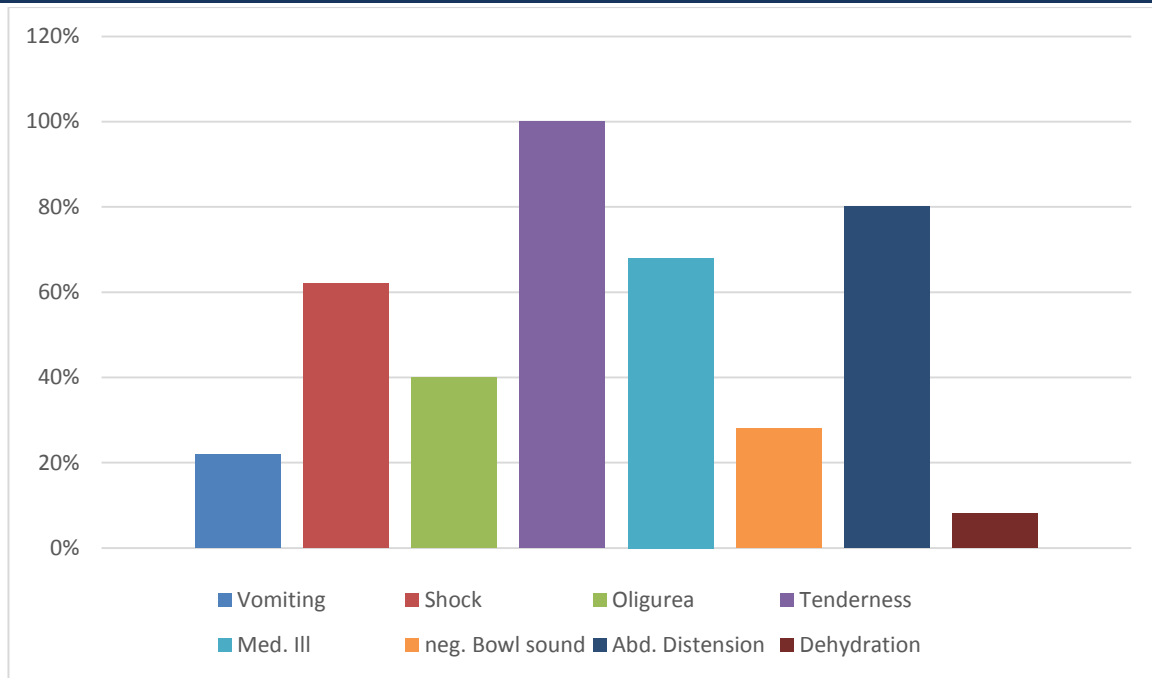


Fig.10: percentage of complications according to presentation

The percentage of complications (in patient who developed them) according to size and site of perforation is shown in fig11. The size of

perforation is a strong predictor of developing complication.

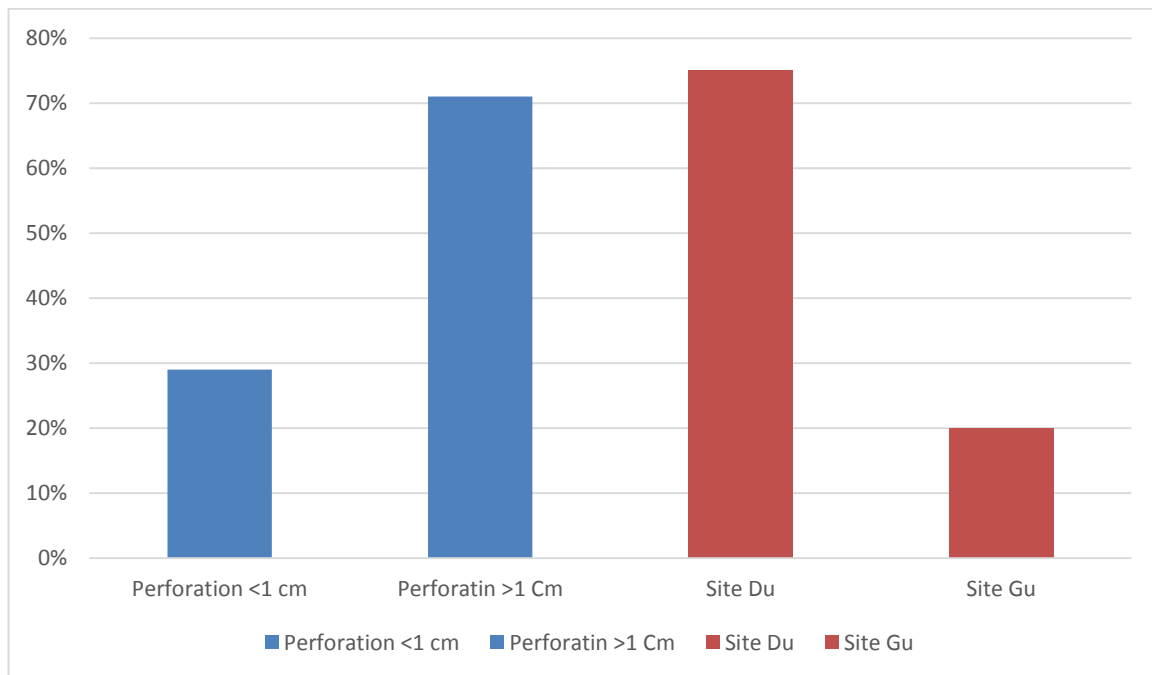


Fig. 11: percentage of complications according to size and site of perforation

DISCUSSION

In this study it was found that male older than 40years old were more liable to develop complication after surgery for perforated P.U and this finding is similar to Di Carlo, *et al.*, 2006, study.

In our study 22 patients (37%) presented late (>24 hours and these patients had the highest post operative complication. Kocer, B. *et al.*, 2007, showed similar results.

Concomitant medical illness and distension of abdomen were simple and accurate predictors of postoperative complications in surgically treated

patients of perforated peptic ulcer. These predictors are clinically relevant since both can be measured at the time of admission. In our study 28 patients (46.7%) presented with co morbid condition and those develop 21 complications (66% of the total complications) these complications include wound infection, burst abdomen and respiratory complications.

The presence of concomitant medical illness has been previously identified as a significant predictor of the risk of postoperative morbidity and mortality by Chou, N.H. *et al.*, 2000; Hamby, L.S. *et al.*, 1993; Lee, F.Y. *et al.*, 2001; and Sillakivi, T. *et al.*, 2000.

Abdominal distension also strongly predicts the risk of postoperative complications.

In patients with perforated peptic ulcer, presence of abdominal distension can indicate the amount of peritoneal spillage. Indeed, in our study the mean amount of peritoneal spillage was significantly higher in patients with distension (1.19 L) than without (0.32 L). Thus, in our study we identified abdominal distension to be a statistically, biologically and clinically meaningful predictor of the risk and number of postoperative complications, this result is similar to Sharma, *et al.*, 2006.

The study showed that patients who presented with shock state at the time of admission (27%) developed more postoperative complications (63%), similar result were obtained by Testini, *et al.*, 2003.

In our study it was found that there's was a strong correlation between the size of perforation and the development of post operative complications; similar result was obtained by Gutpa, *et al.*, 2005, while Sharma, *et al.*, 2006, showed in his study that the size was not associated with postoperative complications.

The size of perforation is an intra-operative finding and therefore its use as a predictor of postoperative complication would rank slightly below the simple and early predictors like concomitant medical illness and abdominal distension.

In our study we found that history of NSAID intake and history of APD has no effect on developing postoperative complication, these results are different from that of Fawaz Chikh, *et al.*, 2009, also we found that smoking has significant effect ($p=0.038$) on post operative

complications this result is similar to that of Di Carlo, *et al.*, 2006; and Bener, A. *et al.*, (2006).

CONCLUSION

Our study demonstrated that advanced age, abdominal distension, presence of concomitant medical illness and shock at presentation were the major and early clinical predictors of the postoperative complications in patients with perforated peptic ulcer, along with delayed presentation.

RECOMMENDATIONS

In our study we recommend that whenever those predictors were found in a patient, the surgeon must consider the possibility of occurrence of one or more postoperative complications which should be dealt with as follow:

- The use of appropriate antibiotics coverage, local wound care, leaving the wound widely opened.
- The use of tension sutures.
- The use of antisecretory drugs.
- Encouraging early chest physiotherapy.

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