

Surgical Techniques of Closure of Peptic Perforation and their Outcomes

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Abstract

Introduction: Peptic ulcer is one of the most common disease leading to perforations. Only by early diagnosis and treatment, it is possible to reduce the still relatively high mortality. The perforation and resultant peritonitis are immediate threats to the life. The therapeutic priorities are the treatment of peritonitis and securing the closure of perforation with a surgical procedure. Even with the better understanding of the disease, effective resuscitation and prompt surgery under modern anesthesia techniques, there is high morbidity and mortality. **Aim and Objectives:** The main aim of my study is to study multiple factors causing a peptic ulcer and its perforation and outcome of various surgical techniques of the closure of peptic perforation. **Material and Methods:** In the present study, a total of 180 patients admitted with peptic perforations at tertiary care center were included during December 2012 to August 2014. A detailed history was recorded. Other data like the condition of the patient at the time of admission, the duration of symptoms and surgery and mode of treatment were recorded. Those patient managed conservatively i.e placement of drains, were not included in this study. After confirmed diagnosis, resuscitation, the patients underwent simple closure without any definitive surgery by various techniques like Graham's patch (omentopexy), Figure of eight, Laparoscopic closure of perforation and Omental plugging. **Results:** The peak age incidence 51.11% was seen in the age group of 41 to 60 years. All the 180

patients of peptic perforation presented with pain in the abdomen and vomiting was present in 120 cases. Distension was present in about 135 patients, mostly in those presented after 24 hrs and 48 hrs of symptoms. Mortality was higher in patients coming late. i.e. after 48 hrs. The incidence of peptic perforation was more in smokers, alcoholics and NSAIDS users. Majority of the patients 140 (77.77%) were operated through Graham's patch technique for all sizes of perforation, 33 (18.33%) patients were operated through the figure of eight suture and 7 patients were operated laparoscopically. In majority 60 (33.33%) of cases wound complications was a major complication. The oral feeding starting day in Graham's patch was 5.2 days, for the figure of 8 stitch was about 4.3 days and for laparoscopy 4 days. The hospital stay for Graham's patch technique was for about 11 days while for laparoscopy was about 8.3 days. **Conclusion:** In the present study, it could be concluded that peptic ulcer perforation still remains one of the most common causes of abdominal catastrophe. After careful review of published data and numerous discussions, we hope that figure of 8 stitch can be a better alternative to Graham's surgery, as it is associated with fewer complications and mortality rate with less operative time. While though laparoscopy technique shows promising results, it requires expensive set up with surgical expertise with more operative time.

Keywords: Peptic Ulcer; Perforation; Pain in Abdomen; Closure.

Introduction

The peptic ulcer is one of the most common disease, that affects the mankind. Though a lot of work has been done on the etiology of this condition, one

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specific etiological agent cannot be incriminated in the causation of this particular disease. Since, stress forms the most important single feature in causing a peptic ulcer and today's modern life is full of stress, strain, this condition is on the increase. Perforation of gastric or duodenal ulcer is one of the most serious and most overwhelming catastrophic.

Among abdominal emergencies, perforations of peptic ulcer are third in frequencies, acute appendicitis and acute intestinal obstruction being more common. Prompt recognition of the condition is very important and only by early diagnosis and treatment it is possible to reduce the still relatively high mortality. There is a decline in the incidence of duodenal ulcers and elective surgery for duodenal ulcers, which is attributed to the era of H₂ blockers and proton pump inhibitors, which provides symptomatic relief to patient [1]. But the percentage of patients with perforation has not declined, probably due to increased inadvertent use of NSAIDs, corticosteroids and because of irregular use of H₂ antagonist drugs.

When acute or chronic peptic ulcer perforates into the peritoneal cavity, three components require treatment viz., the ulcer, the perforation and the resultant peritonitis [2]. The perforation and resultant peritonitis are immediate threats to the life, the ulcer in itself is not. The therapeutic priorities thus are the treatment of peritonitis and securing the closure of perforation, which may be achieved with a surgical procedure. In spite of better understanding of the disease, effective resuscitation and prompt surgery under modern anesthesia techniques, there is high morbidity and mortality. Hence, an attempt has been made to analyze the various factors, which are affecting the morbidity/mortality of patients with peptic ulcer perforations.

The main aim of our study is to study multiple factors causing a peptic ulcer and its perforation and outcome of various surgical techniques of the closure of peptic perforation.

Aim and Objectives

1. Compare the outcome of various closure techniques of peptic perforation.
2. Estimate the complication of various closure surgical techniques of peptic perforation.
3. Estimate the duration of hospital stay.
4. Measure the day of starting of oral feed.
5. Estimate the morbidity, mortality of various surgical techniques of the closure of peptic perforation.

Material and Methods

In the present study, a total of 180 patients those admitted with peptic perforations at Tertiary care center were included during December 2012 to August 2014. Data was collected from all patients showing signs of peritonitis attending emergency surgery department.

Inclusion Criteria

Perforation due to peptic ulcer, recurrent peptic perforation, perforation of any size, including all ages and both gender patients.

Exclusion Criteria

Perforation due to malignancy, trauma, iatrogenic injury and perforated Meckels diverticulum.

The patients of peptic perforation were admitted and detailed history including age, gender, complaints, past surgical history, history of the peptic disease, any addiction, immunodeficiency status was recorded. Other data like the condition of the patient at the time of admission, the duration of symptoms and surgery and mode of treatment were recorded.

Examination

Symptoms of abdominal pain, associated with vomiting, nausea, fever with signs of tachycardia, abdominal tenderness, guarding, rigidity suggestive of perforation peritonitis. A repeated examination was done, upto which resuscitation and diagnosis confirmed clinically. The diagnosis was then confirmed by radiological investigation.

Investigations

Complete blood examination was done, X-ray abdomen erect, USG abdomen pelvis. when there was a clinical sign of perforation peritonitis, but on X-ray abdomen erect there was no gas under the diaphragm NCCT abdomen was done which showed free extraluminal air foci in the abdomen.

When patients were not fit for anaesthesia in conditions such as with grossly deranged renal function test, congestive cardiac failure etc., they were managed by conservative treatment by placing bilateral abdominal drains under local anaesthesia and managed by antibiotics and intravenous fluids, with monitoring of general condition with vitals and urine output.

Those patient managed by exclusive conservatively were not included in this study. The patient and relatives were informed about surgical procedures and consent was taken. General anaesthesia was used in all cases. The incision used in all cases was midline. Then abdomen opened in layers, contaminated fluid collected, sucked out and noted, mopping done, perforation searched and closure was done with different methods. A drain was kept in every case and lastly before closure of abdomen, other viscera also were checked.

Techniques Used for Closure

In our study, we used only simple closure of perforation without any definitive surgery. The various techniques used for closure of peptic perforation were as follows:

- *Graham's Patch (Omentopexy)*: was used for all sizes of perforation, in which perforation closure was done with atraumatic silk and then live omentum kept over it and sutured to the duodenum or gastric wall, and then drain kept in subhepatic space.
- *Figure of Eight*: New method of closure of peptic perforation, first described by SP Gupta in Rajasthan. This method was used in our study exclusively for peptic perforation size 0.5cm, a drain was kept in every case.
- *Laparoscopy* was kept limited to less than 1cm size of peptic perforation, admission within 24 hrs of symptoms, simple closure of perforation done with the help of atraumatic silk.
- *Omental Plugging*: This technique is originally described for large sized perforation, in our study we also initially reserved it for perforation larger than 1.5 cm, we could get very less amount of perforation having the size of more than 1 cm. (5 in number), those patients were having general

condition poor, presented with more duration of symptoms and comorbid factors were associated. So, considering all above conditions, we preferred to go for traditional Grahms patch closure in these patients. Hence, we couldn't do any omental plugging technique for closure of the perforation in our study.

Postoperatively proton pump inhibitors, intravenous fluids, and broad spectrum antibiotics were administered.

Variable Factors Studied and Analyzed were

Age, sex, occupation, duration of symptoms, past history of smoking, alcohol, NSAIDS, h/o peptic ulcer symptoms, general condition of patient, site, size, type of operation, postoperative complications, oral feeding starting day, duration of hospital stay (from the day of surgery to discharge) and outcome of the patient for each surgery individually. Patients were then observed for any complication such as wound complication, pleural effusion, lung consolidation or biliary leak and recorded and further were managed by accordingly if required surgically. Postoperatively on discharge patients were prescribed H. pylori eradication kit for 7 days and proton pump inhibitors for 3 months. Patients were followed up after 3 months to know whether they develop recurrences of ulcer symptoms, in order to know the effectiveness of the operation.

Results

The collected data of 180 patients was analyzed and presented in tabular form.

The peak age incidence 51.11% was seen in the age group of 41 to 60 years. The lowest incidence was reported from the 11 – 20 years age group.

Table 1: Distribution of cases according to their age:

Age (in years)	No. of cases	Percentage of cases
11-20	03	1.66%
21-30	15	8.33%
31-40	35	19.44%
41-50	47	26.11%
51-60	45	25%
> 60	35	19.44%
Total	180	100%

Table 2: Distribution of cases according to clinical presentation of perforation (multiple responses)

Symptoms	Clinical Presentation	
	No. of cases	Percentage %
Pain	180	100%
Vomiting	120	66.66%
Distension	135	75%
Fever	54	30%

Clinical Presentation

All the 180 patients of peptic perforation presented with pain in abdomen, vomiting was present in 120 cases. Distension was present in about 135 patients, mostly in those presented after 24 hrs and 48 hrs of symptoms. Fever was recorded in 54 patients.

Half of the patients 90 (50%) came to emergency department within 24-48hrs of symptoms.

The incidence of peptic perforation was more in smokers and alcoholics than patients who were non smokers or non alcoholics. There was increased incidence of peptic perforation in NSAIDS users. 60 (33.33%) patients had history of previous symptoms of peptic ulcer disease.

Majority of the patients 140 (77.77 %) were operated through Graham's patch technique for all sizes of

perforation, 33 (18.33%) patients were operated through figure of eight suture exclusively for 0.5 cm and less in size and 7 (3.88 %) patients were operated laparoscopically for sizes less than 1 cm.

About 50% of peptic perforation patient came in hospital after 24 to 48 hours after symptoms started. More the duration more were the complications. Mortality was higher in patients coming late. i.e. after 48 hrs.

In majority 60 (33.33%) of cases wound complications (including wound infection, wound dehiscence, burst abdomen were included in this category) was a major complication. Other Complications were lung complications 18 (10%) and biliary fistula 3 (1.66%).

Table 3: Distribution of cases according to duration of symptoms and admission

Duration of symptoms and admission.	No. of Cases	Percentage
06-24 hrs	50	27.8%
24-48 hrs	90	50%
>48 hrs	40	22.2%
Total	180	100%

Table 4: Distribution of cases according to history of addiction and dyspepsia

History	No. of Cases	Percentage
Smoking	110	61.11%
Alcohol	117	65%
NSAID'S	50	27.77%
H/O Peptic Ulcer	60	33.33%

Table 5: Distribution of cases according to operative techniques according to size of perforation

Operative techniques	Size of perforation			No. of cases
	0.5 cm.	0.6 cm -1 cm	> 1 cm.	
Graham's Patch	102	33	05	140(77.77 %)
Figure of 8 stitch	33	-	-	33(18.33 %)
Laparoscopic closure	05	2	-	07(3.88 %)
Total	140	35	05	180

Table 6: Distribution of cases according to duration of symptoms and post-operative outcome

Duration between symptoms & admission	No. of Cases	Outcome	
		Morbidity	Mortality
06-24 hrs	50 (27.77%)	15	02
24-48 hrs	90 (50%)	45	05
>48 hrs	40 (22.22%)	20	07
Total	180	80	14

Table 7: Distribution of cases according to post-operative complications

Complications	Overall complications	
	No. of Cases	Percentage
Wound Complications	60	33.33%
Lung Complications	18	10%
Biliary fistula	03	1.66%
Death	14	7.77%

Table 8: Post operative factors

Operative Techniques	Post operative factors		
	MEAN Average Days		
	Oral feeding starting day	Ryle's Tube removal day	Hospital stay in days
Graham's Patch	5.2	4.18	11
Figure of 8 stitch	4.3	3.25	10.5
Laparoscopic closure	4	3	8.3

The oral feeding starting day in Grahms patch was 5.2 days, for figure of 8 stitch was about 4.3 days and for laparoscopic closure 4 days. The hospital stay for Grahms patch technique was for about 11 days while for laparoscopic closure was about 8.3 days.

Discussion

The present study was carried out from December 2012 to August 2014 in the department of surgery at a tertiary care center. This discussion is based on 180 patients with the surgical emergency of peptic perforation managed by a simple closure of peptic perforation without any definitive surgery. Three operative techniques for closure of peptic perforation were used, which were Graham's patch, a figure of 8 stitch and laparoscopic simple closure of peptic perforation.

The outcome of each technique, in terms of hospital stay, starting with oral feed, complications and mortality rate was studied.

Age Incidence

Palanivelu et al (2007) [3] reported that peak age incidence of peptic perforation was in the age group of 20-30 years while Kassim et al [4] (2011) reported peak age in 31-40. V.Koliwad et al (2013) [5] and Chalya et al [6] (2011) reported peak age incidence in the age group of 40-60 years of age. This may be due to stress and strain and indulgence in alcohol and smoking during this period. Present study matches with Chalya et al [6] (2011) and V. Koliwad et al [5] (2013) who reported peak age in the age group of 40-50 years. Perforation was more common in the elderly group may be due to smoking & alcohol addiction with or without chronic NSAID use.

Gender Incidence

Palanivelu et al (2007) [3] reported that sex incidence of peptic perforation was about 12.3:1, while Nakeeb et al (2008) [7] reported sex incidence 4.5:1. While Chalya et al (2011) [6] reported sex incidence of 1.3:1. V.koliwad et al (2013) [5] reported

all were male patients in their study out of 50 patients. In our studies series 150 were males and 30 were females and the male-female ratio was 5:1. High prevalence of perforation is more in male patients as they are more in stress as compared to their female counterpart reported by Zahid Amman (2008) [8]. Present study matches with the Nakeeb et al (2008) [7].

Socioeconomic Status

It is believed that perforation of peptic ulcer occurs in those people who are engaged in heavy manual labour. Zahid Aman et al (2008) [8] quoted perforation is present in all walks of life, but 82% of patients from poor socio economic class. V. Koliwad et al (2013) [5] reported about 66% were unskilled workers, and 22% were semi-skilled and the majority was from lower socio economic status. S. Vijaya Rao et al (2014) [9] also quoted that peptic perforation is more common in lower socio economic status group. In our study, it was noticed that perforations occurred in the majority of patients belonging to poor socioeconomic status (72.2%) and more so from the rural population, who were farmers and labourers (unskilled workers). The farmers were about 55% and labourers (unskilled workers) were about 33%. Present series matches with V. Koliwad et al (2013) [5]. The majority coming to our institute were from lower socioeconomic status and from farmer family.

Addictions

Alcohol consumption and smoking have been reported to be associated with increased risk for perforated peptic ulcer. Alcohol is a noxious agent causes gastric mucosal injury, stimulates acid secretion, and increases serum gastrin levels. Smoking inhibits pancreatic secretion, resulting in increased acidity of ulcers. Palanivelu et al (2007) [3] reported that smoking incidence in peptic perforation patients was about 72.5 percent while alcohol consumption incidence was 70.2%. History of chronic use of NSAID was about 10%. Chalya et al (2011) [6] reported that smoking incidence in peptic perforation patients was about 64.3 percent while alcohol consumption incidence was 85.7%. History of chronic use of NSAID

was about 10.7%. Sreenidhi et al (2013) [1] reported that smoking incidence in peptic perforation patients was about 48 % while alcohol consumption incidence was 64 %. History of chronic use of NSAID was about 22%. In present series, 110 patients out of 180 patients were the smoker and 117 patients were alcoholic. The present study matches with Chalya et al [6] (2011) with respect to smoking. The study also matches with Sreenidhi et al [1] (2013) with respect to alcohol and NSAIDs.

Clinical Presentation

Chalya et al (2011) [6] reported symptom of pain in abdomen in 97.6%, distension in 76.2%, vomiting in 36.9%, fever in 21.4%, tenderness in 88.1% and guarding and rigidity in 66.7%. Kassim et al (2011) [4] reported symptom of pain in 100%, distension in 65 %, fever in 30%, tenderness in 100% and guarding and rigidity in 100%. Sreenidhi et al (2013) [1] reported symptom of pain in 100%, distension in 94%, vomiting in 76%, fever in 36%, tenderness in 100% and guarding and rigidity in 100%.

In the present study, pain was present in all cases of peptic ulcer perforation, indicating that pain in abdomen is the most common symptom in peptic perforation cases. Vomiting was present in about 66.6% patients. Guarding and rigidity was present in 100% cases. All patients had absent bowel sounds. Fever was present in about 30% of cases. While tenderness was present in all cases. Present study matches with the Kassim et al (2011) [4] and Sreenidhi et al [1] (2013).

Duration of Symptom before Presentation to Hospital and Mortality

The duration between onset of symptoms and the admission to the hospital has a great influence on the post operative complications [6]. It has also been reported that the interval between perforation and initiation of treatment is a better predictor of outcome.

Boey John et al [10] (1987) in their study revealed that concurrent medical illness, pre operative shock and delayed operation (>48hrs) as significant risk factors that increase mortality in patients with perforated duodenal ulcer. Walgenbach & Bernhard [11] in 1993 in their study showed that mortality in patients group who present themselves within 24 hrs of onset of symptoms will be less (12%) and if the duration is more than 24 hrs mortality was high (24%). El-Nakeeb et al [7] (2002) analyzed that time interval between onset of acute symptoms and surgery was less than or equal to 24 hours mortality rate is

12% and if more than 24 hours the mortality rate is 21%. The mortality risk for the patient who is operated on more than 24 hours after onset of acute symptom is 4.9 times to that of a patient operated within 24 hours.

In the present study, the time ranges from 6 hrs to 60 hrs, about 27.7% patients admitted within 24 hrs. 50% patient were admitted within 24-48 hrs of symptoms. And remaining about 22.2% were admitted after 48 hrs of the appearance of symptoms. It was found that more morbidity and mortality was in patients who were admitted after 48 hrs of symptoms. About 4% mortality was seen in patients who presented before 24 hrs of symptoms. 5.5% mortality in those who presented in between 24 hrs to 48 hrs of symptom and 14.5% who presented after 48 hrs of symptoms.

Complications Related to Each Surgery

• *For Graham's Patch Technique:*

Kassim et al [48] (2011) reported that in Graham's patch surgery wound complications were about 20.8%, lung complication was 20.8% and death was about 10.7%. Motewar et al [12] (2013) reported that in Graham's patch surgery, wound complications were about 25.7%, lung complication was 20%, biliary fistula in 1.42% and death was about 9.5%. S.Vijaya et al [9] (2014) reported that in Graham's patch surgery, wound complications were about 16%, lung complication was 15%, biliary fistula in about 0.8% and death was about 3.6%.

In our study, the wound complication (including wound infection, wound dehiscence, burst abdomen) was about 35%, while lung complication was about 10%, biliary fistulas were about 2.1%. We observed wound complication rate more it does not match with any above study. Deaths were about 9.9%, which matched with the Motewar et al [9] (2013) study. In our study complications and death in Graham's patch technique was found more, as the majority of the population was elderly and belonged to poor socioeconomic status, late reportig and poor nutritional status and also with all sizes of perforation, with or without shock on admission were included in this category.

• *Laparoscopic Technique - Complication Rate*

Palanivelu et al [4] (2007) reported that in laparoscopic closure wound complications were about 5.8%, no biliary fistula and death. Motewar et al [12] (2013) reported that in laparoscopy surgery, wound complications was about 4.28%, lung

complications was 4.28%, biliary fistula in 2.85% and death was 0%. In our study, we observed no wound complication and no mortality and about 14% patients had lung complications. Present series does not match with any above study. This may be so due to less number of operated cases of peptic perforation laparoscopically in our study. The mortality of our study matches with the Motewar et al [12] (2013) and Palanivelu et al [3] (2007).

• *Figure of 8 Stitch: Complication Rate*

This is a completely new technique of closure of peptic perforation. A single case series is published on this technique done by Lalit Choudhary et al [13] in 2014.

The wound complication rate was about 30% in this technique, with no biliary fistulas. The lung complications were in 3 cases out of 33 cases operated through this technique. The single death noted in patient operated through this technique. Lalit Chaudhary et al [13] (2014) studied this technique in 153 patients of peptic perforation. Out of 153 patients in this study, 3 postoperative leakages from perforation site occurred. From these 3 patients, 2 were later diagnosed as advanced gastric malignancy. Total mortality was about 8 out of 153 patients.

In our study, we used this technique in only perforation of size 0.5 cm or less. This technique is a good alternative option for traditional Grahms patch surgery with a good outcome. According to SP Gupta et al [14] (2005) this technique should be the standard technique of closure of peptic ulcer perforation. He used this technique in perforation with friable and edematous edges and found useful without any re-perforation and rare mortality. There is a lesser tendency to cut through because the pressure at the point is divided into two directions, and the pressure is exerted on four points instead of two points. When a simple stitch is applied there are more chances of cut through the friable and edematous walls because the pressure is directed toward one point.

Mean Oral Feeding Starting Day

Motewar et al (2013) [12] reported that mean oral feeding starting day was about 5 days in Grahm's patch surgery and 3 days in Laparoscopic closure. In our study, the oral feeding starting day for Grahm's patch was 5.2 days, for laparoscopic closure was for 4 days. Present study matches with Motewar et al 2013 study. The mean day for the figure of eight was 4.3 days. Lesser the oral feeding starting day, early mobilization of the patient, early recovery, less

hospital stay, less hospital burden, more economical for patients.

Mean Hospital Stay of Each Surgical Technique

Mehendale et al (2002) [15] reported mean hospital stay of Grahm's patch surgery was 9 days and 6 days in Laparoscopic closure. LAMA trial 2009 [16] reported that mean hospital stay of Grahm's patch surgery was 8 days and 6.5 days in Laparoscopic closure. In our study hospital stay for Grahm patch was for 11 days, 8.3 days for laparoscopic closure, while figure of 8 stitch technique had a hospital stay of 10.5 days.

Summary and Conclusion

In the present study, it could be summarized that peptic ulcer perforation still remains one of the most common causes of abdominal catastrophe. Peptic perforation commonly occurs in the age group of 40-50 years of age and commonly in males. More frequently seen in patients from the rural area with poor socioeconomic status and farmers. It was observed that peptic perforation is a multifactorial disease with smoking and alcohol in the causation of peptic ulcers, while NSAIDs is an emerging factor seen in about 28% of the cases.

Sudden onset of abdominal pain, situated at epigastrium and right hypochondrium was a constant symptom. Tenderness, rigidity, absence of bowel sounds with or without shock are the important signs. Presence of gas under diaphragm confirms the diagnosis but its absence does not exclude the diagnosis. Risk factors for the operation of perforated peptic ulcer were old age, duration of perforation and presence pre operative shock.

In the present study Grahm's technique was used for the majority of patients. The average oral feeding starting day was 5th day while average hospital stay was 11 days. The mortality was about 9.9%. In our study the newly described figure of 8 suture technique showed good outcome for small perforation with less morbidity and mortality.

Laparoscopy decreases the burden of patients over hospital as well it lessens economic burden of hospital stay over patients. The factors significantly related to increased morbidity and mortality are delayed presentation, elderly age group, and size of perforation. After careful review of published data and numerous discussions we hope that figure of 8 stitch can be a better alternative to Grahm's surgery as it is associated with fewer complications and

mortality rate with less operative time. While though laparoscopic technique showed promising results, it requires expensive set up with surgical expertise with more operative time.

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