



A Case Study of Graham's Omentopexy, Figure of 8 and Laparoscopy Procedure in the Treatment of Perforated Duodenal Ulcers

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Abstract

Purpose: *The purpose of the present study is to examine the Grahms Omentopexy, Figure of 8 and Laparoscopic peptic ulcer perforation closure procedure and the associated operative risks among the patients.*

Method: *The study was conducted among 180 patients who were admitted at the Tertiary care centre with gastric perforations. The perforation present in all the study subjects was closed using either Grahms patch (omentopexy), Figure of 8 or Laparoscopy under general anaesthesia. Any complications such as wound complication, pleural effusion, lung consolidation or biliary leak, death were recorded. The data obtained were recorded and suitable statistical analyses were performed.*

Results: *The mean time taken for starting oral feeding, the time for removal of Ryle's tube as well as the length of hospital stay was found to be the highest among the patients operated using Grahms patch while the least was observed for patients performed using laparoscopy. The percentage of patients with wound complications, lung complications, biliary fistula and death post surgery was found to be the highest in the Grahms patch group and lowest for the laparoscopic group. It was also observed that patients with smoking, alcohol consumption habit and history of APD had a higher risk for increased perforation size.*

Conclusion: *The study concluded that Figure of 8 being a new technique can be used in small, friable edges of perforation, and having less post operative complications than Grahms patch and also decreases length of hospital stay, oral feeding start as well as Ryle's tube removal day.*

Keywords: *Biliary fistula, Figure of 8, Graham's Omentopexy, Laparoscopic, Peptic ulcer perforation.*

Introduction

Globally, perforated peptic ulcer is one of the common life threatening emergency condition with mortality rate up to 30%, therefore requires urgent surgical intervention^[1]. The common risk factors or etiological factors for perforated peptic ulcer include previous history of perforated ulcer, smoking, alcohol consumption etc. It has been estimated that globally around 4 million people

suffers every year with peptic ulcer. In India, the prevalence of peptic ulcer is more in the southern part where about 10-20% patients are reported to have complications related to peptic ulcer among which about 2-14% patients are diagnosed with perforations. Perforations in the prepyloric, pyloric and duodenal region are reported to the most common site among those diagnosed with perforation^[2].

Various modalities of treatment options are available, which ranges from non-operative to laparoscopic repair. However best treatment option still to be categorized. From last few decades, there is no consensus on treatment of perforated pylorodudenal ulcer, conservative treatments are in use which includes simple closing of ulcer, closure with the use of free or pedicled mentum, treatment with truncal vagotomy and parietal cell vagotomy or drainage procedures^[1]. Treatment like medical therapy has proved to be effective for peptic ulcer; however difficulty of perforation does arise. Various surgical options depending on size of perforation, duration of peritonitis, past history of symptomatic peptic ulcer and associated co-morbid are used for treatment. Surgical treatment is the most common procedure, however the changing trend is more towards least invasive surgery due to use of effective antibiotics. The patients with duodenal perforation who present with gross peritoneal contamination and unstable haemodynamics, simple closure with a Graham's patch using omentum is the safest surgery^[3]. Recent technique such as the figure of 8 technique has been reported to be very helpful among patients especially when they present late, that is post two or more days, when the ulcer edges as well as duodenum wall are very crumbly^[4]. Now a day laparoscopic closure of perforated peptic ulcer is increasingly being carried out^[5]. However, in emergency case, Graham's patch is still a useful surgery for patients with perforated peptic ulcer. The aim of present study is to examine the Grahm's Omentopexy, Figure of 8 and Laparoscopic peptic ulcer perforation closure procedure and the associated operative risks among the patients.

Methods

This study was conducted among 180 patients who were admitted at the Tertiary care centre with gastric perforations.

Inclusion criteria

Patients of all ages and sex with perforation of any size due to peptic ulcer.

Exclusion criteria

Patients with perforations due to malignancy, trauma, iatrogenic injury as well as perforations from meckels diverticulum.

Information pertaining to the age, gender, complaints, past surgical history, past history of peptic disease, any addiction, and immuno-deficiency status were recorded for the study.

The baseline findings of all the patients were examined carefully prior to surgery. The patients were recorded of any symptoms of abdominal pain, nausea, vomiting, fever with signs of tachycardia, abdominal tenderness any sort of rigidity suggestive of perforation peritonitis etc. Clinical and hematological investigation such as complete hemogram, liver function test, X-ray abdomen erect and renal function test were performed for the patients. Under presence of clinical sign of perforations peritonitis, but absence of any gas under diaphragm X-ray abdomen erect, NCCT abdomen was performed for detection of any free extraluminal air foci in abdomen. The patients, if not found physically fit for anaesthesia due to congestive heart failure or abnormal renal function were managed by placing abdominal drains with constant monitoring of vitals and urine output.

The patients were included in the study with informed consent. All the cases were performed under general anaesthesia. The perforation was closed using either Grahms patch (omentopexy), Figure of 8 or Laparoscopy (Fig.1). The patients were postoperatively administered proton pump inhibitors, intravenous fluids and broad spectrum antibiotics.

Any complications such as wound complication, pleural effusion, lung consolidation or biliary leak, death were recorded.

The data was reported as number of patients and percentages. Quantitative data's were compared using Student's t-test. All statistical tests were two-tailed and was considered statistically significant for $p < 0.05$. All the statistical analyses were performed using SPSS v24.0 for Windows (IBM SPSS Inc. Chicago, IL, USA).

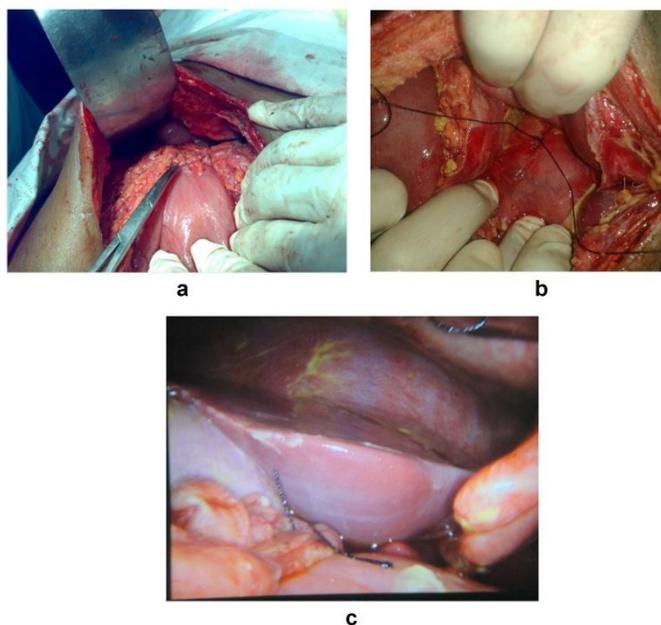


Fig.1: Figure showing the closure of duodenal perforation using (a) Grahms patch (Omentopexy), (b) Figure of 8 stitch, and (c) Laparoscopy.

Results

A total of 180 patients with perforation due to peptic ulcer were included in the study where the perforation was closed using either Grahms patch (omentopexy), Figure of 8 or Laparoscopy technique.

The demographic characteristics such as the age, gender, occupation and socio economic status are represented in Table 1. Information pertaining to the clinical symptoms such as duration of symptoms and admission, mode of presentation of perforation as well as history of peptic ulcer, smoking, alcohol and NSAID’s are represented in Table 2. It has been observed that all the patients were reported to have pain with majority of the patients reporting distension and vomiting along with pain.

Table 1: Table representing the demographic characteristics of the study subjects.

Demographic characteristics		Number of cases (n)	Percentage of cases
Age	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
Gender	Male	150	83.33

Occupation	Female	30	16.66
	Farmer	100	55.55
	Labourer (Unskilled work)	60	33.33
	Skilled work	10	5.55
	Housewife	10	5.55
Socio economic status	Lower	130	72.22
	Middle	40	22.22
	Upper	10	5.55

The mean time taken for starting oral feeding was found to be the highest among the patients operated using Grahms patch while the least was observed for patients performed using laparoscopy. Similarly the time for removal of Ryle’s tube as well as the length of hospital stay was found to be the highest among the patients performed using Grahms patch and lowest for those performed using laparoscopy. There was a significant difference in the time taken for oral feeding among the Grahms patch and Figure of 8 group as well as Grahms patch and Laparoscopic group. The time of removal of the Ryle tube among patients performed with Grahms patch and Figure of 8 was also found to be significantly different. The length of hospital stay among patients performed using Grahms patch was found to be significantly higher in comparison to laparoscopic techniques (Fig.2).

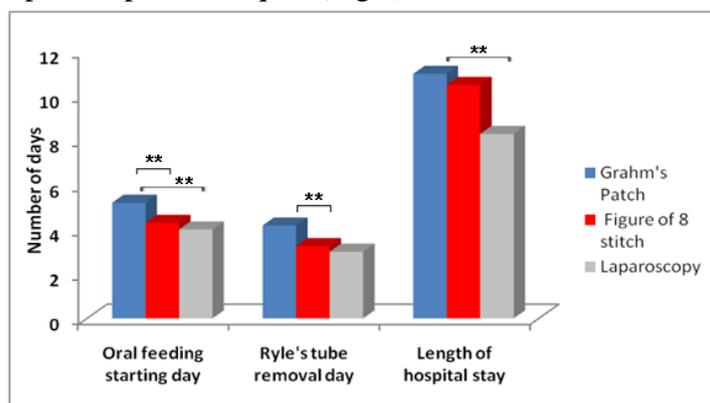


Fig.2: Figure representing the oral feeding starting date, Ryle’s tube removal day and length of hospital stay among the patients performed using Grahms patch, Figure of 8 and Laparoscopy technique. With regard to the various complications it has been observed that the percentage of patients with wound complications, lung complications, biliary fistula and death post surgery was found to be the highest

in the Grahms patch group while it was lowest for the laparoscopic group except for lung complications which was found to be the highest among the laparoscopic group. In all the cases the percentage of patients with complications and death in the Figure of 8 group was found to be lower in comparison to Grahms patch group (Fig.3).

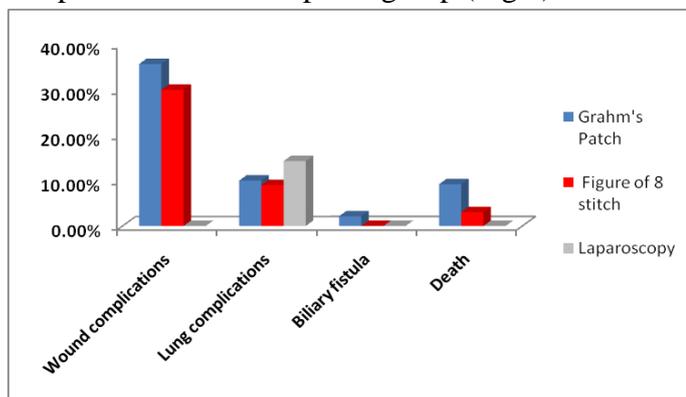


Fig.3: Figure representing the wound complications, lung complications, biliary fistula and death among the patients performed using Grahms patch, Figure of 8 and Laparoscopy technique.

It has been observed from the study that in the biochemical investigations performed among the study subjects majority of the patients were reported to have leucocytosis (60%). A significant number of study subjects were also reported to have derranged KFT (25%) and derranged electrolytes (22.2%) (Fig.4a). From the radiological observation it was observed that majority of the patients were found to have been detected with gas under diaphragm (93.33%) from the X-Ray abdomen erect test while a very small percentage of the patients were detected with pneumoperitoneum (6.67%) using the NCCT abdomen (Fig.4b).

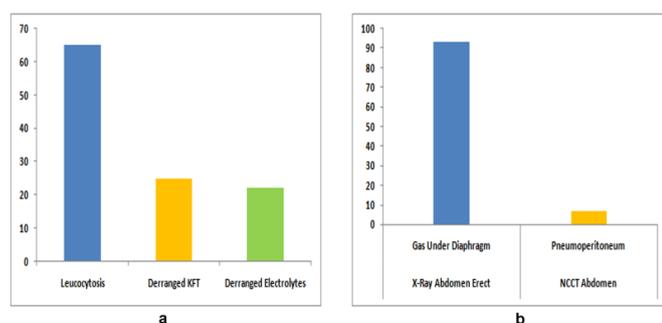


Fig.4: Figure representing the (a) Biochemical investigations and (b) Radiological investigations among the study subjects.

Table 2: Table representing the history of clinical symptoms and addiction of the study subjects

Symptoms and history	Number of cases (n)	Percentage of cases
Duration of symptoms and admission	06-24 hrs	27.8
	24-48 hrs	50
	>48 hrs	22.2
History of addiction and disease	Smoking	61.11
	Alcohol	65
	NSAIDs	27.77
	Peptic ulcer history	33.33
Mode of presentation of perforation	Pain	100
	Vomiting	66.66
	Distension	75
	Fever	30

Table 3: Table representing the Odds Ratio (OR) for the risk of increased perforation among study subjects with the habit of smoking, alcohol, NSAIDs and history of APD.

SMOKING				
Perforation Size	Non Smoker	Smoker	OR (95% CI)	P value
S1	59	81	1	-
S2	11	24	1.59 (0.73-3.46)	0.335
S3	1	4	2.91 (0.40-21.28)	0.404
ALCOHOL				
Perforation Size	Non Alcohol	Alcohol	OR (95% CI)	P value
S1	52	88	1	-
S2	10	25	1.48 (0.66-3.29)	0.431
S3	1	4	2.36 (0.32-17.28)	0.653
NSAIDs				
Perforation Size	No NSAIDs	NSAIDs	OR (95% CI)	P value
S1	99	41	1	-
S2	27	8	0.72 (0.30-1.69)	0.532
S3	4	1	0.60 (0.08-4.43)	1
HISTORY OF APD				
Perforation Size	No H/O APD	H/O APD	OR (95% CI)	P value
S1	103	37	1	-
S2	25	10	1.11 (0.49-2.51)	0.832
S3	2	3	4.18 (0.81-21.60)	0.129

S1, S2 and S3 denotes ulcer diameter of ≤ 0.5 cm, 0.6-1 cm and >1 cm respectively

In order to determine the risk for increased perforation size among the patients with the habits of smoking, alcohol, NSAIDs and history of APD, the odds ratio along with 95% confidence interval was calculated for the study subjects. It has been observed from the study that patients with the habits of smoking had a 1.6 and 2.9 fold risk for S2 and S3 perforation respectively in comparison to those

without the habit of smoking. Similarly it has been observed that the patients with the habit of alcohol consumption had a 1.5 fold and 2.3 fold risks for S2 and S3 perforation size respectively in comparison to non alcoholic patients. It was also observed that the patients with the previous history of APD had a 4.18 fold increase in the risk for S3 perforation size in comparison to those without any previous APD history. However, for patients with the habit of taking NSAIDs we did not observe any such increased risk for developing large sized perforation (Table 3).

Discussion

Peptic ulcer perforation still remains the one of the most common cause of abdominal catastrophe. Peptic perforation has been found to occur mostly in the age group of 40-50 years and 50-60 years. Males were found to be most affected by perforation due to peptic ulcer. Koliwad et al 2013 reported peak age incidence in the age group of 40-60 years of age which may be attributed due to stress and strain and partially due to smoking and alcohol consumption during the period^[6].

Grahms patch (omental patch) repair still remains the gold standard for and laparoscopic surgery should be considered when expertise is available. The patient is placed in supine position on the operating table, the abdomen prepped and draped. Upper midline incision is preferred route to enter peritoneal cavity. It provides good exposure, it permits extension inferiorly if a perforated ulcer not found. Suctioning of gastrointestinal spillage and of any fibrinous exudates is quickly performed; attention is turned to inspect the duodenum and stomach for visualization of the perforation. The conservative management with omental patch repair seems to be attractive especially, when extensive inflammatory reaction of the pylorus and duodenum is observed, however the patient has been found to have poor hemodynamic status, and rapid control of septic source is required, in comparison to definitive surgery^[7]. In our study, the Grahms patch technique was used for majority of patients and was the primary technique for all sizes of perforations. The

average time taken for starting oral feeding, Ryle's tube removal as well as length of hospital stay was found to be the highest among the Grahms patch group in comparison to other group. Similarly the percentage of patients with wound complications, biliary fistulas and incidence of death was also found to be higher in the Grahms patch group in comparison to the other group. According to a study by Bertleff et al., wound complications are found to be one of the most common forms of complication post surgery of perforated peptic ulcer^[8].

It has been observed from the study that smoking, alcohol consumption and history of APD can lead the increased risk for peptic ulcer. The study also revealed that use of smoking and alcohol consumption can lead to increased size of the perforation due to peptic ulcer by 2.9 and 2.3 fold respectively. It was also observed that any previous history of APD among the patients can deteriorate the conditions of the peptic ulcer patients by increasing the risk of perforation of the peptic ulcer by 4 fold. The results were however found to be non significant and needs to be verified on a larger sample size. A similar observation was also observed by Li et al., 2014 where it was reported that cigarette smoking can be one of the major contributors to ulcer diseases. The study also compared a large US population-based study in which it was revealed that the risk for peptic ulcer disease among the current and former smokers was found to be double in comparison to those without the habit of smoking. The study also reported that the risk for peptic ulcer was also associated with the quantity of tobacco use. It has been also been reported previously that patients smoking cigarettes are more at risk for developing ulcers that are very difficult to heal^[1]. In a study by Strate et al., 2016 it was reported that there was a linear association between the risk for gastro intestinal bleeding and the amount of alcohol intake. The study also revealed that alcohol consumption of more than 15 g/day was associated with a higher risk of upper gastrointestinal bleeding, which may particularly lead to peptic ulcer^[1]. A study by Asali et al., 2018 reported that history of gastric ulcer disease is a

major risk factor for developing peptic ulcer risk among the individuals^[9]. Another study by Ramakrishnan et al., 2007 also reported that ulcers and its associated complications are found to be more common among patients with a history of ulcer or gastrointestinal bleeding^[10].

The figure of 8 stitch procedure is a newly developed perforated peptic ulcer closure procedure first developed and used by Gupta et al, in 2005. He used this technique in all cases when the edges of the ulcer were very friable and oedematous. In these cases, when the stitches were applied they cut through the edges. The suture can be taken from a relatively longer distance by even a small needle. There is lesser tendency to cut through because the pressure at one points is divided into two directions. The edges of the ulcer do not tend to evert by the effect of the figure of 8 stitch and approximation of edges has been found to be satisfactory. The cross of the figure of 8 comes over and supports the most friable and oedematous central part of the ulcers^[11]. In our study, the newly described figure of 8 suture technique was mainly reserved for small perforation that is for 0.5 cm and less. In our study it showed good outcome for small perforation with less morbidity and mortality. No biliary fistula was observed among the individuals performed using this study. The time taken for starting oral feeding, Ryle's tube removal and length of hospital stay was also found to be lower in comparison to those performed using Graham's patch. Our study was found to be consistent with that reported by Bhandari et al., which reported that figure of 8 stitch closure procedure is not inferior to omentopexy when considering the post-operative complications and thus can be used as a safe alternative to omentopexy particularly in cases when the patient reports late^[4]. In another study by Choudhury et al., it was reported that Figure of 8 stitch closure procedure displayed very good and acceptable result and was therefore recommended to be used for surgery of perforated peptic ulcer^[12].

The laparoscopy technique is recent developments in minimally invasive surgery which allows laparoscopic closure of peptic perforation. Patient

with peptic perforation within 24 hrs of symptoms, having low morbidity with minimal contamination was preferred in our study for laparoscopic closure of perforation. The laparoscopic technique was found to reduce postoperative complications, length of hospital stay, hospital burden, with best cosmetic results^[13]. In our study it was observed that there were no incidence of wound complications, biliary fistula or death among the patients performed using the laparoscopic technique which may be due to less invasive technique required to perform the procedure. Our observation was found to be consistent with Palanivelu et al., where it was reported that in laparoscopy, there were no incidence of biliary fistula and death^[14]. In another study by Motewar et al., it was reported that in laparoscopy surgery there were no incidence of death among the patients^[15]. Thus laparoscopy decreases burden of patients over hospital as well it lessens economic burden of hospital stay over patients.

Conclusion

From the study it can be concluded that Figure of 8 being a new technique can be used in small, friable edges of perforation, and having less post operative complications than Grahms patch and also decreases length of hospital stay, oral feeding start as well as Ryle's tube removal day. The Laparoscopy being a less invasive an recent development in closure of perforated peptic ulcer is the most effective among the three techniques in reducing postoperative complications and length of hospital stay, oral feeding and Ryle's tube removal.

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