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SURGICAL OUTCOMES OF LARGE DUODENAL ULCER PERFORATION MANAGED BY GRAHAM'S PATCH WITH GASTROJEJUNOSTOMY

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Abstract

Introduction: Duodenal ulcers mostly occur in the first part of duodenum (>95%). A chronic ulcer penetrates into the muscle coat, leading to fibrosis. Perforation of a duodenal ulcer allows egress of gastric and duodenal contents into the peritoneal cavity, which may initiate catastrophic cascade of events; there are three components of the resulting clinical syndrome, which we have to consider while developing a rational plan of treatment. Although it is commonly and wrongly attributed to Graham, who described the use of a free graft of the omentum to repair the perforation.

Material and Methods: This is a Hospital based Prospective Observational Study was conducted in the Veer Surendra Sai Institute of Medical Sciences and Research (VSSIMSAR), Burla, Sambalpur, Odisha, India, 21.5° N 83.87 °E. All postoperative patients admitted in the inpatient wards under Department of General Surgery, following Graham's omental patch repair with Gastrojejunostomy for Large duodenal ulcer perforation (size 1cm-3cms)[16] in the emergency setting of our hospital.

Results: Of the 60 patients, postoperative complications (morbidity) occurred in 21(35%) patients, and 8(13.33%) of them died. Postoperative morbidity or complications were observed in 21 (35%) cases, 17 (80.95%) of them were males and four (19.05%) were females. Among the eight patients who died, 7 (87.5%) were males and 1(12.5%) female. Postoperative complications (morbidity) affected 21 (35%) of 60 patients in this study. Some of the patients experienced multiple complications. Among the 21, the most frequent morbidity noted as expected was surgical site infection, occurring in 15(71.4%) cases, followed by postop pyrexia in 13(61.9%). Eight of them (38.1%) required ventilator support >48 hours and had respiratory complications. Acute renal failure occurred in 3(14.29%) of them.

Conclusion: Graham's omental patch repair with the addition of a Gastrojejunostomy and tube drain in the Morrison's space is simple, can be performed in a relatively short time, and remains dependable even for the closure of large sized perforations (i.e. perforations upto 3 cms in size) Postoperative morbidity and mortality rates in our study were 35% and 13.33% respectively. Surgical site infection (25%) was the most common complication to occur, and most of the deaths were due to respiratory complications (8, 37.5%).

Keywords: Duodenal ulcers, Graham's omental patch, Gastrojejunostomy.

INTRODUCTION

Peptic ulcers are defined as erosions or focal defects in the gastric or duodenal mucosa that extends into the submucosa or deeper into the muscularis mucosae. PUD encompasses both gastric and duodenal ulcers. [1] They are caused by increased aggressive factors, decreased defensive factors, or both. It has been widely accepted that H. pylori infection and NSAIDs intake are the most important risk factors in the development of peptic ulceration.[2] Smoking, stress and other factors like alcohol intake, cocaine, intake of smoked and spicy foods also increases the risk. [3] Duodenal ulcers mostly occur in the first part of duodenum (>95%). A chronic ulcer penetrates into the muscle coat, leading to fibrosis. The fibrosis causes deformities such as pyloric stenosis. Anteriorly placed ulcers tend to perforate and in contrast, posterior duodenal ulcers tend to bleed, sometimes by eroding into the gastroduodenal artery.[4,5]

Perforation of a duodenal ulcer allows egress of gastric and duodenal contents into the peritoneal cavity, which may initiate catastrophic cascade of events; there are three components of the resulting clinical syndrome, which we have to consider while developing a rational plan of treatment. [6] These are the ulcer, the

perforation, and the resulting peritonitis, among which perforation and the resultant peritonitis can be an immediate life threatening complication. Considering the life threatening sequel of this condition, it needs special attention with early diagnosis, prompt resuscitation, intravenous antibiotics and appropriate surgical management as earliest as possible if mortality and morbidity to be avoided. A number of factors have been associated with poor outcome after perforated peptic ulcer which includes delay in diagnosis (>24 hours), medical comorbidities, shock, increasing age (>75).[7]

Management of PPU is primarily surgical, and has wide array of options depending upon the size of perforation and the condition of the patient at the time of presentation. Johan Mikulicz- Radecki (1850–1905) became the first surgeon to close the duodenal ulcer by simple suture. He stated, "Every doctor, faced with perforated duodenal ulcer of the stomach or intestine, must consider opening up the stomach, sewing up the hole, and averting the possible inflammation by careful cleansing of the abdominal cavity."[8] The classic, pedicled omental patch performed for the 'plugging' of these perforations was first described by Cellan-Jones in 1929.[9] Although it is commonly and wrongly attributed to Graham, who described the use of a free graft of the omentum to repair the perforation in 1937.[10] In this, a strand of omentum is drawn over the perforation and held in place by full thickness sutures placed on either side of the perforation, and this procedure has become the "gold standard" for the treatment of such perforations.

As these large duodenal perforations (size 1cm-3cms)[11] are encountered more frequently in this part of our country and are considered particularly hazardous, because simple closure using omental patch may often resulting into post-operative leak or gastric outlet obstruction, diversion procedures like gastrojejunostomy can be added along with the standard omental patch repair. This may help in bypassing the duodenum, decrease the otherwise high intraluminal pressure, reducing the inflammation at suture site, preventing further exposure of gastric juice at ulcer site, early initiation of enteral feeds, and may compensate for outlet obstruction, which is one among the complications of peptic ulcer. Doing a standard gastrojejunostomy in the emergency setting is not that much demanding like definitive procedures, nor taking much time, but may help in reducing the associated morbidity and mortality, provides an option for better chance of survival in those subset of patients with large duodenal perforations.

The present study is an attempt to assess the various surgical outcomes in patients with large duodenal ulcer perforation managed by Graham's omental patch with gastrojejunostomy, and to find out the association of various risk factors with postoperative morbidity and mortality in these patients.

MATERIAL AND METHODS

This is a Hospital based Prospective Observational Study was conducted in the Veer Surendra Sai Institute of Medical Sciences and Research (VSSIMSAR), Burla, Sambalpur, Odisha, India, 21.5° N 83.87 °E.

Inclusion Criteria:

All postoperative patients admitted in the inpatient wards under Department of General Surgery, following Graham's omental patch repair with Gastrojejunostomy for Large duodenal ulcer perforation (size 1cm-3cms)[16] in the emergency setting of our hospital.

Exclusion criteria:

1. Duodenal ulcer perforations of size <1cm and >3cms.
2. Patients with traumatic and iatrogenic duodenal perforations.
3. Patients with duodenal perforation with suspected underlying malignancy.
4. Patients having other hollow viscous perforations along with duodenal perforation.
5. Patients with large duodenal ulcer perforation managed with other surgical techniques.
6. Immunocompromised patients.
7. Those patients who were not willing to participate in the study.

Study Tools & Techniques:

Tools: – Hospital records, bed head tickets, laboratory reports, radiological modalities such as Digital X-ray abdomen, USG abdomen, CECT Abdomen and medical and surgical equipments.

Techniques:

- Clinical examination of the patients both pre and post operatively.
- Measurement of vital parameters of the patients.
- Review of hospital records, radiological and laboratory reports.

Study Variables:

- Demographic variables – Age, Gender – (Male/Female)
- Anthropometric parameters – Height (cms), Weight (Kg), BMI (Kg/m2)
- Pre-existing comorbid diseases – Diabetes mellitus, Hypertension, COPD
- Habits / Addictions – Smoking, Alcohol
- Laboratory parameters –
  - Haemoglobin (gm %)
  - Serum. Creatinine (mg/dl)
  - Serum Total protein (gm/dl) & Albumin (gm/dl)
- Other parameters - Lag period (hours), Shock at the time of presentation.

nt was taken from each patient/ guardian. Data were collected by approved data collection form.

Data Analysis:

Data Management & Statistical Analysis will be done with proper statistical values and proportions at the end of data collection. Data analysis was done both manually and by using computer. Data analysis was performed using MS Excel 2016 and IBM Statistical Package for the Social Sciences (SPSS) for Windows. The mean ± standard deviation (SD), median and ranges were calculated for continuous variables whereas proportions and frequency tables were used to summarize categorical variables. The mean differences between groups were compared by Student's t-test. Continuous variables were categorized. Chi-square ($\chi 2$) test was used to test for the significance of association between the independent (predictor) and dependent (outcome) variables in the categorical variables. The level of significance was considered as $p < 0.05$. Mortality and morbidity was assessed in terms of percentages and association of various factors with morbidity and mortality were determined using standard statistical tests.

RESULTS

Table-1: Age and Sex distribution of patients.

Age group (Years)	Males		Females		TOTAL	
	n	%	n	%	n	%
20-29	8	15.09	0	0	8	13.33
30-39	13	24.53	0	0	13	21.67
40-49	18	33.96	0	0	18	30
50-59	7	13.21	4	57.14	11	18.33
>60	7	13.21	3	42.86	10	16.67
TOTAL	53	88.33	7	11.67	60	100
Mean ±SD	44±12		58±6		45±12	

In the present series of 60 cases of large duodenal perforation, the age of patients varied from 24 years to 70 years, with a mean age of 45 ±12 years. The peak incidence was in 5^{th} decade, i.e. 40-49 years, which constituted 30 percent of total cases. Majority of the cases were older than 40 years, 39 (65%) and only 8 (13.33%) were less than 30 years of age.

Perforation was more common in males compared to females, the ratio being 7.5:1. Out of 60 cases, 53 (88.33%) were males and seven (11.67%) were females, The mean ages were, 44 ±12 years for males and 58 ±6 years for females.

Table-2: Clinical characteristics of the patients.

Clinical Characteristics	No. of Patients (%)
Diabetes	13 (21.67)
Hypertension	11 (18.33)
COPD	6 (10)
Smoking	40 (66.67)
Alcoholism	44 (73.33)
Shock on Admission	20 (33.33)

In our study of 60 cases, 13(21.67%) had diabetes, 11(18.33%) had hypertension and six (10%) had COPD. 40(66.67%) cases were smokers and 44(73.33%) were alcoholic. Of the 60 cases only 20(33.33%) had shock at the time of admission.

Table-3: Distribution of Comorbidities and Substance abuse.

HISTORY OF	Males		Females		Total	
	n	%	n	%	n	%
Diabetes	10	18.87	3	42.86	13	21.67
Hypertension	10	18.87	1	14.29	11	18.33
COPD	3	5.66	3	42.86	6	10
Smoking	38	71.7	2	28.57	40	66.67
Alcohol	39	73.58	5	71.43	44	73.33

Among the males 10(18.87%) were diabetic, 10(18.87%) were hypertensive and three (5.66%) had COPD. 38(71.7%) and 39(73.58%) of the males were smokers and alcoholic respectively. Among females, 3(42.86%) had diabetes, 1(14.29%) had hypertension, 3(42.86%) had COPD and 2(28.6%) were smokers and 5(71.4%) were alcoholic.

Table-4: Distribution of patients based on lag period.

Lag Period (hours)	No. of Patients (n)	%
<24	26	43.33
24-48	17	28.33
>48	17	28.33
Total	60	100

The lag period (i.e., onset of acute symptoms to presentation time) varied from <24 hours to >48 hours. Only 26(43.33%) patients presented with in <24 hours whereas,

Table-5: Presence of shock on admission.

Shock on Admission	No. of Patients	%
Present	20	33.33
Absent	40	66.67
Total	60	100

Majority of the patients 40(66.7%) were not having shock at the time of admission.

Table-6: Laboratory parameters.

Parameter	Male	Female
	Mean ± SD	Mean ± SD
Haemoglobin (gm %)	13.40±0.63	12.01±0.62
S. Albumin (gm/dl)	3.87±0.59	3.80±0.63
S. Creatinine (mg/dl)	1.92±0.57	1.88±0.40

The mean±SD levels in males were, Haemoglobin 13.40±0.63, Serum Albumin 3.87±0.59, and Serum Creatinine 1.92±0.57 and in females were Haemoglobin 12.01±0.62, Albumin 3.80±0.63, and S. creatinine 1.88±0.40.

Table-7: Surgical outcomes in patients.

No. of patients	Outcomes	
	Morbidity	Mortality
Yes n (%)	21 (35)	8 (13.33)
No n (%)	39 (65)	52 (86.67)

Of the 60 patients, postoperative complications (morbidity) occurred in 21(35%) patients, and 8(13.33%) of them died.

Table-8: Distribution of surgical outcomes.

Sex	Morbidity		Mortality	
	Yes n (%)	No n (%)	Yes n (%)	No n (%)
Males	17 (80.95)	36 (92.31)	7 (87.5)	46 (88.5)
Females	4 (19.05)	3 (7.69)	1 (12.5)	6 (11.5)
Total	21 (100)	39 (100)	8 (100)	52 (100)

Postoperative morbidity or complications were observed in 21 (35%) cases, 17 (80.95%) of them were males and four (19.05%) were females. Among the eight patients who died, 7 (87.5%) were males and 1(12.5%) female.

Table-9: Postoperative complications. (n=21)

Postoperative Complications	No. of Patients (%)
Surgical Site Infection	15 (71.42)
Postop pyrexia	13 (61.90)
Respiratory complications	8 (38.09)
Ventilator support >48 hours	8 (38..09)
Paralytic ileus	7 (33.33)
Wound Dehiscence	6 (28.57)
Acute renal failure	3 (14.29)
Intra-abdominal abscess	2 (9.52)
Enterocutaneous fistula	2 (9.52)
Septic Shock	2 (9.52)
Cardiovascular complication	2 (9.52)

Postoperative complications (morbidity) affected 21 (35%) of 60 patients in this study. Some of the patients experienced multiple complications. Among the 21, the most frequent morbidity noted as expected was surgical site infection, occurring in 15(71.4%) cases, followed by postop pyrexia in 13(61.9%). Eight of them (38.1%) required ventilator support >48 hours and had respiratory complications. Acute renal failure occurred in 3(14.29%) of them. Intra abdominal abscess, Enterocutaneous fistula, Septic shock and Cardiovascular complications occurred in 2 (9.52%) each.

Table-10: Causes of postoperative mortality.

Causes of postoperative mortality	No. of patients (%)
Respiratory complications	3 (37.5)
Septic shock	2 (25)
Cardiovascular causes	2 (25)
Acute renal failure	1 (12.5)

In this study, eight patients (13.33%) died at the hospital postoperatively. Of the eight, most patients died due to development of respiratory complications 3(37.5%), followed by septic shock 2 (25%), cardiovascular causes in 2 (25%) and acute renal failure in 1(12.5%) patient. Haemodialysis was required for 2 patients in renal failure during the postoperative period and the one patient died in spite of timely dialysis.

Discussion

In the present series of 60 cases, the age of patients varied from 24 years to 70 years, with a mean±SD age of 45±12 years. The incidence of perforated duodenal ulcer was highest among patients in the fifth decade (40-49yrs) of life (30%). Jani K et al.[12] also noticed similar incidence in their study. In a study by Noola G S, Shivakumar[13] in India, among 60 patients, highest incidence was found in 40 – 49 years of age (25%).

Of the 60 patients, 53 (88.33%) were males and 7 (11.67%) were females, the ratio being 7.5:1. There was an overwhelming predominance of males in our study. This is similar to the observations in many other reports of PPU in which 80% are males.[14] The observed male to female ratio also compares favourably with other studies.[15] But Saverio D et al from Italy observed that more than half the patients undergoing surgery were females.[16] There is sharp contrast in socio demographic profile of the patients observed by studies in developed countries where majority of the patients tend to be elderly and there is a high incidence of ulcerogenic drug ingestion.[17]

In this study of large duodenal ulcer perforation managed by Graham's patch with gastrojejunostomy, postoperative complications (morbidity) occurred in 21 (35%) patients. Some of the patients experienced multiple complications. The most frequent morbidity noted as expected was surgical site infection, occurring in 15(71.4%), followed by postop pyrexia in 13(61.9%) of the 21 patients. Post-operative anastomotic or leak from perforation site occurred in 2 (3.3%) patients in our study. Leak rates of 2- 8% have been reported after perforation repair. These unfortunate patients have a 35% chance of mortality.[18] In this study, eight patients (13.33%) died at the hospital postoperatively. Most of the deaths occurred following development of respiratory complications in 3 (37.5%). Unver M et al. [103] in their study also observed similar causes for mortality.

Arveen S et al.[19] suggested adjunctive procedures like feeding jejunostomy or pyloric exclusion along with simple closure with an omental patch or pyloric exclusion in the management of large perforated peptic ulcer. Pyloric exclusion carries an advantage of gastrojejunostomy when the duodenum is found to be badly scarred and stenosed as a result of chronic ulcer.

Gupta et al.[20] reported, the results of omentopexy in small and large sized perforations in the present series give statistically similar results. the overall morbidity was 48.76 %, it was much higher in the larger perforations. The mortality in this series was 8.64 % (14 cases), and again, it was significantly higher in perforations more than 1 cm in size The leak rates and mortality of the two groups after omentopexy remain comparable, thereby suggesting that this may be considered as the procedure of choice in all perforations upto a size of 3 cms. The procedure is simple and easy to master, and, avoids the performance of a major resection in a patient who is already compromised.

In a study by Mukhopadhyay M et al.[21] of the 718 patients, 23 (3.2%) had a giant perforation (size>2cm). Omental plugging (OP) was done in ten patients (cases) and omentopexy (OX) in 13 (controls). Intestinal fistula formation was 0% in OP group while three (23.08%) patients developed intestinal (duodenal) fistula in the OX group. The overall mortality rate was 26%. The death in the OP group was 10% and that in the OX group was 38.5%.

Conclusion

Graham's omental patch repair with the addition of a Gastrojejunostomy and tube drain in the Morrison's space is simple, can be performed in a relatively short time, and remains dependable even for the closure of large sized perforations (i.e. perforations upto 3 cms in size) Postoperative morbidity and mortality rates in our study were 35% and 13.33% respectively. Surgical site infection (25%) was the most common complication to occur, and most of the deaths were due to respiratory complications (8, 37.5%). Enterocutaneous fistula formation was seen in only 2 (3.3%) patients. And this is very much less when compared with morbidity and mortality of other procedures advised for managing large duodenal perforations in different case series around the world. Hence for managing large duodenal ulcer perforations, Graham's omental patch with gastrojejunostomy shall be considered as an option with preferably better surgical outcomes and decreased postoperative mortality and morbidity.

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