

A COMPARATIVE STUDY OF CLOSURE OF DUODENAL PERFORATION BY OMENTOPLASTY VERSUS OMENTOPEXY

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KEYWORDS

DUODENAL PERFORATION, OMENTOPEXY, OMENTOPLASTY

ABSTRACT:

Introduction: Duodenal perforation, a surgical emergency with a mortality rate of 4%-30% in Western countries, is often underreported in India. Peptic ulcer disease, caused by drugs and H. pylori infection, is the leading cause. Perforation sizes range from 3mm to over 3 cm, impacting prognosis. Mortality depends on size, age, and risk factors. The omentum is used in gastrointestinal surgery to promote fibrosis and prevent leakage. **Aims:** The study compares the success rate of omentoplasty and omentopexy in closing duodenal perforations, examining pre-operative, intra-operative, and post-operative outcomes, including age, sex, symptom duration, and complications. **Methodology:** The study compares omentoplasty and omentopexy procedures for treating giant peptic perforation in Emergency Exploratory Laparotomy patients aged 15-85, covering 64 patients from March 2022 to September 2023. **Results:** The study found no significant difference in age distribution between Omentopexy and Omentoplasty groups in duodenal perforations prevalence. Young patients had higher perforation rates, leading to postoperative complications. Males and females had higher complications. Early and late patients presented differently, with higher rates in Omentopexy and Omentoplasty. **Discussion:** Duodenal perforation is a major surgical emergency with mortality rates of 4-30% in Western countries. It's difficult to repair due to its complex anatomy. Techniques like Omentopexy and Omentoplasty have been developed, but common post-operative complications include infection, pneumonia, and incisional hernia. Patients over 50 years old have higher mortality rates, and delayed diagnosis and treatment contribute to higher morbidity. **Conclusion:** The study found that older age, delayed presentation, shock, and large perforations increase mortality risk. Omentopexy was found to be more effective in reducing postoperative complications and mortality.

INTRODUCTION

Duodenal perforation, a surgical emergency with a mortality rate of 4%-30% in Western countries, is often underreported in India.¹

Peptic ulcer disease, caused by non-steroidal anti-inflammatory drugs and H. pylori infection, is the leading cause of duodenal perforation, with risk factors including smoking, stress, and history of the disease.²

The decrease in elective peptic ulcer surgery is slowing, but perforation-related emergencies are increasing. Perforation sizes range from 3mm to over 3 cm, impacting prognosis. Perforation sizes range from 6% to 24%.³

Mortality in gastroduodenal perforations depends on size, age, and risk factors like concomitant diseases, preoperative shock, and surgery delay. Repairing these perforations is challenging due to the complex anatomy and blood supply. The omentum, an intraperitoneal organ with biological properties, is used in gastrointestinal surgery to promote fibrosis, regenerate the duodenal wall, and prevent leakage.^{4,5}

Perforated peptic ulcer patients often experience tachycardia, sudden severe abdominal pain, and abdominal rigidity. Diagnosis is usually by abdominal tenderness, guarding, rigidity, and tachycardia. Sepsis is common, and surgical complications include pneumonia, wound dehiscence, peritonitis, incisional hernia, entero-cutaneous fistula, intra-abdominal collection or abscess, surgical site infection, and paralytic ileus. The study compares the success rate of omentoplasty and omentopexy in closing duodenal perforations.^{2,5,6}

AIMS AND OBJECTIVES:

This study compares the success rate of omentoplasty and omentopexy in closing duodenal perforations. It compares outcomes in pre-operative, intra-operative, and post-operative assessments,

including age, sex, symptom duration, concomitant diseases, shock presentation, size of perforation, and post-operative complications.

MATERIALS AND METHODS:

- i. Study Site:**Department of General Surgery, Krishna Vishwa Vidyapeeth, a deemed to be Institute, a Tertiary Level Hospital.
- ii. Study Duration:**March 2022 to September 2023.
- iii. Study Design:**The study design is Prospective comparative study.

Sample Size:A study published by Madhumita Mukhopadhyay compared omentoplasty and omentopexy for treating giant peptic perforation in 2011. The mortality rate was 10% in omentoplasty and 38.5% in omentopexy. The study will study 64 patients from March 2022 to September 2023, comparing the outcomes of both procedures.

Inclusion Criteria:The study includes patients aged 15-85 with duodenal ulcer perforation who have undergone Emergency Exploratory Laparotomy at KVV HOSPITAL, KARAD.

Exclusion Criteria: Patients aged 15-85, unable to tolerate general anesthesia, refractory coagulopathy, pregnant, severe comorbid conditions, multiple perforations, non-duodenal perforations, and 0.5cm and larger duodenal perforations excluded.

This prospective comparative study focuses on patients with duodenal perforation who underwent Emergency Exploratory Laparotomy in Krishna Vishwa Vidyapeeth, Karad, from March 2022 to September 2023. Patients were grouped into two groups: those undergoing omentoplasty and those undergoing omentopexy. All patients received standard preoperative and postoperative management, and informed consent was obtained before the procedure. Comparisons were made based on preoperative assessment, intra-operative assessment, and post-operative assessment. Patients were informed about the nature of surgery and its complications.

OBSERVATION AND RESULTS:

The mean age of all cases is 55.34 years, with a standard deviation of 16.10 years, with a median of 57 years and a mode of 60 years.

Table 1: Age distribution amongst all cases of duodenal perforations-

All cases of perforation (n=64)	Age (in years)
Mean	55.34
Median	57
Mode	60
Maximum	85
Minimum	20
Range	65
Standard deviation	16.10

The study found no significant difference in age distribution between Omentopexy and Omentoplasty groups, with mean age of 52.06 years and standard deviation of 15.69 years, respectively.

Table 2: Age distribution amongst Omentopexy and Omentoplasty cases-

Findings (age in years)	Omentopexy (n=32)	Omentoplasty (n=32)
Mean	52.06	58.62
Median	48.5	60
Mode	60	40, 60, 75
Minimum	20	28
Maximum	80	85
Range	60	57
Standard deviation	14.19	15.69

The study categorized patients into young and old age groups, with the young group experiencing a 40.625% perforation rate and the old group experiencing a 59.375% perforation rate.

Table 3: Age distribution amongst young & old age groups-

Age groups	Young age group(15-50years)	Old age group(50-85years)
No. Of patients	26	38
Mean	39.3	66.31
Median	40	66
Mode	40	60
Standard deviation	7.43	9.02

The study found that 26.9% of young patients presented with shock, leading to postoperative complications such as leak, burst abdomen, and death, while 55.26% of old patients experienced similar complications.

Table 4: Comparison between young and old age groups-

Based on preoperative presentation and postoperative complications.

Age groups	Young age group (n=26)	Old age group (n=38)	Total	P value
Presentation with shock	7	21	28	0.02
Mean duration of ICU stay (in days)	2.85	4.37	-	-
Postoperative leak	3	8	11	0.3
Postoperative burst abdomen	2	7	9	0.2
Postoperative gastric outlet obstruction	0	0	0	-
Postoperative fistula formation	0	1	1	0.4
Postoperative septicaemia	2	13	15	0.013
Postoperative intra-abdominal abscess	1	1	2	0.7
Expired	3	13	16	0.04

The study found that 64.06% of males and 35.9% of females had duodenal perforation, 68.75% underwent Omentopexy, and 59.38% underwent Omentoplasty.

Table 5: Gender distribution-

Gender	Omentopexy (n=32)	Omentoplasty (n=32)	Total
Male	22	19	41
Female	10	13	23

P value = 0.0014, i.e.<0.05, thus statistically significant.

Postoperative complications in males and females are significantly higher than in females, with a P value > 0.05, indicating statistical insignificance. The percentages of leak, burst abdomen, gastric outlet obstruction, fistula formation, septicaemia, and intra-abdominal abscess are high.

Table 6: Gender comparison-

	Males (n=41)	Females (n=23)	Total (n=64)	P value
Postoperative leak	8	3	11	0.51
Postoperative burst abdomen	7	2	9	0.3
Postoperative gastric outlet obstruction	0	0	0	-
Postoperative fistula formation	1	0	1	0.4
Postoperative septicaemia	9	6	15	0.7
Postoperative intra- abdominal abscess	1	1	2	0.6
Expired	9	7	16	0.4

Patients were categorized into early and late presenters based on time of presentation, shock presentation, ICU stay duration, and postoperative death.

Table 7: Comparison between early and late presenters-

Time of presentation	Early presenters (n=46)	Late presenters (n=18)	Total	P value
Presentation with shock	13	15	28	0.00006
Mean duration of ICU stay (in days)	3.1	5.1	-	-
Postoperative death	7	9	16	0.004

P value < 0.05 indicates that the comparison is statistically significant.

The study shows that 28.26% of patients present with shock in early cases and 83% in late cases, and 15.2% and 50% of patients die postoperatively.

The study found that 43.75% of patients with shock presented to the hospital, while 56.25% did not. Postoperatively, 42.85% of patients with shock died, indicating a statistically significant difference.

Table 8: Shock distribution-

Shock	Omentopexy (n=32)	Omentoplasty (n=32)	Total	Expired
Present	14	14	28	12
Absent	18	18	36	4

The study found that the mean size of a duodenal perforation was 1.195cm, with a standard deviation of 0.57cm.

Table 9: Size of Perforation Distribution-

Findings	Size of perforation (in cm)
Mean	1.195
Median	1
Mode	1
Maximum	2
Minimum	0.5
Range	1.5
Standard deviation	0.571

Duodenal perforations are classified as small or large, with 59.38% and 40.62% of patients having small and large perforations, respectively.

Table 10: Size of perforation distribution amongst Omentoplasty and Omentopexy-

Duodenal Perforation (n=64)	Small perforation (n=38)	Omentopexy (n=20)
		Omentoplasty (n=18)
	Large perforation (n=26)	Omentopexy (n=12)
		Omentoplasty (n=14)

The mean and standard deviation of small and large perforations are 0.82cm and 1.73cm respectively, respectively.

Table 11: Distribution amongst Small and Large duodenal perforations-

Findings (in cm)	Small perforation (n=38)	Large perforation (n=26)
Mean	0.82	1.73
Median	1	1.5
Mode	1	1.5
Maximum	1	2
Minimum	0.5	1.5
Range	0.5	0.5
Standard deviation	0.234	0.368
Mean ICU stay duration (in days)	3.29	4.42
Mean OT duration (in hours)	3.03	3.02

The study compared small and large duodenal perforations based on postoperative complications. Statistically significant differences were observed in preoperative leak and postoperative death. Small perforations had higher postoperative complications, while large perforations had higher complications. Omentopexy was used to reduce the percentage of small perforations requiring postoperative complications.

The study reveals that a significant percentage of patients with small perforations who underwent Omentoplasty experienced postoperative complications such as leak, burst abdomen, gastric outlet obstruction, fistula formation, septicaemia, intra-abdominal abscess, and death, while a significant proportion of patients with large perforations experienced similar complications.

Findings	Small perforation (n=38)		Large perforation (n=26)		P value
	Omentopexy (n=20)	Omentoplasty (n=18)	Omentopexy (n=12)	Omentoplasty (n=14)	
Postoperative leak	1	2	2	6	0.017 significant
Postoperative burst abdomen	2	2	2	3	0.328
Postoperative gastric outlet obstruction	0	0	0	0	0
Postoperative fistula formation	0	0	0	1	0.224
Postoperative septicaemia	1	5	4	5	0.080
Postoperative intra-abdominal	1	0	0	1	0.784

abscess					
Postoperative death	2	3	4	7	0.008 significant

Table 12: Comparison between small and large duodenal perforation-

Out of 64 patients, 32 underwent Omentopexy and 32 underwent Omentoplasty.

Table 13: OT procedure distribution-

Procedure	Omentopexy	Omentoplasty
Number of patients	32	32

The study found significant differences in mean and standard deviation of operative time (OT) duration between Omentopexy and Omentoplasty groups, indicating comparable outcomes.

Table 14: OT duration distribution amongst Omentoplasty and Omentopexy-

OT duration (in hours)	Omentopexy (n=32)	Omentoplasty (n=32)
Mean	2.77	3.22
Median	3	3
Mode	3	3
Maximum	4.5	5
Minimum	2	2
Range	2.5	3
Standard deviation	0.725	0.725

The study found no significant difference in ICU stay duration between Omentopexy and Omentoplasty groups, with mean OT durations of 3.4 and 4.09 days, respectively.

Table 15: ICU stay duration distribution amongst Omentoplasty and Omentopexy-

ICU stay duration (in days)	Omentopexy (n=32)	Omentoplasty (n=32)
Mean	3.4	4.09
Median	2	3
Mode	2	2
Maximum	10	15
Minimum	1	1
Range	9	14
Standard deviation	2.7	2.6

The study found no significant difference in hospital stay duration between Omentopexy and Omentoplasty groups, with mean durations of 8.16 and 9.06 days, respectively, and standard deviations of 1.46 and 5.49 days.

Table 16: Hospital stay duration distribution amongst Omentoplasty and Omentopexy-

Hospital stay duration (in days)	Omentopexy (n=32)	Omentoplasty (n=32)
Mean	8.16	9.06
Median	8	8
Mode	8	8
Maximum	11	36
Minimum	4	3
Range	7	33
Standard deviation	1.46	5.49

The study found that postoperative complications of leak, burst abdomen, gastric outlet obstruction, fistula formation, septicaemia, intra-abdominal abscess, and death were prevalent in all cases, with higher rates in Omentopexy and Omentoplasty, with varying percentages in each case.

Table 17: Postoperative complications distribution-

Complications	Omentopexy (n=32)	Omentoplasty (n=32)	Total (n=64)	P value
Leak	3	8	11	0.098
Burst abdomen	4	5	9	0.7
Gastric outlet obstruction	0	0	0	-
Fistula formation	0	1	1	0.3
Septicaemia	5	10	15	0.142
Intra-abdominal abscess	1	1	2	1
Death	6	10	16	0.248

DISCUSSION

Duodenal perforation is a major surgical emergency with mortality rates of 4-30% in Western countries. It's difficult to repair due to its complex anatomy and marginal blood supply. Techniques like Omentopexy and Omentoplasty have been developed, but common post-operative complications include surgical site infection, paralytic ileus, pneumonia, and complications like incisional hernia and gastric outlet obstruction.^{2,3}

The study compares the age of duodenal perforations with Omentoplasty and Omentopexy. It involved 64 patients divided into two groups: Omentoplasty and Omentopexy. The mean age of the patients was 55.34 years, with a higher rate of preoperative shock and complications in the older age group. Previous studies have found similar results, with patients aged >50 years having higher mortality rates. The study also found that the frequency of perforation was mostly in the 4th and 5th decade. Age >60 years had a significant influence on mortality, with mortality rates being 1.4% in patients under 65 years and 37.3% in those over 65 years.^{4,6,7}

The study found that males were more affected by perforation (64.06%) than females (34.9%), with postoperative complications more common in males. Similar findings were found in previous studies, such as Bojanapu et al¹, Rajneesh Kumar et al⁴, and Taş⁷. The incidence of omentopexy and omentoplasty was also higher in males (83.3%) and females (16.6%). The study found that preoperative shock and postoperative death were more common in patients presenting after 48 hours of symptom onset.

A study by Bojanapu et al¹ found that patients with a delayed diagnosis and treatment after surgery had higher morbidity and mortality rates. Similar findings were found in Khalil et al⁶, Kocera, and Taş⁷. In my study, 28.57% of patients had comorbidities, and a higher mortality rate was observed in patients with preoperative organ failure. The presence of concomitant diseases also increased

morbidity rates. In my study, 43.75% of patients presented with shock, and 42.85% had mortality. The mean size of the duodenal perforation was 1.195cm, with 59.38% having small perforations and 40.62% having large perforations. Large perforations had more ICU stays and more postoperative complications, with Omentoplasty being more common in both small and large perforations. Postoperative complications were mainly seen in the Omentoplasty group.

A study by Khalil et al⁶. found that the size of perforation > 1cm had a significantly higher association with mortality and morbidity. The mean operating time (OT) duration was 3.02 hours for Omentopexy compared to Omentoplasty, with a mean ICU stay of 3.75 days and a mean hospital stay of 8.6 days for Omentopexy. The mean operative time duration was 108 minutes in the Omentoplasty group, compared to 83 minutes in the Omentopexy group. The mean hospital stay was 12.6 days for the Omentoplasty group compared to 14.2 days for the Omentopexy group.

Post-operative complications were higher in Omentopexy (9.38%, 12.5%, 0%, 0%, 15.63%, 3.125%, and 18.75% respectively) than in Omentoplasty (25%, 15.63%, 0%, 3.125%, 31.25%, 3.125%, and 31.25% respectively). The most frequent reason for mortality was wound infection, and 28 (18.2%) patients died.

Morbidity was high in the old age group (34.2%), females (30.43%), late presenters (50%), presentation with shock (42.8%), large perforations (42.3%), and Omentoplasty (31.25%) than Omentopexy (18.75%). Similar findings were found in a study by Bojanapu et al¹, where age > 50 years, time to surgery \geq 4 days, presence of preoperative organ failure, and postoperative leak were associated with high mortality rates.

SUMMARY

Duodenal perforation is a common surgical emergency with a mortality rate of 4% to 30% in Western countries. Major causes include H. pylori infection, non-steroidal anti-inflammatory drugs, smoking, stress, prior peptic ulcer disease, and corticosteroids. Despite a decrease in elective peptic ulcer surgery, emergency perforation cases are increasing. A study comparing omentoplasty and omentopexy success rates in duodenal perforation closure found that omentoplasty had higher postoperative complications than omentopexy. Timely intervention and patient condition were critical for better outcomes. Omentopexy was found to be a better procedure than omentoplasty in closing duodenal perforations.

CONCLUSION

Old age, delayed presentation, presentation with shock, and big perforations were strongly associated with a considerably higher mortality risk, according to the findings of the study. According to the findings of the research, Omentopexy was shown to be superior than Omentoplasty in terms of the rates of postoperative complications and mortality when it came to the closure of duodenal perforations.

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