

Duodenal Ulcer Perforation and Our Experience and Outcome with Modified Graham's Repair

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Abstract

Background and Objectives: Duodenal ulcer perforation is an emergency and requires urgent surgical treatment. Even though many modalities of treatment are available, ranging from conservative treatment to laparoscopic repair, there is still no consensus regarding a most definitive option; literature is silent on the exact definition, incidence, management, and complications of large perforations of duodenal ulcers. There is a paucity of published reports on acute perforated peptic ulcers in our environment. This study was conducted to evaluate the different pattern of risk factors clinical presentations, management, and clinical outcome of patients with acute perforated peptic ulcer in our setting.

Materials and Methods: A total of 40 patients, presenting with duodenal ulcer perforation in the past 3 years, were enrolled. All patients with duodenal perforation in the first part (D1) were included in the study. All patients presented within 24 h of onset of symptoms of perforation. Pyloric perforations, multiple perforations, and traumatic perforations were excluded from this study. A pedicled omentum was used in the repair of duodenal perforation in all cases. Immediate and late post-operative complications were recorded. The patients were followed for 6 months.

Results: Out of 40 cases, there were 35 male patients and 5 female patients. The majority of male patients were in the age group between 30 and 45 years of age and the female patients were of older age group between 40 and 55 years of age. These patients presented with a history of severe acute pain in the epigastric region or right upper quadrant. All perforations were anterior perforations within the first 2.5 cm of the duodenum and all had simple closure with pedicled omental patch and peritoneal toilet with copious volumes of warm normal saline. Postoperatively, all received *Helicobacter pylori* eradication therapy and proton-pump inhibitors for at least 2 months. All the patients underwent modified Graham's patch repair (indirect omentopexy). In post-operative period, three patients had surgical site infection and one patient developed acute wound failure. Two patients had persistent fever and one developed paralytic ileus. Severe respiratory tract infection occurred in two patients. One patient died because of severe sepsis. The hospital stay was in the range of 6–12 days.

Conclusion: Modified/indirect Graham's repair using pedicled omentum gives excellent results in terms of healing, morbidity, and mortality.

Key words: Perforation, Omentum, Repair

INTRODUCTION

Peptic ulcer disease (PUD) represents a worldwide health problem because of its high morbidity, mortality, and economic loss.^[1] Globally, the incidence of PUD has fallen in recent years.^[2-4] Despite this and

recent advances in both diagnosis and management of PUD, namely, the improvement in endoscopic facilities, eradication of *H. pylori*, and the introduction of the proton-pump inhibitors, complications such as peptic ulcer perforation remain a substantial health-care problem. This may be due to an increase in the risk factors for peptic ulcer complications.^[2,5] Peptic ulcer perforation presents with an overall mortality of 10%.^[6] although some authors report ranges between 1.3% and 20%.^[7,8] Being a life-threatening complication of PUD, it needs special attention with prompt resuscitation and appropriate management if morbidity and mortality are to be avoided.^[2,8]

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Conservative treatment has a limited role.^[9] Studies have suggested that if signs of peritonitis are present the exploratory laparotomy should be done.^[10] This should be done within 12 h to avoid poor outcome.^[11] Various surgical options are available and choice depends on duration of peritonitis, size of perforation, history of symptomatic PUD, and comorbid conditions.^[12] The surgical treatment is the method of choice, but the changing trend is towards minimally invasive surgery due to effective antibiotics. Laparoscopic closure of perforated peptic ulcer is increasingly being performed.^[13] Omentum has still a role in laparoscopic closure of duodenal perforation. A successful outcome is obtained by prompt recognition of the diagnosis, aggressive resuscitation, and early institution of surgical management.

MATERIALS AND METHODS

This study was conducted in the emergency department and no ethical clearance was needed. However, a proper pre-operative consent was taken from the patient/attendants for the procedure and the probable outcome explained to them in their local language. A total of 40 patients were studied in this study presenting with duodenal ulcer perforation in the past 3 years.

Inclusion Criteria

All patients with duodenal perforation in the first part (D1) were included in the study.

Exclusion Criteria

Pyloric perforations, multiple perforations, and traumatic perforations were excluded from the study.

In the emergency department, a detailed clinical history was taken from all the patients [Table 1]. The history regarding risk factors and comorbid conditions was also taken. These patients were investigated by hematological investigations such as complete hemogram, serum electrolytes, blood urea, serum creatinine, and blood sugar. Ultrasound of abdomen and X-ray abdomen in standing and lying position was done.

Table 1: Clinical presentation

Clinical presentation	Frequency	Percentage
Severe abdominal pain	36	90.0
Abdominal distention	30	75.0
Vomiting	22	55.0
Nausea	16	40
Severe dyspepsia	11	27.5
Fever	10	25.0
Shock	9	22.5
Abdominal tenderness	34	85.0
Classical signs of peritonitis	28	70.0

Resuscitation was done in all the patients by transfusion of crystalloids 20–40 ml/kg of body weight. Good urinary output and stable hemodynamics were ensured in all the patients before being taken for surgery. Broad-spectrum antibiotics were given to all patients.

Under general anesthesia, an upper midline incision was made. The site and size of perforation was identified in all patients. Freshening of margins was strictly prohibited as freshening of margins decreases suture holding capacity of ulcer crater. In all cases, three full thickness 2–0 Vicryl (round body) sutures were placed across the perforation, and pedicled omentum placed over the perforation. The sutures were secured from above downward over the omentum, thus keeping the omentum over the perforation as a plug. The repair was tested by putting the warm saline in peritoneal cavity and insufflating air into stomach through nasogastric tube; no air leak was the end point of closure. Thorough peritoneal lavage was given and after cleaning the peritoneum two drains were inserted, one in hepatorenal pouch and another in pelvic cavity. The midline incision was closed in single layer using monofilamentous suture polypropylene suture. Pre-operative nasogastric decompression using Ryle's tube was initiated during resuscitation period and post-operative period till the paralytic ileus subsided. Adequate urinary output, mean arterial pressure, central venous pressure, and acid base balance were recorded. The observations made in the post-operative period regarding pain, wound infection, and hospital stay. The follow-up was done for a period of 6 months. Depending on their symptoms at each visit, patients were graded using a modified Visick classification as follows:

- Grade 1: No symptoms, excellent results.
- Grade 2: Mild symptoms, good results.
- Grade 3: Moderate symptoms, easily controlled by medications.
- Grade 4: Severe symptoms, requiring constant medication or reoperation.

RESULTS

Out of 40 cases, there were 35 male patients and 5 female patients. The majority of male patients were in the middle age group between 30 and 45 years of age and belonged to lower strata, particularly labourers. The female patients were in the age group of 40–55 years and mainly non-working women. These patients presented with the history of severe acute pain either in the epigastric region or right hypochondrium and all presented with acute-free perforation. Most of the patients group gave history smoking or analgesic abuse with use of nonsteroidal anti-inflammatory drugs. Few patients did not give history of any abuse. The plain X-ray abdomen in erect position revealed free gas

under diaphragm in 36 patients. In four patients, no free gas was seen under diaphragm. The pre-operative resuscitation of these patients was done using crystalloid solutions. The hemodynamic stability and good urine output were achieved in all the patients. Two patients could achieve a delayed hemodynamic stability after blood was infused.

Exploratory laparotomy was done in all these patients under general anesthesia. All the patients underwent modified Graham's patch repair, indirect omentopexy. The mean operative time of the procedure was 80 min.

Immediate post-operative period in all these patients was uneventful. In late post-operative period, three patients had surgical site infection and one patient had acute wound failure and was managed conservatively initially and later on after 3 months, planned ventral wall hernia repair was done satisfactorily. Postoperative fever was noted in two patients and one patient had long lasting paralytic ileus. Respiratory tract infection developed in two patients and one patient died because of severe sepsis [Table 2]. None of our patients developed biliary fistula or thromboembolism. The hospital stay was in the range of 6–12 days.

After patch repair, for 4–6 days, the patients were given intravenous therapy with antibiotics. On discharge, the patients were given triple antimicrobial therapy for eradication of *H. pylori* and proton-pump inhibitors were given for 4 weeks. In 6 months follow up, none of the patients had symptom recurrence.

DISCUSSION

Duodenal ulcer perforation is a common surgical emergency in our part of the world. The overall reported mortality rate varies between 1.3 and nearly 20%^[6-8] in different series, and recent studies have shown it to be around 10%.^[6] Factors such as advancing age,

concomitant disease, pre-operative shock, size of the perforation, delay in presentation, and operation have all been defined by various authors to be risk factors for mortality in such a situation.^[6-8] Although the size of a perforation is an important measure in determining the outcome, a review of literature failed to reveal, any accepted definition of either small or giant perforations of duodenal ulcers. Neither could we come across any specific recommendations regarding the management of giant/large perforations, which are said to be “difficult” to manage and have anecdotally been associated with high leak rates and mortality. This is in contrast to the well-accepted and documented definition of giant duodenal ulcers (more than 2 cm in size), which may or may not perforate, but are usually considered to be an indication for definitive, elective ulcer surgery.^[14,15]

The definitive surgery has declined very much because medical therapy for *H. pylori* eradication has resulted in decreased incidence of PUD and peptic perforation. The geriatric patients with comorbidities are unfit for definitive surgery and surgeons with limited experience also contribute to decline in definitive surgery for PUD.^[7]

Perforation of peptic ulcer is conventionally treated by primary closure and covered by omentum. The classical Graham patch technique described by Grahams in 1937 can be used.^[16] However, modified Graham's technique makes use of pedicled omentum or omentoplasty to cover the peptic perforation closed by sutures. The use of vascularized pedicled omentum helps in sealing the perforation and reduces the risk of cutting through of sutures used for perforation closure; neovascularization accelerates ulcer healing and prevents recurrence.^[17]

Conservative treatment of peptic perforation can be done in selected cases with prolonged hospital stay and high mortality rate if conservative treatment fails. Misdiagnosis of gastric carcinoma is likely if surgical treatment is not opted. Hence, the conservative treatment should be reserved for geriatric patients with serious comorbidities.^[18]

Simple closure of peptic perforation can be done by interrupted suture using free omental patch. Simple closure of perforation is done with a pedicled omentum plug drawn into perforation after which sutures are tied over it. This modification of pedicled omentum instead of free omental graft was used in this study with excellent results and outcome.^[19]

In the past three decades, there has been a paradigm shift from radical anti-ulcer procedures to minimally invasive laparoscopic surgery. The laparoscopic surgery is time consuming but reduces morbidity and mortality. Laparoscopic omental patch repair of perforated duodenal

Table 2: Post-operative complications (n=40)

Complications	Frequency	Percentage
Surgical site infections	3	48.0
Post-operative pyrexia	2	36.0
Pulmonary infection	2	28.0
Intra-abdominal abscess	0	--
Wound dehiscence/burst abdomen	1	20.0
Reperforation	0	--
Septic shock/death	1	12.0
Enterocutaneous fistula	0	--
Peritonitis	0	12.0
Incisional hernia	1	8.0
Cardiopulmonary arrest	0	--
Acute renal failure	0	--
Paralytic ileus	1	4.0

ulcers has emerged as a useful tool in selected patients. As compared to open laparotomy pedicled omentum repair, the laparoscopic omental patch closure in selected patients has short hospital stay, less post-operative pain, and early return to work.

Wong *et al.* evaluated the surgical outcomes of laparoscopic omental patch repair versus open repair for perforated peptic ulcer in pediatric patients and concluded that omental patch repair is a feasible surgical option and is associated with satisfactory outcomes.^[20] Chernookov *et al.* analyzed the results of surgical treatment with perforated gastric and duodenal ulcers in 782 patients. The results of various operations done in these patients such as palliative operations, vagotomy with ulcer excision and pyloroplasty, various types of stomach resections were analyzed for the quality of life. The quality of was very good in stomach saving surgery particularly gastric vagotomy with excision of ulcer and pyloro- or duodenoplasty.^[21] Kocer *et al.* stated that peptic ulcer perforation if diagnosed quickly and treated early, the mortality ranges from 6% to 14% in various studies.

In our study, a proper pre-operative resuscitation was done. The pedicled omental patch technique was used in all the patients and an excellent surgical outcome achieved. None of our patients had duodenal blow out with fistula formation so there are less chances of biliary fistula formation with this technique. Wound infection also occurred in three patients which was minor and healed with antibiotics. There was only one mortality in this series.

CONCLUSION

We conclude that the surgery for perforated peptic ulcer should use modified Graham's repair using pedicled omentum giving excellent results in terms of healing, morbidity, and mortality. This procedure can be done by upper abdominal laparotomy or laparoscopically. However, modified Graham's procedure is associated with long operative time and higher incidence of surgical site infection which can be reduced if the procedure is done by skilled surgeons. Therefore, upper abdominal laparotomy for perforated peptic ulcer should be the first choice in the present clinical settings.

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