# **Original Research Article**

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# Modified Graham's repair for peptic ulcer perforation: reassessment study

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### **ABSTRACT**

**Background:** Peptic perforation is an emergency and requires urgent surgical treatment. Many modalities of treatment are available ranging from conservative treatment to laparoscopic repair. There is no consensus on treatment of perforated pylorodudenal ulcer which can be treated with conservative treatment, simple closure of ulcer, closure of ulcer with free omentum, closure of perforation with use of pedicled omentum, definitive treatment with truncal vagotomy and drainage procedures or parietal cell vagotomy. However best treatment is still to be decided.

**Methods:** This study was conducted in department of surgery 60 patients presenting with peptic perforation in last three years. All patients with duodenal perforation in first part (D1) were included in the study. Pyloric perforations, multiple perforations, traumatic perforations and severe co-morbid condition were excluded from study. A pedicled omentum was used in the repair of duodenal perforation. Immediate and late postoperative complications were recorded. The patients were followed for three months.

**Results:** Out of 60 cases there were 50 male patients and 10 female patients. The majority of male patients were in the middle age group between 35 to 45 years of age and the female patients were of older age group between 40 to 65 years of age. These patients presented with history of acute pain abdomen in the epigastric region. All the patients underwent modified Graham's patch repair. In postoperative period, two patients had burst abdomen on fourth postoperative day. Biliary fistula formation occurred in 2 patients. Wound infection occurred in 4 patients and the hospital stay was 5 to 9 days. There was no mortality recorded in this series.

**Conclusions:** In summary, 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.

**Keywords:** Duodenal perforation, Graham's patch, Modified Graham's repair, Pedicled omentoplasty, Peptic perforation

# INTRODUCTION

Peptic ulcer perforation is a common life threatening emergency and requires urgent surgical intervention.<sup>1</sup> Many modalities of treatment are available ranging from nonoperative option to laparoscopic repair. However best treatment is still to be decided. For last many decades,

there is no consensus on treatment of perforated pylorodudenal ulcer which can be treated with conservative treatment, simple closure of ulcer, closure of ulcer with free omentum, closure of perforation with use of pedicled omentum, definitive treatment with truncal vagotomy and drainage procedures or parietal cell vagotomy.<sup>2</sup> The medical therapy for peptic ulcer has

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proved to be very effective treatment but complication of perforation does occur. Conservative treatment has a limited role.<sup>3</sup> Studies have suggested that if signs of peritonitis are present the exploratory laparotomy should be done. 4 This should be done within 12 hours to avoid poor outcome.5 Various surgical options are available and choice depends on duration of peritonitis, size of perforation, past history of symptomatic peptic ulcer disease and co-morbid conditions. <sup>6</sup> The surgical treatment is the method of choice but the changing trend is towards minimum invasive surgery due to effective antibiotics. Laparoscopic closure of perforated peptic ulcer is increasingly being performed.<sup>7</sup> Omentum has still a role in laparoscopic closure of duodenal perforation. A definitive ulcer procedure can be performed if contamination of the upper abdomen is minimal and the patient is stable. This may include a highly selective vagotomy, a truncal vagotomy and pyloroplasty, or vagotomy and antrectomy for a perforated duodenal ulcer.8 The patients with duodenal perforation who present with unstable haemodynamics and gross peritoneal contamination the safest surgery, is a simple closure with a Graham's patch using omentum.<sup>9</sup> This Graham's patch is still relevant and useful in emergency surgery for perforated peptic ulcer in selected patients.<sup>10</sup> The aim of this study is evaluate the operative risks and revisit the Graham's patch technique in patients with duodenal perforation.

#### **METHODS**

This study was conducted in department of surgery 60 patients presenting with peptic perforation in last three years.

## Inclusion criteria

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

## Exclusion criteria

Pyloric perforations, multiple perforations, traumatic perforations and severe co-morbid condition were excluded from study.

A detailed clinical history was taken in all the patients. The history regarding risk factors and co-morbid conditions was also taken. These patients were investigated by haematological investigations like complete haemogram, serum electrolytes, blood urea, serum creatinine and blood sugar. Ultrasound of abdomen and X-ray abdomen in standing and lying position was done. Resuscitation was done in all the patients by transfusion of crystalloids 20-40ml/kg of body weight. Good urinary output and stable haemodynamics was ensured in all the patients before being taken for surgery. Triple antibiotics using broad spectrum antibiotic, an aminoglycoside and metronidazole were given in all the patients. Under general anaesthesia, an upper midline

incision is given. The site and size of perforation was identified. Freshening of margins and taking this tissue as biopsy was done in all cases (Figure 1). Several full thickness simple silk sutures are placed across the perforation, and pedicled omentum is placed over the perforation. The silk sutures are secured. The repair can be tested by putting the warm saline in peritoneal cavity and insufflating air into stomach through nasogastric tube; if there is no air leak the perforation has sealed. Through peritoneal washing were done and tube drain was left in the pelvic cavity. The modification of the Graham's patch has been used in this study. Silk sutures are passed between edges of perforation and tied to close the perforation (Figure 2). A pedicle of omentum based on right omental artery is brought between these sutures and these sutures are tied again with pedicle of omentum between knots over the perforation (Figure 3).

After cleaning the peritoneum two drains are inserted one in hepatorenal pouch and another in pelvic cavity. The midline incision was closed in single layer using monofilamentous suture polypropylene suture. Preoperative nasogatric decompression using Ryle's tube initiated during resuscitation period postoperative period till the paralytic ileus continues. Similarly preoperative resuscitation with intravenous crystalloid infusion should be continued in the postoperative period. Adequate urinary output, mean arterial pressure, central venous pressure and acid base balance were recorded. The observations made in the postoperative period regarding pain, wound infection, hospital stay. The follow up was done for three months.

#### RESULTS

Out of 60 cases there were 50 male patients and 10 female patients with ratio 5:1. The majority of male patients were in the middle age group between 35 to 45 years of age and belonged to lower strata particularly labourers. The female patients were of older age group between 40 to 65 years of age and non-working women. These patients presented with history of acute pain abdomen in the epigastric region. Only a small percentage of patients have either past history of ulcerative dyspepsia. Majority of these patients present with acute free perforation. The 43 male patients group gave history smoking or alcohol with occasional use of non-steroidal anti-inflammatory drugs. The rest of 7 patients did not give history of any abuse. The 8 female patients gave history of use of non-steroidal antiinflammatory drugs for joint pains or oral steroids for asthmatic problem. The rest of 2 female patients gave history of none of these. The plain X-ray abdomen in erect position revealed free gas under diaphragm in 58 patients. In 2 patients, no free gas was seen under diaphragm. The preoperative resuscitation of these patients was done using crystalloid solutions. The hemodynamic stability and good urine output was achieved in all the patients. Two patients could achieve a delayed hemodynamic stability. Exploratory laparotomy

was done in all these patients under general anaesthesia. All the patients underwent modified Graham's patch repair as described in methods.



Figure 1: Duodenal perforation.

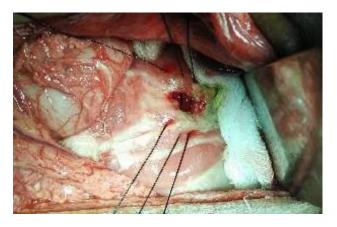


Figure 2: Interrupted suture passed.

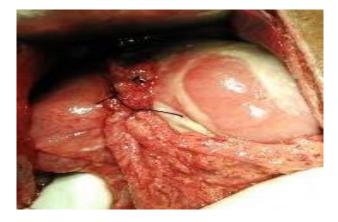


Figure 3: Pedicled omentum used for closure of perforation.

Immediate postoperative period in all these patients was uneventful. In late postoperative period, two patients had burst abdomen on fourth postoperative day and resuturing was done in these patients. Biliary fistula formation occurred in 2 patients and these were reoperated

necessitating partial gastrectomy with gastrojejunostomy. Wound infection occurred in 4 patients treated with systemic antibiotics and local dressings. The minimum hospital stay varied from 5 days to 9 days except the two patients who were reoperated. After graham patch for 4-7 days the patients of intravenous therapy with antibiotics. These patients were given triple antimicrobial therapy for eradication of *H. pylori*. This oral antimicrobial therapy was given for three weeks. In 3 months follow up none of the patients had become symptom of epigastric pain or recurrence of peptic perforation. There was no mortality in this series.

#### DISCUSSION

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.<sup>11</sup> However modified Graham's technique makes use of pedicled omentum or omentoplasty to cover the peptic perforation closed by sutures. The use of vascularised pedicled omentum helps in sealing the perforation and reduces the risk of cutting through of sutures used for perforation closure; neovascularisation accelerates ulcer healing and prevents recurrence.12 Minimum invasive treatment or laparoscopic closure of peptic perforation is gaining popularity because of less pain, decreased morbidity and reduced hospital stay. But this takes more operative time and trained personnel are not available everywhere; so laparoscopic surgery repair of perforated peptic ulcer yet is not the procedure of choice in majority of hospitals. The laparoscopic suturing techniques take much longer time as compared to open surgical techniques as the inflamed tissue around peptic perforation is quite friable.<sup>13</sup> Still in experimental stage stitching and pedicled omentoplasty is being replaced by use of a glued patch of biodegradable material to be applied on outer surface of peptic perforation. The application of this patch avoids suturing of friable edges of peptic perforation, thus saving valuable operative time.14

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. So the conservative treatment should be reserved for geriatric patients with serious comorbidities.<sup>15</sup> On exploratory laparotomy, the site of perforation is decided whether duodenum or gastric. Multiple perforations can occur. In gastric ulcer perforation, a biopsy from the margin of perforation is must to rule out malignancy. 16 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. 17 The definitive surgery has declined very much because medical therapy

for H. pylori eradication has resulted in decreased incidence of peptic ulcer disease and peptic perforation. The geriatric patients with co-morbidities are unfit for definitive surgery and surgeons with limited experience also contribute to decline in definitive surgery for peptic ulcer disease.<sup>18</sup> Graham's concluded that routine gastroenterostomy was unnecessary and that omental patch was sufficient for closure of perforated duodenal ulcer. The closure of perforated duodenal ulcer should provide adequate closure and control of acid production. The control of acid production is conventionally is done vagotomy and drainage procedure gastrojejunostomy/pyeloroplasty or highly selective vagotomy. 19 This control of acid production is better achieved with PPIs (proton pump inhibitors) very easily. Most of duodenal can be treated with well with medical therapy. So the best approach to perforated duodenal ulcer can be operative repair by omental patch closure with medical control of acid secretion by use of PPIs in postoperative patients. The eradication of Helicobacter pylori can be achieved with medical therapy thereby justifying only omental patch closure in perforated duodenal ulcer.<sup>20</sup> Fallat ME studied 67 patients operated for perforated peptic ulcer including Graham closure that is plication with omentum in 27 patients, vagotomy and pyloroplasty in 32 patients or vagotomy and antrectomy in 8 patients. Mortality was high with simple closure only in patients with long duration or co-morbidities. Graham's closure is associated with rebleeding, perforation and obstruction. This procedure is safe and produces excellent long term results.<sup>21</sup> Tsugawa K et al studied surgical procedures for peptic perforation in elderly patients and concluded that simple closure and vagotomy is recommended because of low mortality except in cases with giant perforation of more than 20mm.22

In last three decades, a paradigm shift in treatment in treatment of peptic ulcer perforation from radical antiulcer procedures to replacing open technique with laparoscopic surgery.

The laparoscopic surgery is time consuming but reduces morbidity and mortality.

Laparoscopic omental patch repair of perforated duodenal 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 postoperative 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.<sup>23</sup> Chernookov et al analysed the results of surgical treatment with perforated gastric and duodenal ulcers in 782 patients. The results of various operations done in these patients like palliative operations, vagotomy with ulcer excision and pyloroplasty, various

type of stomach resections were analysed for quality of life. The quality of was very good in stomach saving surgery particularly gastric vagotomy with excision of ulcer and pyloro- or duodenoplasty.24 Kocer B et al stated that peptic ulcer perforation if diagnosed quickly and treated early, the mortality ranges from 6%-14% in various studies. However mortality increases in very old patients, associated co-morbidities, shock, delayed diagnosis and treatment for more than 24 hours. The better antibiotics and resuscitation have improved the prognosis in perforated peptic ulcer but in geriatric patients with co-morbidities still have a very high mortality rate of about 41%.<sup>25</sup> In this study a proper selection of patients and resuscitation was done. The pedicled omental patch technique was used in all the patients with better surgical outcome. Only two 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 two patients which was minor and healed with antibiotics. There was no mortality in this series.

#### **CONCLUSION**

In summary, 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. The need for definitive surgery has declined very much due to effective medical therapy for eradication of *H. pylori* and reduced recurrence rate of peptic ulcer disease. However this procedure can be done by upper abdominal laparotomy or laparoscopically. The laparoscopic procedure has the benefit of less pain, early mobility and reduced morbidity. However this procedure is associated with long operative time and higher incidence of re-leakage 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 present clinical settings.

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institutional ethics committee

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