ORIGINAL ARTICLE

STUDY OF THE ROLE OF JEJUNAL SEROSAL PATCH IN THE MANAGEMENT OF LARGE GASTRODUODENAL PERFORATIONS

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Abstract

Background: Duodenal ulcer perforations are a common surgical emergency and a common cause of peritonitis in Egypt. The worldwide mortality rate varies between 1.3 to 20% in different series.

Methods: This study was carried out on 25 patients with large (more than 1 cm in size) gastric or duodenal ulcer perforations presented to the Emergency Department at the Main Alexandria University Hospital over a period of six years from May 2005 to April 2011. Patients with large perforations were sorted into two groups according to a newly suggested classification that depends on the size of ulcer perforation noted intra-operatively: Group I (1 cm to 2 cm); and Group II (2 cm to 3 cm). The technique of jejunal serosal patch was used in 20 cases.

Results: Most perforations were in the 1st part of the duodenum (80%). Perforations greater than 1 cm and less than 2 cm in size were accounting for 88% (22 cases) while perforations greater than 2 cm and less than 3 cm in size were seen in 12% (3 cases). Overall, the commonest surgery performed was jejunal serosal patch using a loop of the jejunum in 17 of the 22 cases in Group I; and the 3 patients in Group II. Morbidities were found in 52% (13/25). The hospital mortality in our series was 12 % (3 cases).

Conclusion: Large gastroduodenal perforations can safely be closed using a jejunal loop as serosal onlay patch.

Keywords: Large gastroduodenal perforations, jejunal serosal patch.

INTRODUCTION

Duodenal ulcer perforations are a common surgical emergency and a common cause of peritonitis in Egypt.

The worldwide mortality rate varies between 1.3 to 20% in different series, and recent studies have shown it to be around 10%.[1-3] Commonly, duodenal ulcer perforations are less than 1cm in greatest diameter, and as such, are amenable to closure by omentopexy.[4]

The classic pedicled omental patch that is performed for the 'plugging' of these perforations was first described by Cellan-Jones[5] in 1929, 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.[6] 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.[4] However, occasionally, large perforations (more than 1 cm in size) of the duodenum are considered particularly hazardous because of the extensive duodenal tissue loss and surrounding tissue inflammation, which are said to preclude simple closure using omental patch, often resulting into post-operative leak or gastric outlet obstruction.[4,7,8] Here, other surgical options such as partial gastrectomy, jejunal serosal patch, jejunal pedicled graft, free omental plug, suturing of the omentum to the nasogastric tube, proximal gastrojejunostomy, or, even, gastric disconnection may be deemed necessary for adequate closure.[7-12]

Very little data is available in literature regarding the definition, incidence, and the management of large perforations of duodenal ulcers; it is the perforations that are larger than 1 cm in size. The size of 'giant' sized perforations has arbitrarily been defined by various authors as being greater than 0.5 cm,[11] 1 cm,[4,8] or 2.5 cm[10] in greatest diameter. Duodenal perforations can be classified into three main groups (1) small perforations that are less than 1 cm in size, and have the best outcome; (2) large perforations, that have a size between 1 cm and 3 cm; and, (3) giant perforations that exceed 3 cm in size.[13] The usage of the word 'giant' for a duodenal perforation should be restricted to such large defects, where omentopexy may be deemed unsafe, and other options may be thought to be necessary. A giant perforated peptic ulcer is defined arbitrarily as any perforation > 2.5 cm in size, the edges of such ulcer are too friable to be safely closed by simple closure. The mortality rate for giant perforated peptic ulcer reaches 17.5 – 40.5%. At such times surgeons have to use other techniques to manage the condition. The most common method employed is partial gastrectomy, which has an increased mortality rate in the elderly. The proper surgical procedure for giant duodenal ulcers remains controversial.[10,14-17]

This paper represents our experience with the management of this subset of gastroduodenal ulcer perforations over a period of six years from May 2005 to April 2011. Over this period, twenty five patients were treated for gastroduodenal ulcer perforations measuring more than one centimetre in diameter.

PATIENTS AND METHODS

This study was carried out on 25 patients with large (more than 1 cm in size) gastric or duodenal ulcer perforations presented to the Emergency Department at the Main Alexandria University Hospital. The twenty five patients underwent emergency surgery for duodenal or gastric perforations at our hospital over a period of six years. All patients were subjected to full history taking, thorough clinical examination, routine laboratory work up, standing plain abdominal X-ray, abdominal ultrasound, and computed tomography (CT) scan whenever indicated.

Patients with large perforations (more than 1 cm) were sorted into two groups according to a newly suggested classification that considers the size of the perforation noted intra-operatively: Group I (1 cm to 2 cm); and Group II (2 cm to 3 cm). No cases of giant perforations (more than 3 cm) and no cases of multiple perforations were encountered in our study.

Most perforations were in the 1st part of the duodenum (20 cases, 80%) while there were 5 cases (20%) of perforated gastric ulcer (prepyloric). Perforations greater than 1 cm and less than 2 cm in size were accounting for 88% (22 cases) while perforations greater than 2 cm and less than 3 cm in size were seen in 12% (3 cases).

Patients were managed by jejunal serosal patch in 20 cases and omental patch in 5 cases (the first cases in our study).

The technique of jejunal serosal patch; a loop of jejunum was brought up to the perforation and sutured to the defect, using interrupted absorbable sutures (Fig. 1).

The technique of omentopexy (omental patch closure); a total of three sutures were placed onto the normal healthy duodenum on either side of the perforation and away from it, a strand of omentum (the omentum is mobilized on its pedicle from the colon) was placed directly onto the perforation, and the sutures were knotted above this. No attempt was made to close the perforation prior to placing the omentum as a graft.

All patients were prospectively analyzed for patient details, intra-operative findings, surgery performed, post-operative stay, morbidity and mortality. Patients were followed up postoperatively for development of complications.

Statistical analysis: The SPSS version 12.0.1 statistical package was used for statistical analysis. Values for qualitative variables were given as percentages and those for quantitative variables were given as medians and ranges. Survival curves were calculated using the Kaplan-Meier method.

RESULTS

Twenty five patients (21 men, 4 women) underwent emergency surgery for gastroduodenal ulcer perforations at our hospital over six years, giving a male to female ratio of 5.25: 1.

The majority of patients presented with small gastroduodenal perforations (less than 1 cm in size as measured intraoperatively). They underwent simple primary closure and omentopexy and were excluded from our study.

Overall, the commonest surgery performed was jejunal serosal patch in 17 of the 22 cases in Group I; and the 3 patients in Group II.

Post-operative leakage was evident by simply examining the drains and by abdominal ultrasound. Three patients (12%) suffered from leakage following surgery; one following omental patch in group I and 2 patients following jejunal serosal patch (one from each group). The patient of group II, who presented postoperatively by duodenal leak died on the fifth post-operative day. The other 2 patients of duodenal leak remained well with control of sepsis and good nutritional support (TPN) and were discharged on the 20thpost-operative day.

Overall, patients with large perforations (group II) had increased hospital stay and morbidity than group I. The hospital stay was nearly double for these patients (23.67 days versus 12.5 days). This therefore, lends support to the popular opinion that larger perforations have a worse outcome.

Morbidities were found in 52% (13/25), some of them presented with more than one complication. The common morbidity encountered was chest infection (7 cases), wound infection (5 cases), biliary leak (3 cases), intra-abdominal abscess (one case), renal failure (one case), upper gastrointestinal bleeding (one case), cardiac complication (one case).

Hospital mortality was 12% (3 cases). The first case was from group II and suffered from post-operative duodenal leak and peritonitis after jejunal serosal patch closure of duodenal ulcer perforation. He died on the 5th post-operative day from sepsis. The second case from group I was admitted before surgery with multiple attacks of haematemsis. Following control of his general condition and omental patch closure of the perforation he suffered from severe chest infection and died on the 12thpostoperative day. The third case from group I was admitted with neglected peritonitis 5 days before jejunal serosal patch closure of gastric ulcer perforation. He was hypertensive and suffering from cardiac failure and despite control of his blood pressure and cardiac condition, he died on the 20th postoperative day. Table 1 gives the details of the two groups.

The overall actuarial one-year survival in our patients was 80% at one year and 72% at two years.

The survival curves following the management of gastroduodenal perforations are shown in (Figs. 2-4).

Table 1. Clinical characteristics and postoperative complications of the 25 patients.

Patients	Large perforations (1-3 cm)	
	Group I (1-2 cm perforation)	Group II (2-3 cm perforation)
Number of cases	22 (88%)	3 (12%)
Mean age (years)	49.6	58.3
Male / female	18:4	3:0
Average duration of symptoms	2.2 days	4.3 days
Gastroduodenal perforations	Duodenal (18), gastric (4)	Duodenal (2), gastric (1)
Operation	Jejunal serosal patch (17) Omental patch (5)	Jejunal serosal patch (3)
Morbidity:	10	3
Chest infection	5	2
Wound infection	3	2
Biliary (duodenal) leakage	2	1
Renal failure	1	0
Intra-abdominal abscess	0	1
Upper gastrointestinal bleeding	1	0
cardiac complication (AF)	1	0
Mortality	2	1
Average postoperative hospital stay	12.5 days	23.67 days

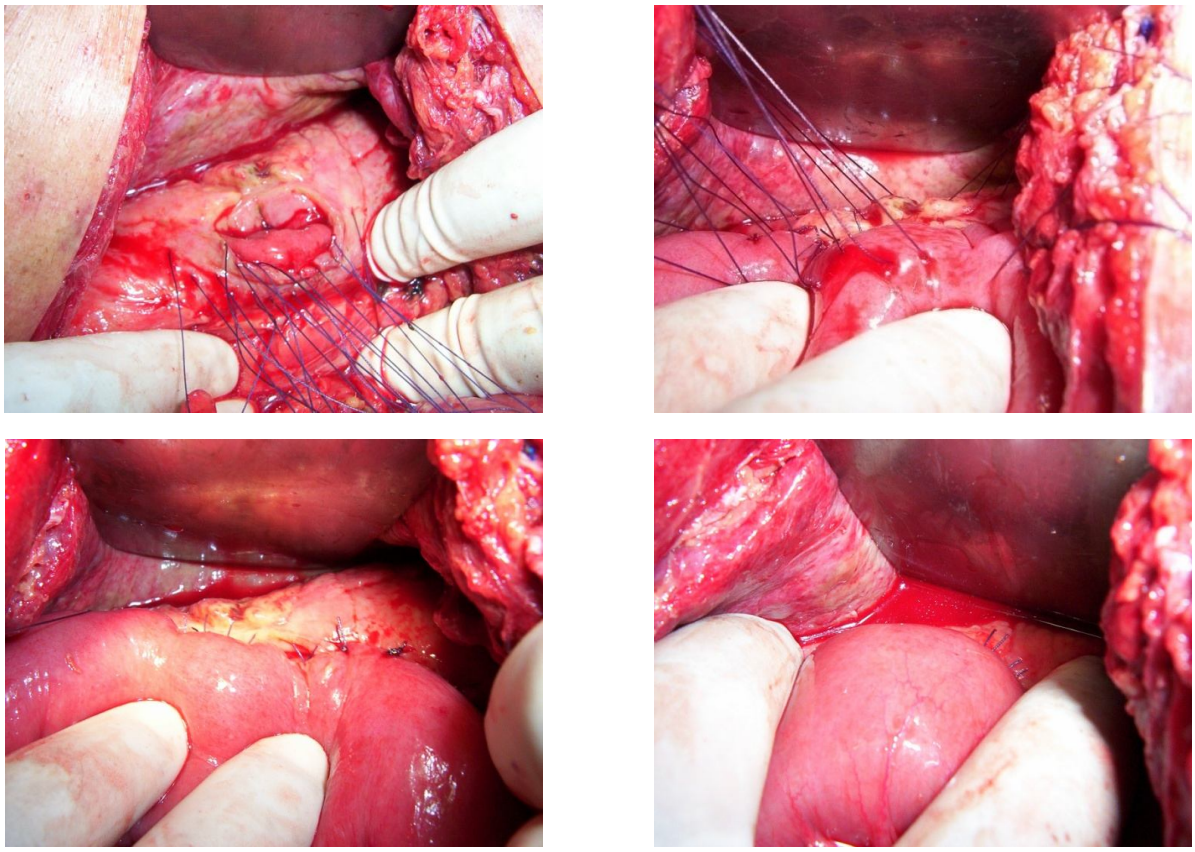

Fig 1. Steps of jejunal serosal patch for large prepyloric gastric perforation.

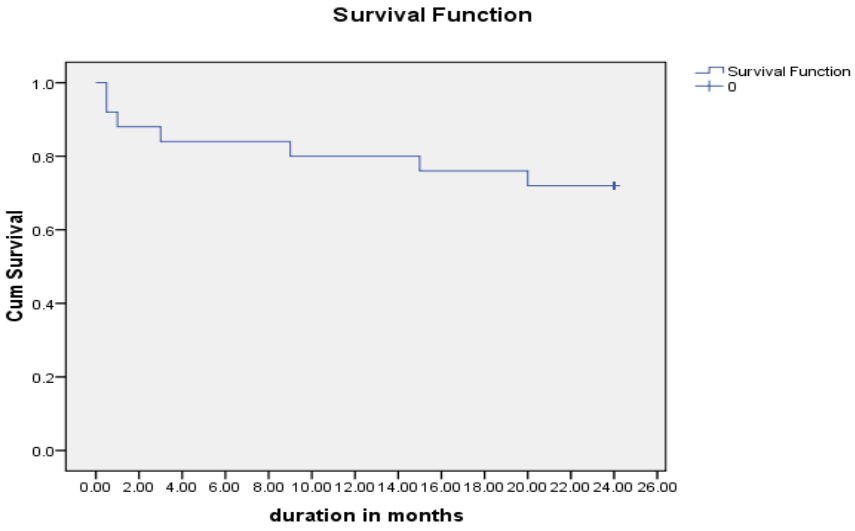

Fig 2. Overall actuarial survival curve for all patients after management of gastroduodenal perforations (2-year Kaplan-Meier's survival curve).

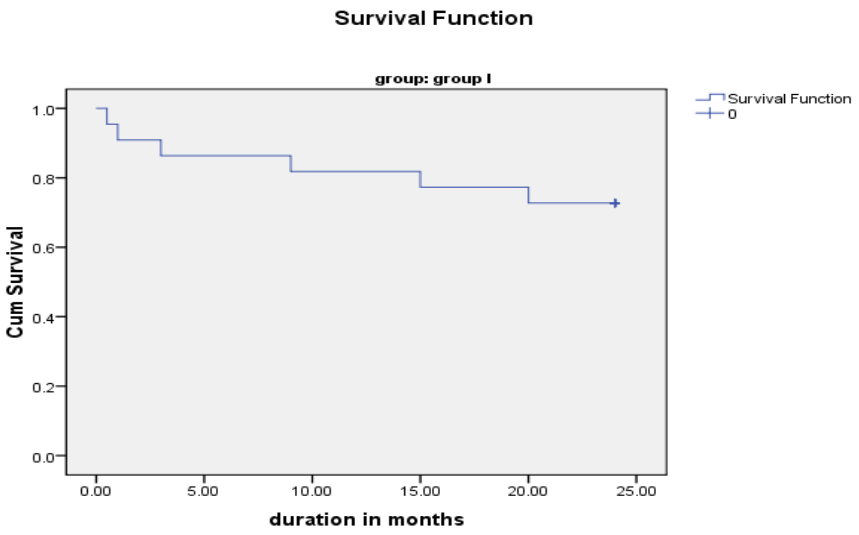

Fig 3. The actuarial survival curve for group I (22 patients).(2-year Kaplan-Meier's survival curve, 72.7%).

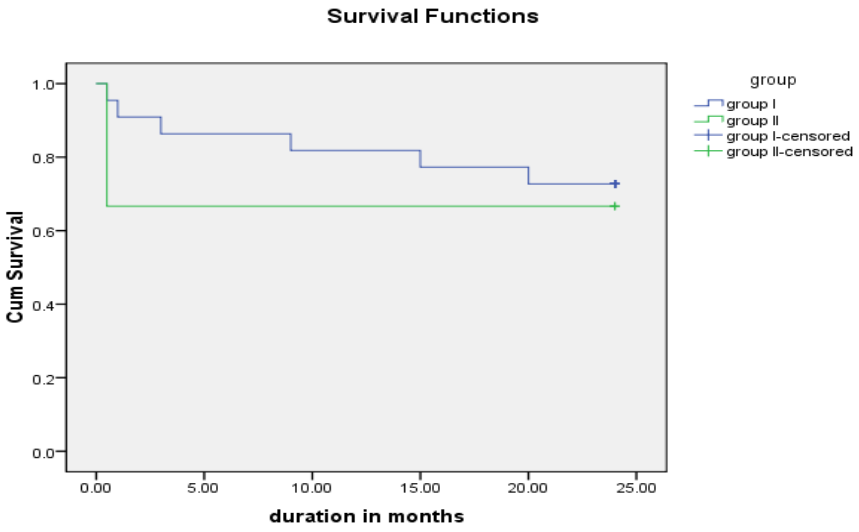

Fig 4. The actuarial survival curve for group II (3 patients). (2-year Kaplan-Meier's survival curve, 66.6%).

DISCUSSION

Duodenal ulcer perforations are a common surgical emergency. Factors such as advancing age, concomitant disease, 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.[1-3]

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. 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.[12,18] Commonly, duodenal ulcer perforations are less than 1 cm in greatest diameter, and as such, are amenable to closure by omentopexy.[4]

Duodenal perforations are classified into three groups, small perforations that are less than 1 cm in size, and have best outcome, large perforations (1 cm to 3 cm), and giant perforations that exceed 3 cm in size.[13]

Leak after repair of duodenal perforation is due to multiple factors. Chronic ulcer, old age, hypoalbuminemia and prolonged peritonitis have been incriminated.[19,20] The size of the perforation may also contribute to the development of fistula.[21-25]

In the present study, morbidity rate was found in 52% (13/25), the common morbidity encountered was chest infection in 28% of cases. Three patients (12%) suffered from leak following closure of the perforation; one following omental patch and 2 patients following jejunal serosal patch. One patient died on the fifth post-operative day. The other 2 patients of duodenal leak remained well with conservative treatment with TPN.

In the absence of any specific definition and guidelines regarding the management of such large perforations in literature, different authors have recommended varied surgical options from time to time, based on their experience and research. These have included resection of the perforation bearing duodenum and the gastric antrum in the form of a partial gastrectomy, with reconstruction as either a Billroth I or II anastomosis.[12]

Others have recommended conversion of the perforation into a pyloroplasty, or, closure of the perforation using a serosal patch or a pedicled graft of the jejunum, or, the use of a free omental plug to patch the defect, and even, suturing of the omentum to the nasogastric tube.[4,8-12]

Proximal gastrojejunostomy and/or vagotomy may be added to these procedures to provide diversion and a definitive acid reducing procedure respectively.[12] But, each of these procedures not only prolongs the operating time, but also requires a level of surgical expertise that may not be available in the emergency.[10]

In fact, Sharma et al also reported the success of the omental plug in perforations of duodenal ulcers more than 2.5 cms in size; only, they preferred using a free graft of the omentum rather than a pedicled one.[10] We feel that mobilization of the omentum on its pedicle from the colon, and placement of sutures into the normal duodenum away from the perforation makes the performance of omental patch safe in the presence of small sized perforations.

In this study; the leak rates and mortality of the two groups suggesting that jejunal serosal patch may be considered as the procedure of choice in large sized perforations.

In the present study, over a period of six years, twenty five patients were treated for gastroduodenal ulcer perforations measuring more than one centimetre in diameter. The 22 (88%) surviving patients were discharged from our hospital with the advice for a subsequent 'ulcer-curing' operation after six months. Patients with H. pylori infections were advised to receive the proper treatment. Delay in doing the definitive surgery for the ulcer may be dangerous. The overall one-year survival in our patients was 80%.

In the emergency setting, such patients are often seriously ill and it is not advisable to perform major surgical procedures on them and so, we decided on jejunal serosal patch closure for our patients because of the large perforations and the patients were too ill for a major procedure. The type of surgical repair should be individualized taking into consideration the extent of the gastroduodenal perforation and the co-morbid conditions of the patients. The main consideration was 'damage control' over any definitive reconstruction.

In conclusion large gastroduodenal perforations (1-3 cm in size) can safely be closed using a jejunal serosal patch in a critically ill patient. The procedure was done within a short period of time with a successful outcome. The procedure is simple and easy to master and avoids the performance of a major resection in a patient who is already compromised.

The tube drain postoperatively may offer security to the operating surgeon, creating a controlled duodenal fistula in case of a post-operative leak. Conservative treatment with TPN of duodenal leak and fistula is the principal line of management which gives best results, followed by late surgery in selected patients.

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