

Management of perforated duodenal ulcer at a tertiary care hospital

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ABSTRACT

Introduction: Multiple etiologies are associated with duodenal perforations such as peptic ulcer disease, iatrogenic causes and trauma. Computed tomography with intravenous and oral contrast is the most valuable imaging technique to identify duodenal perforation. In some cases, surgical exploration may be necessary for diagnosis. **Materials and Methods:** The case files of all the patients were retrospectively analyzed for patient particulars, intra-operative findings, surgery performed, post-operative stay, morbidity and mortality. The groups were then compared with each other in terms of age, leak rates, hospital stay, morbidity, mortality and the surgery performed. Statistical analysis was done using the *chi-square* and the *t-test* by an independent comparison of each group singly against another by a statistician who was blinded to the study. A *p* value of < 0.05 was taken as significant. **Results:** The majority of patients came under the 'small' perforation group, but there were 38 patients (23.46%) with large perforations as per our definition. These patients had a higher age of presentation (47.18 years) than the patients with smaller perforations (39.46 years). Giant perforations, or perforations greater than 3 cms in size were seen only 2 cases, accounting for a small percentage (1.28%) of all cases seen. **Conclusion:** The type of treatment should be individualized and depends on the mechanism of injury, the timing, location and extent of the injury and the clinical state of the patient.

Keywords: Duodenal ulcers, Management, operative outcome

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INTRODUCTION

Over the last two decades there have been a number of advances in the management of perforated duodenal ulcer that have suggested that the morbidity and mortality of the disease might be decreased. These include risk stratification to define patients suitable for various treatment protocols, an expanded role for non-operative treatment, a developing role for laparoscopic surgery and more precise identification of those patients suitable for immediate definitive ulcer management. The earliest operative description was made by Mikulicz in 1884 but the first successful operation for a perforated duodenal ulcer was not until 1894.

Ulceration occurs due to acid peptic damage to the gastroduodenal mucosa, resulting in mucosal erosion that exposes the underlying tissues to the digestive action of gastroduodenal secretions. This pathology was traditionally related to a hypersecretory acid environment, dietary factors and stress. However, the increasing incidence of the *Helicobacter pylori* infection, the extensive use of NSAIDs, and the increase in alcohol and smoking abuse have changed the epidemiology of this disease. Despite a sharp reduction in incidence and rates of hospital admission and mortality over the past 30 years,¹⁻⁷ complications are still encountered in 10–20% of these patients.^{8,9} Complications of peptic ulcer disease include perforation and bleeding and improvement in medical management has made obstruction from chronic fibrotic disease a rare event. A recent review on the epidemiology of complicated peptic ulcer disease⁹ found that hemorrhage was by far the most common complication of peptic disease, with a reported annual incidence of hemorrhage in the general population ranging from 0.02 to 0.06%, with sample size-weighted average 30-day mortality of 8.6%. Reported annual incidence of perforation ranges from 0.004 to 0.014%, with sample size-weighted average 30-day mortality of 23.5%. Although perforation is less common, with a perforation: bleeding ratio of approximately 1:6, it is the most

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common indication for emergency operation and causes about 40% of all ulcer-related deaths.¹⁰

The pattern of perforated PUD has been reported to vary from one geographical area to another depending on the prevailing socio-demographic and environmental factors.¹¹ In the developing world, the patient population is young with male predominance, patients present late, and there is a strong association with smoking.¹² In the west the patients tend to be elderly and there is a high incidence of ulcerogenic drug ingestion.¹³ The diagnosis of perforated PUD poses a diagnostic challenge in most of cases. The spillage of duodenal or gastric contents into peritoneal cavity causing abdominal pain, shock, peritonitis, marked tenderness and decreased liver dullness offers little difficulty in diagnosis of perforations.¹⁴ The presence of gas under the diaphragm on plain abdominal erect X-ray is diagnostic in 75% of the cases.¹⁵ Since the first description of surgery for acute perforated peptic ulcer disease, many techniques have been recommended. The recent advances in antiulcer therapy have shown that simple closure of perforation with omental patch followed by eradication of *H. Pylori*

is a simple and safe option in many centers and have changed the old trend of truncal vagotomy and drainage procedures.¹⁶ The definitive operation for perforated PUD is performed by few surgeons. Delay in diagnosis and initiation of surgical treatment of perforated PUD has been reported to be associated with high morbidity and mortality after surgery for perforated PUD.^{16,17} Early recognition and prompt surgical treatment of perforated PUD is of paramount importance if morbidity and mortality associated with perforated PUD are to be avoided.^{17,18} A successful outcome is obtained by prompt recognition of the diagnosis, aggressive resuscitation and early institution of surgical management.

METHODS

The case files of all these patients were analyzed, and the patients were sorted into four groups according to the size of the perforation noted intra-operatively – Group 1 (less than 1 cm perforation); Group 2 (1 cm to 2 cm); Group 3 (2 cms to 3 cms); and, Group 4 (more than 3 cms perforation). No cases of anterior and posterior ulcers, or multiple perforations were encountered while reviewing the operative notes. The technique of omentopexy was essentially the same in all the cases – a total of three sutures were placed onto the normal, healthy duodenum on either side of the perforation, a strand of omentum 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.

The case files of all the patients were retrospectively analyzed for patient particulars, intra-operative findings, surgery performed, post-operative stay, morbidity and mortality. The groups were then compared with each other in terms of age, leak rates, hospital stay, morbidity, mortality and the surgery performed. Statistical analysis was done using the *chi-square* and the *t-test* by an independent comparison of each group singly against another by a statistician who was blinded to the study. A *p* value of < 0.05 was taken as significant.

RESULTS

Of the total of 182 patients that underwent emergency surgery for duodenal ulcer perforations at our hospital over three years, there were 158 males (86.8%) and 24 female (13.1%) patients, giving a male to female ratio of 10.57: 1. The average age of the patients was 40.63 years (range 15 – 82 years), with an almost equal age of occurrence for males (41.50 years) and females (42.73 years).

The majority of patients came under the 'small' perforation group, but there were 38 patients (23.46 %) with large perforations as per our definition. These patients had a higher age of presentation (47.18 years) than the patients with smaller

perforations (39.46 years). Giant perforations, or perforations greater than 3 cms in size were seen only 2 cases, accounting for a small percentage (1.28 %) of all cases seen.

When the small perforation group was compared with the larger perforations, it was found that the large perforations had a higher morbidity ($\chi^2 = 37.4503$, $p < 0.05$), leak rate ($\chi^2 = 4.9117$, $p < 0.05$), and hospital stay (*t* value 5.117, $p < 0.001$) and that this difference was statistically significant. This therefore, lends support to the popular opinion that large perforations have a worse outcome.

Overall, the patients with large perforations (Group B) had significantly increased hospital stay, leak rates, and morbidity (Table 1). The hospital stay was almost double for these patients (13.65 days versus 6.93 days). Although the overall morbidity was 49.71 %, it was much higher in the larger perforations (groups B and C). The common morbidity encountered was chest infections (39 cases), but wound infection (12 cases), biliary leak (08 cases), intra-abdominal abscesses (06 cases), burst abdomen (06 cases), renal failure (02 cases), DIC (04 cases), jaundice and upper gastrointestinal bleeding (01 case each) were also recorded.

DISCUSSION

Factors such as advancing age, concomitant disease, preoperative 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.¹⁹⁻²¹ 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 cms in size), which may or may not perforate, but are usually considered to be an indication for definitive, elective ulcer surgery.^{22,23}

Commonly, duodenal ulcer perforations are less than 1 cm in greatest diameter, and as such, are amenable to closure by omentopexy.²⁴ Our experience does seem to validate this, and this subset of 'small' perforations does seem to have the best outcome. It is the perforations that are larger that have been the cause of much confusion in their definition and management. The size of such 'giant' sized perforations has arbitrarily been defined by various authors as being greater than 0.5 cms,²⁷ 1 cm,^{24,25} or 2.5 cms²⁶ in greatest diameter, but we failed to uncover any specific size in available English language literature beyond which to label

Table 1: Patient data

	Group A – 'Small' (Less than 1 cm)	Group B – 'Large' (1 cm – 3 cm)	Group C – 'Giant' (More than 3 cm)
Number of cases	135 (74.1%)	44 (24.1%)	03 (1.6%)
Average age	40.41 years	48.11 years	38.42 years
Male/Female	110 : 11	38 : 1	3 : 0
Average Duration of Symptoms	2.5 days	3.18 days	3.50 days
Surgery Performed	Omental Patch 119 ** Pyloroplasty 03 *	Omental Patch 30 *** Jejunal Serosal Patch 04 * Antrectomy 04 *	Antrectomy and Billroth II 01 Jejunal Serosal Patch 01
Post-operative Leak	04 (2.9 %)	05 (13.6 %)	-
Morbidity	43	39	02
Post-operative Hospital Stay	6.93 days	13.65 days	6.00 days
Mortality	08 (5.9 %)	07 (15.9 %)	02 (66 %)

these perforations as “giant”. These perforations 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.^{24,25} The tendency to leak may further be aggravated by the high intraluminal pressures, extrusion of the duodenal mucosa through the closure, and, autodigestion by the pancreatic enzymes and bile, thereby further compromising an already sick patient.

CONCLUSION

In the emergency setting, such patients are often seriously ill and it is not advisable to perform major surgical procedures on them. The Cellan-Jones omental patch is simple, can be performed in a relatively short time, and remains dependable even for the closure of large sized perforations. The type of treatment should be individualized and depends on the mechanism of injury, the timing, location and extent of the injury and the clinical state of the patient. Open surgery is still the gold standard for patients that need surgical intervention and most duodenal perforations can be managed with a simple repair of the defect.

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