RETROSPECTIVE ANALYSIS WITH EVALUATION AND MANAGEMENT OF DUODENAL PERFORATIONS
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ABSTRACT

BACKGROUND
Duodenal ulcer perforations are a common surgical emergency. In spite of modern progress in surgical, anaesthetic and management, it is still a life-threatening catastrophe. Due to friable margins and the morbid state of the patient, managing giant duodenal perforation is a challenging task.

MATERIALS AND METHODS
The case of 244 patients who underwent emergency laparotomy for duodenal ulcer perforations over a period of two years (2015-2016) were studied and sorted into groups based on the size of the perforations - one group was defined as ‘small’ perforations (less than 1 cm in diameter), another ‘large’ (when the perforation was more than 1 cm, but less than 3 cm), and the third, ‘giant’ (when the perforation exceeded 3 cm). These groups of patients were then compared with each other in regard to the patient particulars, duration of symptoms, surgery performed and the outcome.

RESULTS
Of the total of 244 patients, there were 178 cases who came under the ‘small’ perforation. There were 48 patients with large perforation and 18 patients with giant perforations. These patients had a significantly higher incidence of leak, morbidity and mortality when compared to those with small and large perforations.

CONCLUSION
There are three distinct types of perforations of duodenal ulcers that are encountered in clinical practice. The first are the ‘small’ perforations that are easy to manage and have low morbidity and mortality. The second are the ‘large’ perforations that are also not uncommon and omental patch closure gives the best results even in this subset of patients. The word ‘giant’ should be reserved for perforations that exceed 3 cm in diameter and these are uncommon.

KEYWORDS
Giant Duodenal Perforation, Omental Patch, Jejunal Serosal Patch, Antrectomy and Billroth II Reconstruction.

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BACKGROUND
Perforation is the most catastrophic complication of duodenal ulcer.1 These are common cause of peritonitis. The classic, pedicled omental patch that is performed for the ‘plugging’ of these perforations was first described by Celann-Jones in 1929,2 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 1937.3 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. However, occasionally, large perforations of the duodenum maybe encountered in which there exists the threat of postoperative leakage following closure by this simple method.4,5 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 gastrojejunosotomy or even gastric disconnection maybe deemed necessary for adequate closure.4,5,6,7 Very little data is available in literature regarding the definition, incidence and the management of giant perforations of duodenal ulcers. This study represents our experience with the management of this subset of duodenal ulcer perforations over a period of two years from January 2015 to December 2016.

MATERIALS AND METHODS
A total of 244 patients underwent emergency surgery for duodenal ulcer perforations at our hospital over a period of two years (January 2015 to December 2016). The case files of all these patients were analysed and the patients were sorted into four groups according to the size of the perforation noted intraoperatively - Group 1 (less than 1 cm perforation); Group 2 (1 cm to 2 cm); Group 3 (2 cm to 3 cm); Group 4 (more than 3 cm).
cm); and Group 4 (more than 3 cm perforation). No cases of multiple perforations were encountered, while study of 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 analysed for patient particulars, intraoperative findings, surgery performed, postoperative 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. P value of <0.05 was taken as significant. It was found that the perforations between 1 cm and 3 cm in size (groups 2 and 3 as above) behaved in a similar manner statistically, and therefore, the patients of these two groups were combined to give a single group. We finally ended up with 3 groups of perforations - Group A (less than 1 cm perforations), Group B (perforations between 1 cm and 3 cm in size), and Group C (more than 3 cm perforation).

RESULTS
Of the total of 244 patients that underwent emergency surgery for duodenal ulcer perforations at our hospital over two years here were 217 males (88.93%) and 27 females (11.07%) patients giving a male-to-female ratio of 12.44:1. The average age of the patients was 41.69 years (range 15-82 years) with an almost equal age of occurrence for males (40.58 years) and females (41.56 years).

All the patients were divided into three groups as explained above. Group A was deemed to be the ‘small’ perforation group, Group B was called ‘large’ perforations and Group C ‘giant’ perforations. The majority of patients came under the ‘small’ perforation group, which was 178 (72.95%), but there were 48 patients (19.67%) with large perforations as per our definition. Giant perforations or perforations greater than 3 cm in size were seen in 18 cases (7.38%) accounting for a small percentage of all cases seen.

When the small perforation group was compared with the larger perforations, it was found that the giant perforations had a higher morbidity, leak rate and hospital stay and that this difference was statistically significant. This therefore lends support to the popular opinion that giant perforations have a worse outcome.

Overall, the commonest surgery performed was the Cellan-Jones omental patching- All cases in Group A, 36 of the 48 patients in Group B. When the results of omental patch were compared between the two groups. No significant difference was found in the leak rates and mortality thereby implying that this was an equally effective method for the closure of larger perforations also.

Jejunal serosal patch using a loop of the jejunum (7 cases) and antrectomy (5 cases) were the other surgeries performed in Group B.

18 cases of Group C had ‘giant’ perforations extending onto the pylorus- In 11 cases, resection and Billroth II reconstruction was performed, and in the other 7 cases, jejunal serosal patch was performed when closure with the omentum was thought to be unsafe by the operating surgeon.

8 patients (16.67%) of group B had a leak following closure of the perforation; 7 following omental patch and 1 after performance of jejunal serosal patch, whereas only 6 cases (3.37%) developed leak in Group A after omental patch. Postoperative leakage was 5 (27.77%) in group C, out of which, 3 cases were undergone antrectomy and Billroth II reconstruction, and in 2 cases, jejunal serosal patch was done. 5 patients out of 11 who underwent resection had presented late and succumbed to septicaemia on the very first postoperative day. The other remained for prolonged hospital stay with morbidity and then discharged on the 11-15th postoperative day.

Overall, the patients with large perforations (Group B) and giant perforations (Group C) had significantly increased hospital stay, leak rates and morbidity (Table 1).

The hospital stay was almost double for these patients (14.56 days versus 7.4 days). Although, the overall morbidity was 50.81%. It was much higher in the larger perforations (groups B (83.33%) and Group C (88.89%)). The common morbidity encountered was chest infections (78 cases), but wound infection (67 cases), biliary leak (18 cases), intra-abdominal abscesses (13 cases), burst abdomen (14 cases), renal failure (6 cases), jaundice and upper gastrointestinal bleeding (8 cases each) were also recorded.

The mortality in this series was 10.65% (26 cases), and again, it was significantly higher in perforations more than 1 cm in size (Table 1) gives the details of all the three groups.

<table>
<thead>
<tr>
<th></th>
<th>Group A - ‘Small’</th>
<th>Group B - ‘Large’</th>
<th>Group C - ‘Giant’</th>
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<tr>
<td></td>
<td>(Less than 1 cm)</td>
<td>(1 cm - 3 cm)</td>
<td>(More than 3 cm)</td>
</tr>
<tr>
<td>Number of cases</td>
<td>178 (72.95%)</td>
<td>48 (19.67%)</td>
<td>18 (7.38%)</td>
</tr>
<tr>
<td>Average age</td>
<td>40.42 years</td>
<td>46.15 years</td>
<td>46.5 years</td>
</tr>
<tr>
<td>Male/female</td>
<td>156/22</td>
<td>44/4</td>
<td>17/01</td>
</tr>
<tr>
<td>Average duration of symptoms</td>
<td>2 days</td>
<td>3.2 days</td>
<td>3.6 days</td>
</tr>
<tr>
<td>Surgery performed</td>
<td>Omental patch 178</td>
<td>Omental patch 36</td>
<td>Antrectomy and Billroth II (11)***</td>
</tr>
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<td></td>
<td>&quot;*****&quot;</td>
<td>&quot;******&quot;</td>
<td>jejunal serosal patch 7* antrectomy 5</td>
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<tr>
<td>Postoperative leak</td>
<td>6 (3.37%)</td>
<td>8 (16.67%)</td>
<td>5 (27.77%)</td>
</tr>
<tr>
<td>Morbidity</td>
<td>68</td>
<td>40</td>
<td>16</td>
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</tbody>
</table>
Peptic perforation is a common disease in the general population in our part of world. There is a sharp decrease in elective peptic ulcer surgery, but the emergencies such as perforation are on rise in some studies. The size of perforation in a peptic ulcer varies from 3 mm to over 3 cm in diameter, which adversely affects the prognosis. If the perforation is less than 5 mm in diameter, there is a 6% mortality rate, when it is between 5 and 10 mm, the mortality goes up to 19%, and when it is more than 10 mm, the mortality rate is around 24%. There is a paucity of data in literature regarding giant peptic ulcer perforation management.

The overall incidence of more than 3 cm diameter perforation is about 3%. In our study, the incidence was 7.38%. In our study, the highest incidence of perforation was seen in the 4th decade, but in other studies in literature, the highest incidence was seen in the 5th decade.

In our study, majority of patients were males giving a male-to-female ratio of 12.44:1, which is similar to other studies where the male-to-female ratio is between 9:1 to 17.5:1. In our study, the overall reported mortality rate was 8.2%.

Omental patch has become the “gold standard” for the treatment of small perforations. In our study, the commonest surgery performed was the omental patch in all cases in Group A and 36 patients in Group B. However, large perforations of the duodenum may be encountered in which there exists the threat of postoperative leakage following closure by this omental patch.

Giant perforations are technically difficult to repair due to the duodenum’s complex anatomy and marginal blood supply shared with the pancreas. High intraluminal pressure, tendency of the mucosa to extrude through the suture line and autodigestive enzymes of the pancreas and bile acid add to the risk of breakdown of the suture line.

Conventional wisdom dictates that healthy vascularised tissue should be incorporated in the repair of any defect with tissue loss or with friable edges. Several elaborate surgeries have been devised to manage complicated giant peptic ulcers.

These include resection of the perforation bearing duodenum and gastric antrum in the form of antrectomy and Billroth II reconstruction or the closure of the perforation using a serosal patch or pedicled graft of the jejunal. Proximal gastrojejunosotomy and/or vagotomy may be added to these procedures to provide diversion and a definitive acid reducing procedure, respectively. However, each of these procedures not only prolong the operating time, but also require a level of surgical expertise that may not be available in the emergency.

CONCLUSION
Duodenal perforations should be classified as small, large or giant according to their size encountered at laparotomy. 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 (i.e. perforations up to 3 cm in size).

The addition of a feeding jejunostomy and placement of a tube drain in the Morrison’s space may offer a further sense of “security” to the operating surgeon, keeping open the option of maintaining the nutrition of the patient as well as creating a controlled duodenal fistula in case of a postoperative leak.

The word “giant” should be reserved only for perforations that exceed 3 cm in diameter. This is the group of patients with truly giant perforations who need to be analysed further to determine the best course of action, i.e. resectional versus non-resectional surgery. However, the less number of patients in this group did not allow us to reach any definite conclusion regarding their ideal management.

REFERENCES


