

Management and Outcome of Different Sized Duodenal Perforations: A Retrospective Study of 100 Cases in a Tertiary Health Care, Odisha

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Abstract

Background: Multifactorial etiologies are responsible for duodenal perforations, having mortality rate ranges from 1.3%-20%. Although the size of a duodenal perforation is an important measure in determining the outcome, a review of literature failed to reveal, any accepted definition of either small, large, or giant perforation.

Aim and Objectives: This retrospective study represents our experience with the management and outcome of different sized duodenal perforations over a period of one year (between May 2022 to May 2023).

Materials and Methods: In recent study, where 100 patients were enrolled, analyzed as per the division into three groups as per size of perforations- Group-A (small, having < 1cm diameter), Group-B (large, having 1cm-3cms diameter), and Group-C (giant, having > 3cms diameter).

Results: Group-B and Group-C (accounts 27% of patients) were associated with longer hospital stay, higher leak rates, increased morbidity and mortality.

Conclusion: The Cellan-Jones omental patch is simple, can be done in a relatively short time, and remains dependable even for the closure of large sized perforations (i.e. perforations up to 3 cms size). Perforation > 3 cms size are hazardous, where omentopexy may be unsafe, and other option may be thought to be necessary.

Keywords: Duodenal Perforation, Peptic Ulcer Disease, Endoscopic Cholangio-pancreatography.

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Introduction

Gastro-duodenal perforations are common in surgical practice. In spite of there is gradual decreasing in incidence of peptic ulcer disease in recent years due to use of proton pump inhibitors (PPIs) and eradication treatment for H. Pyroli, its complications like bleeding and perforation, are still remain a substantial healthcare problem [1]. The increased incidence relates to use of non-steroidal anti-inflammatory drugs (NSAIDs), alcohol, smoking and to the aging population [2,3].

Also, incidence of iatrogenic duodenal perforations are becoming more common following widespread use of endoscopic procedures such as endoscopic retrograde cholangiopancreatography (ERCP), operative injury related to surgical instrumentation, traumatic injury, foreign bodies (like ingested sharp and thin foreign body, implanted foreign bodies such as endoprosthesis or artificial vascular grafts), and spontaneous duodenal perforation in neonates [4,5].

Many perforations are repaired using an omental patch, a technique that was first described by Cellan-jones in 1929 [6] and was later modified by Graham in 1937 [7]. The laparoscopic repair for a perforated duodenal ulcer was reported in 1990 [8]. Surgery is still the mainstay of treatment for duodenal perforation, where a strand of omentum is drawn over the perforation and held in place by full thickness sutures placed on either side of perforation, and this procedure has become the “gold standard” for treatment of such perforations. However, occasionally, threat e.g. post-operative leakage exists by closing large duodenal perforation with this simple method [2,3], where other procedures may be followed for perfect closure like partial gastrectomy, jejunal serosal patch, jejunal pedicle graft, free omental plug, suturing of omentum to nasogastric tube, Bilroth I/IIgastrojejunostomy, Roux –Y gastrojejunostomy, gastric disconnection [3,8].

Due to scarcity in literature regarding definition, incidence, management and outcome of different sized duodenal perforations, the recent study focuses on our experience in these aspects over a period of one year from May 2022 to May 2023.

Method

This was a retrospective study and conducted in the Department of General Surgery at tertiary care hospital during the period from May 2022 to May 2023. All patients admitted and operated in hospital for duodenal ulcer perforation as emergency surgery. Before commencement of the study, consent was taken from patients/parents.

Inclusion Criteria

Patients between 15 to 80 years of age irrespective of sex who were admitted for emergency surgery due to duodenal ulcer perforation.

Exclusion Criteria

Age below 15 years and more than 80 years

- Patients with multiple perforations
- Patients with anterior and posterior ulcers
- Patients with other diseases
- Immuno-compromised patients

Method of collection of data

Details of cases were recorded including age, history, clinical examination, intra-operative findings, surgery performed, leak rates, post-operative hospital stay, morbidity, and mortality.

Patients were divided into three groups according to the duodenal perforation size noted intra-operatively i.e.

Group – A:(Patient with perforation size less than 1 cm) Or (Small perforation group)

Group – B: (Patient with perforation size 1cm - 3cms) Or (Large perforation group)

Group – C: (Patient with perforation size more than 3 cms) Or (Giant perforation group)

The Gold standard technique of omentopexy is followed in all cases i.e. – a total of three sutures were given onto the normal, healthy duodenum on either side of perforation, a strand of omentum was placed directly onto the perforation, and suture were knotted over this. No attempt was made to close the perforations prior to placing the omentum as a graft.

Statistical Analysis

Data was entered into Microsoft excel data sheet and was analyzed using SPSS (Statistical Package for Social Studies) 22 version software. Data was evaluated according to Chi-square test and unpaired ‘t’-test by a statistician who was blinded to the study. A p-value (Probability that the result is true) of < 0.05 was considered as significant with CI (Confidence Interval) of 95%.

Result

Out of the 100 patients included in our study - 89 (89%), 11 (11%) were male and female respectively, which having a male to female ratio 8.9: 1. The average age of patients was 41.09 years (range 15 - 80 years), with having no significant difference between both sexes.

Maximum and minimum number of patients belongs to Group-A (73) and Group-C (02) respectively.

The Group-B having higher age of presentation i.e. 46.28 years comparing to others.

Table 1: Comparison Between 3-Groups of Patients

	Group – A “Small” (Less than 1 cm)	Group – B “Large” (1cm -3 cms)	Group – C “Giant” (More than3cm)
No. of cases	(73) 73%	(25) 25%	(02) 02%
Average age in years	38.54	46.28	38.45
M: F ratio	64: 09	23: 02	2: 0
Average duration of symptoms	3 days	3.50 days	3.86 days
Surgery performed	Omental patch 70 *** Pyloroplasty 03 *	Omental patch 15***** Jejunalserosalpatch 05** Antrectomy 05**	Antrectomy and Billroth II 01 Jejunalserosal Patch 01
Post-operative leak rate	04 (5.48%)	09 (36%)	0
Morbidity	22	20	01
Post-operative hospital stay	7.74 days	15.27 days	5.98 days
Mortality	05 (6.84%)	07 (28%)	01 (50%)

Each * indicates one post-operative leak.

By comparing 3 Groups, we conclude that Group-B having a higher morbidity ($x_2 = 20.3126$, $p < 0.05$),

a higher leak rate ($x_2 = 9.1067$, $p < 0.05$), and longer post-operative hospital stay (t value 5.117, $p <$

0.05), and this difference were statistically significant. The post-operative hospital stay was almost double for this person (15.27 days versus 7.74 days) and morbidity was much higher (Group-B and Group-C). This signifies that Group-B having worse outcome.

By comparing Group-A and B, where commonest surgery done was Cellan-jones omental patching (i.e. 70 out of 73 cases in Group-A, 15 out of 25 cases in Group-B), no significant difference were found in leak rate ($\chi^2=3.7626$, $p > 0.5$) and mortality ($\chi^2=1.6523$, $p > 0.2$). Hence, we concluded that this procedure is equally effective in both groups.

In Group-A, only 4 cases developed leak (3 after omental patch and, 1 after truncalvagotomy and pyloroplasty). In Group-B, jejunalserosal patch using jejunal loop and antrectomy (5 cases each), surgery performed where closure with omentum was thought to be unsafe by the operative surgeon. 15, 5, 5 cases developed leak after omental patch, jejunalserosal patch, and antrectomy respectively.

In Group-C, surgical procedures done were antrectomy and Bilroth II reconstruction (1 case) and jejunalserosal patch (1 case), where the former succumbed to septicemia on 2nd post-operative day and the later discharged on 11th post-operative day.

Recorded common morbidity were chest infections (12 cases), surgical site infections (08 cases), localized peritoneal abscess (07 cases), biliary leak (05 cases), wound dehiscence (03 cases), burst abdomen (03 cases), renal failure (02 cases), DIC (01 case), jaundice (01 case), upper g.i. bleeding (01 case). In our study overall mortality was 13% (13 cases), out of which Group-B was in higher position ($\chi^2 = 3.7245$, $p < 0.05$). (Table 1- shows the details of all three groups)

Discussion

The overall mortality rate was varies between 1.3% to 20% [9-11], and 13% in our study. Various risk factors for mortality are advancing age concomitant disease, preoperative shock, size of perforation, delay in presentation, and type of operations done [9-11]. Perforations < 1cms size, are best managed with omentopexy according to Chaudhury A et al [12], which reflects our conclusion. Perforations > 1 cms size, due to having extensive duodenal tissue loss and surrounding tissue inflammation, were difficult to manage and associated with high leak rates, high mortality, longer hospital stay.

Perforation > 3 cms size are hazardous, where omentopexy may be unsafe, and other options may be thought to be necessary. Patients in this group need to be analysed further to determine the best course of action. Due to less number of patients in Group-C, a definite conclusion regarding their ideal management cannot be reached.

Due to scarcity in literature regarding specific definitions (perforations size- small, large and giant), and guidelines regarding management, different authors recommended different surgical options based on their experiences and research. Exa – partial gastrectomy with reconstruction as either Bilroth I or II anastomosis, gastrostomy, vagectomy, antrectomy, lateral duodenostomy, feeding jejunostomy, pyloroplasty, omemtopexy, jejunalserosal patch, use of jejunal pedicle graft, suturing of omentum to nasogastric tube, gastrojejuostomy [13].

Conclusion

Some duodenal perforations can be managed conservatively, while others require prompt surgical treatment. The type of treatment should be individualized and depends on the mechanism of injury, the timing, location and extent of injury, and the clinical state of the patient. Open surgery is still the gold standard for patients that need surgical intervention. The Cellan-Jones omental patch is simple, can be done in a relatively short time, and remains dependable even for the closure of large sized perforations (i.e. perforations upto 3 cms size). Perforation > 3 cms size are hazardous, where omentopexy may be unsafe, and other option may be thought to be necessary. Management is quite challenging as present late: with septicemia, fluid and electrolyte derangements, shock or systemic inflammatory response syndrome.

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