Ten-Year Experience of Managing Giant Duodenal Ulcer Perforations with Triple Tube Ostomy at Tertiary Hospital of North India

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Abstract Duodenal ulcer perforations have been known since 1600 AD. It is a common surgical emergency and every surgeon will encounter it. The perforation size of >2 cm has been used as the criteria for defining Giant duodenal ulcers. The management of giant duodenal perforations in hemodynamically unstable patient with comorbid condition is taxing because of high incidence of the postoperative leak and mortality. We have used the simple technique of Triple Tube Ostomy after the primary closure of the defect with encouraging results. It is a retrospective study done at the J. N medical college AMU Aligarh from May 2005 to May 2015. Hemodynamically unstable patients who have presented to the emergency with preoperative diagnoses of giant duodenal ulcer perforation and had undergone triple tube ostomy with primary repair of the perforation were included in the study. There were 34 patients of giant duodenal perforation who

presented in shock. All of them underwent triple-tube-ostomy after primary repair of the duodenum. Thirty-two patients recovered with two mortalities (5.8 %). Several definite surgical techniques have been described for the management of giant duodenal ulcer perforation but they are complex, have very high morbidity and mortality rate and require an expert surgeon. A close retrospective scrutiny of the patients suggests that simple triple-tube-ostomy technique which is based on the principle of damage control surgery has good postoperative results. Therefore, we recommend it as the procedure of choice in these patients.

Keywords Giant · Duodenal · Perforation · Triple · Ostomy

Introduction

The duodenal ulcer perforation has been known since 1600 AD when the daughter of King Charles I, Henriette Anne, had died of sudden epigastric pain and autopsy showed a perforation in the duodenum [1]. Edward Crisp first described the clinical aspect of 43 cases of perforated peptic ulcer in 1843 and drew the inference: “The symptoms are so typical; I hardly believe it is possible that anyone can fail to make the correct diagnoses” [2]. Later, Johan Mikulicz-Radecki (1850–1905) became the first surgeon to close the duodenal ulcer by simple suture. He stated that “Every doctor, faced with perforated duodenal ulcer of the stomach or intestine, must consider opening up the stomach, sewing up the hole, and averting the possible inflammation by careful cleansing of the abdominal cavity.” [3].

The management of the perforated duodenal ulcer has wide array of options depending upon the size of perforation and the condition of the patient at the time of presentation. The small uncomplicated duodenal perforations as proposed by

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Taylor can be managed conservatively (observation, nasogastric decompression, antibiotics and IV fluids and nowadays H. Pylori Triple Therapy) [4]. The classical techniques of primary closure with omentopaxy of the perforation advocated by Cellan Jones in 1929 (Plugging the perforation with pedicled omentoplasty) [5] and Graham in 1937 (Plugging the perforation with free omental plug) [6] are still most widely practised.

The repair of the giant duodenal perforations (≥ 2 cm) is still a matter of debate as these patients are difficult to manage with simple primary closure and omentoplasty because of the following reasons: (a) the size of the ulcer is big, (b) the margins are oedematous and necrotic, (c) there is high intraluminal pressure and (d) the options range from omentopaxy, omental plugging, partial gastrectomy, Jejunal serosa patch, Jejunal pedicled graft, proximal gastrojejunostomy or pyloric exclusion [7, 8]. All these procedures are complex, technically demanding and time consuming. Moreover, the patients are in poor general condition with hemodynamically instability and/or may have significant comorbidity. Therefore, they uniformly have high leak rate ($>10\%$) and high mortality rate (10–65 %) [9–11].

The novel technique of the triple ostomy [12] with its various modifications has often been utilized in these critically ill patients with favourable results. Therefore, we have analysed the data of our patients of perforated duodenal ulcer, who underwent the procedure of triple ostomy over a period of last 10 years and are presenting herewith.

Materials and Methods

This is the retrospective study of the patients with perforated duodenal ulcer who had undergone Triple Ostomy under Unit II, V and IV at J. N Medical College Hospital, AMU Aligarh in the period of last 10 years with effect from May 2005 to May 2015.

The records of all the patients were analysed for the size of the perforation, hemodynamic stability of the patient, age of the patient and delay in diagnoses. Patients found to have the duodenal perforation of size ≥ 2 cm were included in the study like in Fig. 1 showing giant duodenal perforation (>2 cm).

Patients with sole or concomitant gastric perforation, small duodenal perforation (<2 cm) and those who were hemodynamically stable were excluded.

Shock was defined by systolic BP of <90 mmHg, heart rate of at least 100 beats per minute and use of the vasopressor to maintain the BP for at least ≥ 1 h.

Patients were first adequately resuscitated and then taken for the surgery after obtaining the written consent. Exploratory laparotomy was performed through upper midline incision. Suctioning and lavage of the peritoneal cavity was done and perforation in the duodenum was confirmed. Patients with perforation size of ≥ 2 cm, the triple ostomy as shown in

Fig. 1 Giant duodenal perforation (>2 cm)

Fig. 2 was performed after prior kocherisation and primary closure with modified Graham's technique (duodenorrhaphy) in the following manner

- 1) The retrograde duodenostomy was performed with 14 Fr Foley catheter at the antimesenteric border about 15 cm distal to the ligament of Treitz.
- 2) Gastrostomy with 14 Fr Foley catheter was performed
- 3) A 10 Fr feeding tube was placed at the antimesenteric border about 10 cm distal to the retrograde duodenostomy as feeding jejunostomy (FJ)

The abdominal wall was closed in layers with two abdominal tube drains. One from the right flank to the Morrison's Pouch and other from the left flank to the pelvic cavity. All patients were kept NPO with IV fluids for at least 3 days, when feeding through FJ was started provided patient's clinical progress was satisfactory. The gastrograffin meal study was performed once the bilious output in the Morrison's pouch abdominal drain has stopped to confirm that there is no leak like in Fig. 3 showing gastrograffin dye study with normal passage of dye into the jejunum. Oral feeding was gradually started and patients were discharged in satisfactory condition. In case of the leak from duodenal perforation in

Fig. 2 Triple tube ostomy

Fig. 3 Gastrografin dye study. Showing normal passage of dye

barium meal study, feeding through FJ was extended for next the 3 weeks.

Results

There were 2600 patients adults (>18 years) of age who were operated in the emergency as the case of perforated peptic ulcer from May 2005 to May 2015. Out of these 1600 patients had duodenal ulcer perforation with 34 (2.125 %) having giant duodenal ulcer perforation (≥ 2 cm). There were 24 males and 10 female patients with male to female ratio of 2.4:1.76 % of the patients were in the age group of 40–60 years as shown below in the Table 1.

R deranged renal function, *S* smoking, *P* pneumonitis, *DM* diabetes mellitus, *CAD* coronary artery disease, *CAA* chronic analgesic abuse, *WI* wound infection, *BA* burst abdomen, *DS* discharge satisfactorily, *M** mortality, *M* male, *F* female.

Twenty-six patients were presented after 3 days, 7 after 5 days and 1 patient after 7 days. None of the patient with giant duodenal ulcer perforation has presented within 72 h.

The general condition was poor as they presented with shock and had added comorbid conditions as shown in Table 1. Gastrografin dye study showed leak in four patients. The feeding jejunostomy was extended for 3 more weeks in these patients. Twenty-eight patients were discharged on 21st postoperative day and four patients were discharged on 42nd postoperative day. Two patients died within 3rd postoperative day due to septicemia.

Discussion

There is no consensus in the literature on the size of the giant duodenal perforation. It has been arbitrarily defined by various

authors in different studies ranging from perforation size greater than 0.5 to >3 cm [11, 13–15]. However, most of the authors consider perforation ≥ 2 cm in size as giant duodenal perforation [9]. In this study also, perforation size ≥ 2 cm has been considered as giant duodenal perforation.

Leak from the primary repair of giant duodenal ulcer is a well-known complication. There are various factors responsible for the leak like (a) margins of the perforation are wide apart, inflamed and necrotic so the repair is under tension, (b) high intraluminal pressure, (c) the autodigestive effects of the bile mixed with the gastric and pancreatic juices, (d) tendency of mucosa to extrude from the anastomotic line and (e) precarious blood supply of the duodenum [16, 17].

The triple ostomy procedure was first described by Stone and Fabian 1962. They routinely decompressed the duodenum with gastrostomy and twin jejunostomies [12]. Later, several modifications were done in this procedure. Nobuaki and Kazuaki et al. [18] performed the cholecystectomy and inserted the C tube through the cystic duct for biliary drainage, a retrograde duodenostomy and a feeding jejunostomy was done following duodenorrhaphy. Onur C et al. [19] inserted Malecot catheter through the duodenal defect and secured it with purse string sutures along with decompressive gastrostomy and feeding jejunostomy. Furthermore, Stefano et al. [20] did quadruple tube decompression. They performed the cholecystectomy and T-Tube was placed in the common bile duct, nasogastric tube was inserted and negotiated up to the first part of the duodenum, retrograde duodenostomy and a feeding jejunostomy was done. Dr. Sahni [21] proposed the use of the double tube. He inserted two nasogastric tubes (NGT) one drained the stomach and another one was negotiated to the II or III part of the duodenum bypassing the duodenal perforation which was then closed. The NGT were then fixed at the external nares. The triple tube procedure works on the principle of the damage control surgery. The patient after adequate resuscitation is taken for surgery. The retrograde duodenostomy decompresses the duodenum by acting as the controlled fistula. The gastrostomy drains the gastric juices and the bile refluxed into the stomach thereby decreasing the load of secretions passing through the duodenum. The author has preferred gastrostomy in place of Ryle's tube as it causes less discomfort to the patient, and it is more effective in draining the gastric secretions and is without any risk of microaspirations that occur along the Ryle's tube in critically ill patient [22]. The feeding jejunostomy gives an opportunity of the early start of the enteral nutrition which has a trophic effect and also avoids the need for total parenteral nutrition that has its own complications.

This procedure is not only technically less demanding but also less time consuming as compared to any definite surgical procedure. Thus, adding to patient's benefit of early recovery, Boey's score is most commonly used as a prognostic index in the patients of the perforated peptic ulcer [23]. It takes three

Table 1 Master chart showing general condition of patients

S. No.	Age (years)	Sex (M/F)	Time of presentation (h)	Comorbid condition	Blood pressure at admission	Post Op. complications	Oral elementation day (POD)	Length of stay (days)	Outcome
1	34	M	84	R, S	88/40	WI	7	10	DS
2	54	M	96	R, P	88/46	WI	8	10	DS
3	40	M	84	R, S	88/42	WI	7	14	DS
4	48	F	84	R	88/46	WI	7	12	DS
5	66	M	84	R, S, P	86/56	BA	10	20	DS
6	42	M	84	R, S	86/54	BA	11	20	DS
7	46	M	156	R, S, P	70/44	BA	8	21	DS
8	59	F	84	R	74/48	WI	7	10	DS
9	42	F	96	R	86/48	WI	7	9	DS
10	40	M	84	R, S	72/42	WI	7	10	DS
11	43	M	108	R, S, P	78/60	BA	9	14	DS
12	24	M	84	R, S	74/44	WI	8	10	DS
13	53	F	156	R, S, P	78/48	BA	10	21	DS
14	60	M	84	R, S, CAD, CAA	86/70	BA	15	40	DS
15	44	M	84	R, S, DM	86/42	WI	8	10	DS
16	50	M	84	R, S	82/66	WI	7	8	DS
17	64	M	120	R, P, S	88/74	BA	11	21	DS
18	49	F	132	R, S, DM, P	76/48	WI	16	42	DS
19	67	F	84	R	88/52	WI	8	21	DS
20	75	M	156	R, DM, P, CAD, S	74/64			2	M*
21	51	M	96	R, S, P	82/48	BA	10	21	DS
22	55	F	84	R	78/56	WI	7	10	DS
23	53	M	96	R, S, CAD, DM	74/56	BA	15	42	DS
24	54	F	84	R, S, CAA	84/66	BA	11	20	DS
25	53	M	84	R, S, DM, P	86/72	WI	7	16	DS
26	43	M	84	R, S, P	76/64	WI	7	14	DS
27	46	M	84	R, S	88/58	WI	7	8	DS
28	56	M	84	R, S, P	88/68	WI	8	16	DS
29	50	M	84	R, S, DM, P, CAD	84/48	BA	15	38	DS
30	49	M	84	R, S, P	88/62	WI	7	12	DS
31	52	M	144	R, S	78/60	WI	7	14	DS
32	77	F	96	R, S, P, CAD, DM	76/48			3	M*
33	57	M	180	R, S	78/62	BA	10	14	DS
34	55	F	132	R, DM	76/54	BA	8	21	DS

factors into account, the hemodynamic stability of the patients at the time of presentation, any comorbid medical condition, and the time of presentation. Patients with all three poor prognostic factors have 100 % mortality rate. In our study also, the patients have all the three poor prognostic factors therefore the predicted outcome according to the Boey's score was 100 % mortality. But with the application of this novel triple ostomy technique the mortality rate was only 5.8 %.

The basic principle of “damage control surgery” should be applied while managing these patients. The author, in this paper, has shared his experience of 34 patients with giant duodenal perforation where he has done triple tube procedure which includes duodenorrhaphy, retrograde duodenostomy, gastrostomy and feeding jejunostomy safely with encouraging outcome over a period of 10 years.

The triple tube procedure has consistently shown to be very safe and effective method of giant duodenal ulcer management in patients with poor general condition but still this technique is not much popular [12]. We therefore advocate the use of this simple but very effective technique of managing such challenging situations in which an attempt is made to primary

repair the defect (duodenorrhaphy) by performing a technically less demanding surgery in minimal time simultaneously taking care that if the primary repair fails then too only a controlled fistula occurs (retrograde duodenostomy, gastrostomy and drain in the Morison's pouch) without compromising the nutritional requirement of the patient through feeding jejunostomy.

Compliance with Ethical Standards

Conflict of Interest All authors declare that they have no conflict of interest.

References

1. Baron JH (1998) Paintress, princess and physician's paramour: poison or perforation? *J R Soc Med* 91:213–216
2. Lau WY, Leow CK (1997) History of perforated duodenal and gastric ulcers. *World J Surg* 21:890–896

3. Schein M (2005) Perforated peptic ulcer. In: Schein's common sense emergency abdominal surgery. Part III. Springer, Berlin, pp. 143–150
4. Songne B1, Jean F, Foulatier O, Khalil H, Scotté M (2004) Non operative treatment for perforated peptic ulcer: results of a prospective study. *Ann Chir* 129(10):578–582
5. Cellan-Jones CJ (1929) A rapid method of treatment in perforated duodenal ulcer. *BMJ* 1076–1077
6. Graham RR (1937) The treatment of perforated duodenal ulcers. *Surg Gynecol Obstet* 235–238
7. Chaudhary A, Bose SM, Gupta NM, Wig JD, Khanna SK (1991) Giant perforations of duodenal ulcer. *Ind J Gastroenterol* 10:14–15
8. Karanjia ND, Shanahan DJ, Knight MJ (1993) Omental patching of a large perforated duodenal ulcer: a new method. *Br J Surg* 80:65
9. Lal P, Vindal A, Hadke NS (2009) Controlled tube duodenostomy in the management of giant duodenal ulcer perforation—a new technique for a surgically challenging condition. *Am J Surg* 198: 319–323
10. Walley BD, Goco I (1980) Duodenal patch grafting. *Am J Surg* 140:706–707
11. Jani K, Saxena AK, Vaghasia R (2006) Omental plugging for large-sized duodenal peptic perforations: a prospective randomized study of 100 patients. *South Med J* 99:467–471
12. Stone HH, Fabian TC (1979) Management of duodenal wounds. *J Trauma* 19:334–339
13. Choudhary A, Bose SM, Gupta NM, Wig JD, Khanna SK (1991) Giant perforations of duodenal ulcer. *Ind J. Gastroenterol* 10:14–15
14. Karanjia ND, Shanahan DJ, Knight MG (1993) Omental patching of a large perforated duodenal ulcer. A new method *Br J Surg* 80:65
15. Sharma D, Saxena A, Rahman H, Raina VK, Kapoor JP (2000) Free omental plug”: a nostalgic look at an old and dependable technique for giant peptic perforation. *DigSurg* 17:216–218
16. Gupta S, Kaushik R, Sharma R, Attri A (2005) The management of large perforations of duodenal ulcers. *BMC Surg* 5–15
17. Mukhopadhyay M, Banerjee C, Sarkar S, Roy D, Rahman QM ((2011)) Comparative study between omentopexy and omental plugging in treatment of giant peptic ulcer perforation. *Ind J Surg* 73(5):341–345
18. Fujikuni N, Tanabe K, Yamamoto H, Suzuki T, Tokumoto N, Ohdan H (2011) Case Reports in Gastroenterology. (5):672–679
19. Kutlu OC, Garcia S, Dissanaik S (2013) The successful use of simple tube duodenostomy in large duodenal perforations from varied etiologies. *IntJ Surg Case Rep* 4(3):279–282
20. Crippa S, Falconi M, Bettini R, Barugola G, Germani S, Salvi R, Pederzoli P (2007) Isolated blunt duodenal trauma: delayed diagnoses and favourable outcome with “Quadruple tube “decompression. *Journal of the Pancreas* 8(5):617–620
21. Anil KS (2013) Large Gastroduodenal lesion of varying Aetiology, with without pancreatic & other lesions, a treatment modality. *International Journal of Pharmaceutical Science Invention* 2(4): 42–50
22. Teramoto S, Ishii T, Yamamoto H, Yamaguchi Y, Ouchi Y (2006) Nasogastric tube feeding is a cause of aspiration pneumonia in ventilated patients. *Eur Respir J* 27(2):436–437
23. Boey J, Choi KY, Alagaratnam TT, Poon A (1986) Risk stratification in perforated duodenal ulcers. A prospective validation of predictive factors. *Ann Surg* 205:22–26