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Case Series

An overview of laparoscopic closure of duodenal perforation in a tertiary care centre

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ABSTRACT

Duodenal ulcer perforation is one of the most commonly encountered condition in emergency surgery. Laparoscopic repair of the perforation has been reported in many cases since the first laparoscopic repair of a duodenal perforation in the year 1990 by Mouret et al. Aim and objectives were to study the clinical outcomes of laparoscopic repair of duodenal perforation in terms of duration of surgery, post operative pain, initiation of oral feeds, surgical site infection and duration of hospital stay. Over a 2 year period, 2018-2020, 20 patients with a presumptive diagnosis of perforated duodenal ulcers were considered for laparoscopic closure. Primary closure of the perforation was done with intracorporeal suturing followed by omental patch repair. The mean age was 38.75±8.53 years, mean duration of surgery was 97.80±7.89 minutes. The mean number of analgesic injection was 2.90±0.72. The mean duration of initiation of oral feeds was 3.20±0.41 days. The mean duration of removal of drain was 4.65±0.75 days and mean duration of hospital stay was 6.20±0.41 days. No intraoperative complications encountered. Postoperatively, none of the patients develop wound infections. In our setting, laparoscopic closure was found to be safe and a promising method in management of duodenal perforation as it appears to be more beneficial in terms of decreased post-operative pain, early initiation of oral feeds, decreased length of hospital stay and no major complications postoperatively. However, the procedure requires a surgeon with particular expertise in endoscopic suturing skills.

Keywords: Duodenal perforation, Laparoscopic closure of hollow viscus perforation, Emergency surgery

INTRODUCTION

Minimally invasive surgery is rapidly advancing with the improvement of optics, materials, manufacturing, and above all, refinement of surgical technique. Laparoscopic surgery has become the gold standard for many elective procedures, such as cholecystectomy, anti-reflux procedures and in colorectal surgery. However, the adoption of minimally invasive surgeries in the emergency setting such as in the management of hollow viscus perforation is limited.[1]

Hollow viscus perforation is one of the most common cause of acute abdominal pain and constitutes about 5 to 10% of all emergency department visits.[2] Cases have been reduced owing to improved medical, as well as diagnostic facilities in the United Kingdom and North America where malignancies and vascular lesions are major causes of perforations.[3] In India, peptic ulcer, typhoid and tuberculosis, are the common causes.[4] Nonsteroidal anti-inflammatory drugs abuse, and other over-the-counter analgesics have also been stated as the main risk factors for perforation.[4]

Duodenum, stomach and small bowel perforation are common than the colonic perforation. The treatment of choice in hollow viscus perforation is an emergency surgery. Successful treatment not only depend on timely

surgery but competent postoperative care.[5] Open surgery/repair is considered the most standard approach; however, since first report of laparoscopic repair of duodenal perforation by Mouret et al evidences in literature have confirmed feasibility and efficacy of laparoscopic approach and appears to be effective alternative procedure with no. of advantages.[6-12] Royal college of England stated that laparoscopic repair of perforations is clearly feasible and beneficial in terms of significant lower mean duration of hospital stay.[7] Several Reports have revealed that perforations can be closed safely with laparoscopy. However, whether treatment of perforation by laparoscopic approach is better than conventional open repair is not well defined. Study was conducted at tertiary level to analyse clinical outcomes of laparoscopic closure of duodenal perforation.

This is a cross-sectional study over a period of two years; June, 2018 to May, 2020. 20 patients with perforated duodenal ulcers were considered for laparoscopic closure with omental patch. Ethical clearance was obtained from the institutional ethical and research committee. A formal written consent was also obtained from all the patients after explaining the nature of the study.

Patients of any age admitted with hollow viscus perforation of the abdomen, who consented were included in the study. Patients with associated diseases such as inflammatory bowel syndrome and malignancy, systemic disorders such as connective tissue disorders, coagulopathies, comorbid conditions such as renal failure, liver failure and perforations other than duodenal perforation such as appendicular, gastric, typhoid perforations were exempted from the study. Patients requiring extensive surgical management such as resection anastomosis were also exempted.

Demographic data including age, sex, and medical history were collected. The patients were subjected to physical examination and systemic examination. The findings obtained were noted on a predesigned and pretested proforma.

All the selected patients were subjected to routine blood investigations such as complete blood count, blood grouping, random blood sugar level. Renal function tests, serum electrolytes, liver function test, coagulation profile as well as routine urine tests were also performed. X-ray of erect abdomen and chest was also performed to detect free gas under the right dome of diaphragm, which confirmed the diagnosis of hollow viscus perforation.

CASE SERIES

All patients included in the study underwent laparoscopic closure under general anaesthesia. Pneumoperitoneum established with Veress needle through the supraumbilical port and laparoscope was then introduced. Under vision, another two 5 mm trocar were placed in the left and right hypochondrium respectively. The perforation site was identified and primary closure was done by intracorporeal suturing with 2-0 polyglactin suture. Reinforcement was done with a single tie over a pedicled omentum. Sequential laparoscopic lavage was done with more than 6 litres of normal saline. Drainage system was designed to remove free-floating fluids from the peritoneal cavity. All the patients received postoperative intravenous antibiotics for 5 days. Oral intake resumed when the bowel function returned to normal. Triple therapy given for two weeks followed by proton pump inhibitors for one month to eradicate *Helicobacter pylori* in all the patients.

Figure 1: Placement of ports.

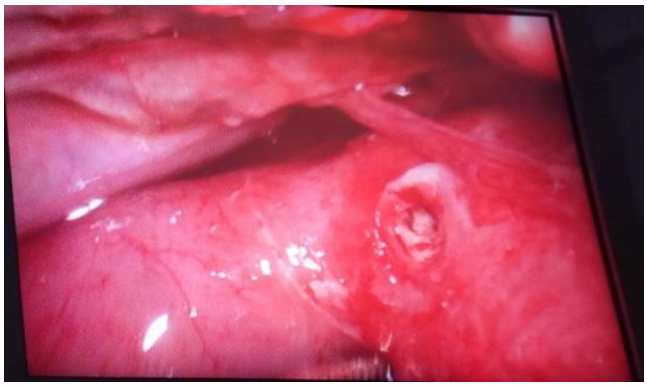

Figure 2: Identification of site of perforation (duodenal perforation).

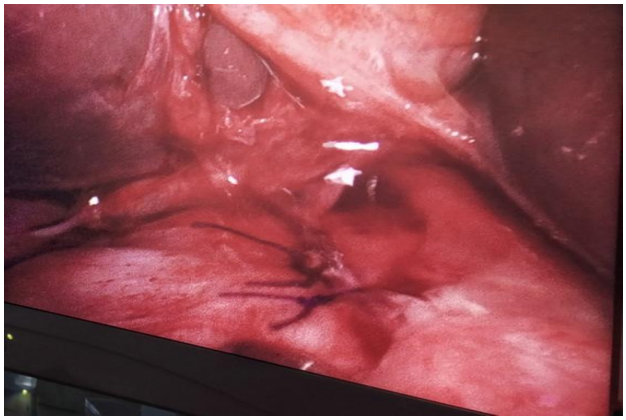

Figure 3: Primary closure of the perforation.

Figure 4: Reinforcement with pedicled omental patch.

Figure 5: Peritoneal lavage with placement of drain.

Table 1: Sex distribution.

Gender	N	Percentage (%)
Male	18	90
Female	2	10
Total	20	100

Table 2: Age distribution of patients.

Age (Years)	N	Percentage (%)
20-40	14	70
40-60	6	30

Table 3: Duration of surgery.

Time (mins)	N
90-100	14
101-110	4
111-120	2

Table 4: No. of analgesic injection.

No. of injections	N
2	13
3	3
4	4

Table 5: Initiation of oral feeds.

Day	N
2nd	0
3rd	16
4th	4

Table 6: Duration of the removal of the drain.

Day	N
2nd	0
3rd	0
4th	11
5th	6
6th	3

Table 7: Duration of hospital stay.

No. of days	N
5	0
6	16
7	4

Table 8: Statistical analysis of duration of pain, surgery, analgesic dosage, initiation of oral feeds, removal of drain and hospital stay.

Variables	Mean ± SD	Min	Max
Duration of pain (days)	1.95±0.76	1	3
Duration of surgery (mins)	97.80±7.89	88	116
No. of injections	2.90±0.72	2	4
Initiation of oral feeds (days)	3.20±0.41	3	4
Drain removal (days)	4.65±0.75	4	6
Duration of hospital stay (days)	6.20±0.41	6	7
Age (years)	38.75±8.53	28	56

Out of the 20 patients, 18 patients were male and 2 females. The mean age was 38.75±8.53 years. The major presenting complaint was diffuse abdominal pain. Majority of the male patients were alcoholic. Two patients had history of NSAID abuse and 10 of them had history of consuming proton pump inhibitors for gastritis. In all 20 patients, there was evidence of air under the right dome of diaphragm. The mean operative time was

97.80±7.89 minutes. The mean number of analgesic injections i.e., tramadol injection (1 mg/kg body weight/dosage) was 2.90±0.72. The mean duration of initiation of oral feeds was 3.20±0.41 days. The mean duration of removal of drain was 4.65±0.75 days and mean duration of hospital stay was 6.20±0.41 days. There was no intraoperative complications. Postoperatively, none of the patients develop wound infections.

DISCUSSION

Duodenal ulcer perforation is one of the most common cause of acute abdominal pain encountered in the emergency setting. First case of laparoscopic suture closure of perforated peptic ulcer was reported in 1990 by Nathanson et al and since then the efficacy and feasibility of the laparoscopic approach appears to be an effective alternative in many of the studies.[5,13-16]

In our institute we employ pedicled omental patch repair as described by Cellan-Jones et al.[17] Omental graft is usually used to provide stimulus for fibrin formation and prevent sutures from cutting through the edges.[18,19] Laparoscopy provides better vision of the peritoneal cavity and it can avoid an unnecessary laparotomy for a relatively simple procedure but experience of the surgeon may have an impact during the operation.[20] In our setting, the surgeries were performed by the same surgeon, who had an experience of more than 10 years in laproscopy, assisted by other two surgeons.

In our study, duodenal ulcer perforation was more common among men (90%) which is comparable with the study done by Siow et al.[1] Among men, majority of them were alcoholic. The mean age in our study was, suggesting that duodenal perforation was more common in the 3rd decade of life. The mean duration of surgery was 97.80±7.89 minutes which is comparable to the study performed by Laforgia et al and Ramesh et al.[21,22] Several studies reported shorter duration even in laparoscopic closure, Sreeramulu et al reported mean duration of 62 minutes, Bertleff et al reported a mean duration of 75 minutes.[23,24] Longer time with the laparoscopic closure may be attributed to the laparoscopic suturing and irrigation of the peritoneal cavity.

Resumption of oral feeds was comparable to the study done by Druart et al.[25] The mean duration of resumption of oral intake in our study was 3.20±0.41 days but the duration of hospital stay was even lesser in our study as compared to Druart et al the mean duration of hospital stay in our study was 6.20±0.41 days and the patients required less number of analgesic injections.[25]

In a cohort study done by Biscione et al risk of surgical site infection is reduced by 60% in laparoscopy as compared to open diagnostic exploration.[26] In terms of postoperative surgical site infection, none of the patients in our study develop wound infection.

CONCLUSION

Considering the decrease in surgical site infections, less number of analgesic injections and decrease hospital stay, which are in line with other studies, we believe that it is quite safe to close perforated ulcers by intracorporeal suturing and omental patch provided the surgeon is well trained in laparoscopy. The cost effectiveness of the procedure should also be considered.

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