

Laparoscopic simple closure for perforated duodenal ulcer in young adults

Abdulrahman Saleh Al-Mulhim*, Reem Ahmed Alyahya

Department of Surgery, Medical College - King Faisal University, Hofuf, P.O. Box 1164, Al-Hassa 31982, Kingdom of Saudi Arabia

ABSTRACT

Objective: Peptic ulcer perforation is one of the most common perforations of the gastrointestinal tract, and this complication of peptic ulcer is traditionally surgically treated. In recent years, a number of papers show a shift for perforation incidence from older to the younger population in developing countries. The aim of this study is to present the outcome of laparoscopic simple closure for perforated duodenal ulcer in young adults.

Materials and Methods: Laparoscopic simple closure performs in 17 young patients (21–36 years) admitted as perforated duodenal ulcer from January 2014 to December 2016. Prospective analyses carry out of patient demographics, presentation, and clinical outcome.

Results: This study consists of 17 patients between 21 and 36 years of age (mean of 26.9 years), and only 3 (17.6%) were females. Pain was the consistent symptom in all patients, while guarding was the signs present in all. No patients presented as shock but tachycardia noticed in those presented late. Pneumoperitoneum was found in all abdominal computed tomography scans. All underwent laparoscopic simple repair, and the mean post-operative follow-up was 15 months (8–34 months), and 13 patients (76%) come for a regular follow-up.

Conclusion: Peptic ulcer perforation is a disease more common in the young population with a male preponderance in developing countries, and laparoscopic simple closure of perforated duodenal ulcer is safe and excellent outcome.

Key words: Laparoscopic, perforated ulcer, simple

INTRODUCTION

Peptic ulcer perforation is a common surgical emergency. It is a serious complication of peptic ulcer disease with localized or generalized peritonitis. It is associated with high morbidity and mortality rate.^[1-4]

Early diagnosis, professional resuscitation, and selection of the appropriate management plan are essential for acceptable outcome. Laparotomy with different techniques for closure was the primarily treatment of perforated peptic ulcer for many years.^[2] In 1990, Mouret *et al.* report the first laparoscopic repair for perforated duodenal ulcer;^[5] and there are many randomized studies reported the advantages of the laparoscopic over open repair.^[6-8]

Taylor in 1946 described the non-operative management option (Taylor method) as an alternative way of management^[9] and supported by others studies, as there more than 40% will seal spontaneously.^[10-12] However, the number of patients needing surgical treatment remains steady.

Currently, simple closure with or without an omental patch is the two standard laparoscopic procedures used to close the perforation,^[13] but unfortunately most published studies include all age group.

The presence of concomitant diseases in elderly patients, as well as the causes of peptic ulcer, and the pathophysiology of the perforation are different^[14] compared to young adults; therefore, we conducted this prospective study to exclude the age factor.

The aim of this study is to evaluate the outcome of laparoscopic simple closure for the perforated duodenal ulcer in young adult.

MATERIALS AND METHODS

A prospective study carried out at King Fahad hospital, Hofuf, Eastern region, Saudi Arabia, from January 2014 to December 2016 in which all young adult patients (18–40 years) admitted on with perforated duodenal ulcer diagnosis were included in this study. Patients with clinical symptoms of perforated duodenal ulcer underwent laparoscopic simple repair.

The collected demographic data were gender, age, duration of abdominal pain before admission, the presence of fever, use of antiulcer drugs or nonsteroidal anti-inflammatory drugs, smoking status, white blood cell (WBC) count, radiological imaging, laparoscopic findings, and post-operative complications.

The diagnosis of perforated duodenal ulcer made on clinical grounds, laboratory investigations, radiological imaging

Address for correspondence:

Dr. Abdulrahman Saleh Al-Mulhim, Department of Surgery, Medical College - King Faisal University, Hofuf, P.O. Box 1164, Al-Hassa 31982, Kingdom of Saudi Arabia. Phone: 00966504922399. E-mail: abdu4949@yahoo.com

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(suspected by abdominal plain film with pneumoperitoneum, confirmed by abdominal computed tomography (CT) scans).

As soon as the diagnosis of perforated duodenal ulcer made, nasogastric tube (NGT) inserted, an indwelling urinary catheter placed, intravenous fluid resuscitation, and broad-spectrum prophylactic antibiotics initiated.

The laparoscopy technique was performed under general anesthesia, with the patient lying supine, in reverse Trendelenburg position. The surgeon and assistant stood on the left side of the patient.

A pneumoperitoneum of 14 mmHg created using a veress needle. A 10-mm subumbilical port and two 5-mm ports inserted - one in the midclavicular line on the left side and one on the right side, at a level according to the position of the duodenal perforation. In some cases, fourth port was placed in the subxiphoid area and used for irrigation, suction, and retraction of the liver.

After introduced the 10 mm 30° laparoscope through the subumbilical port, the inflammatory adhesions divided using blunt and sharp dissection, followed by irrigation and suction of the abdominal cavity.

Once the duodenal perforation was confirmed, it was closed using three-interrupted 3-0 Vicryl sutures. An air-leak test using 250 ml of air injected through the NGT, with compression on the duodenum distal to the repair. At the end of the procedure, the peritoneal cavity again irrigated by thorough peritoneal lavage.

A low pressure closed suction drain inserted after suction all the intraabdominal cavity fluid in the right sub hepatic space through the right 5-mm port wound.

For postoperative management, nasogastric tube (NGT) left to drain 12-24 h depend on the output, and Initiation of oral feeding gradually when the signs of intestinal motility presence. Indwelling urinary catheter removed once the patient out of the bed.

RESULTS

Demographics and clinical profiles of all patients are summarized in Table 1.

From January 2014 to December 2016, 17 patients diagnosed to have perforated duodenal ulcer. They consisting of 14 males and 3 females, and their ages ranged from 21 to 36 years with a mean of 26.9 years.

Twelve patients presented with symptoms for <6 h, 4 patients between 6 and 12 h, and only one male patient presented after 12 h. The three female patients present earlier than the male patients, but all three present with tachycardia. The five male patients who presented after 6 h duration they presented with tachycardia as well as tachypnea.

The mean time from the onset of symptoms to the beginning of the operation was 6.5 h (range 5.5-7.5 h). The mean time for those five patients with symptoms more than 6 h was 9 h (range 8-14 h).

Three (17.6%) patients had a previous history suggestive of peptic ulcer disease on medication, and only two (11.8%) patients had the diagnosis of *Helicobacter pylori* infection.

All 14 male patients (82%) were smokers, whereas the three female patients (18%) were non-smokers. 13 patients (76%) had a history of nonsteroidal anti-inflammatory drugs (NSAIDs) used, and the three female patients gave a history of the use of NSAIDs frequently mainly during menstruation period.

All the patients had elevated WBC count, with mean value of $13 \times 10^9/L \pm 4.3$ (range $10.4 \times 10^9/L$ - $16.8 \times 10^9/L$), and other laboratory test results were not significant.

Plain X-ray of the abdomen was done in erect position for all patients; free air under the diaphragm was evident in 14 patients (82%), whereas CT scan of the abdomen showed free intraperitoneal air in all patients.

All patients were considered as ASA 1, except for two patients were ASA 2, and none of the patients has comorbid medical diseases.

The most common site of perforation was the first part of duodenum (9 patients 53%), followed by prepyloric region (5 patients 29.4%) and pyloric (3 patients, 17.6%).

The size of perforation was <0.5 cm in 15 patients (88%) and was 1 cm in only two patients.

All the patients showed intra-abdominal free fluid, 12 patients had localized fluid in hepatorenal and subphrenic spaces (greenish bilious fluid), and five patients had diffuse peritonitis in all abdominal compartments and pelvis (purulent fluid with pyogenic membranes). Those five patients with generalized peritonitis had longer duration of the perforation (more than 6 h presentation).

The mean operative time was 75 ± 24.7 min while the mean post-operative hospital stay was 63 ± 32.1 h.

All the patients started on clear fluids at 18-36 h post-operatively and gradually advanced to take full diet. The mean time for return to a normal diet was 52 ± 5.4 h.

No leakage from the repair site was reported, and no significant long-term complications were detected during follow-up.

The mean post-operative follow-up was 15 months (8-34 months), and 13 patients (76%) come for a regular follow-up.

DISCUSSION

Perforated peptic ulcer is a common abdominal emergency and the surgical treatment is essential in most cases.

The use of laparoscopy in the late 1980s and its expansion from elective to acute intra-abdominal pathologies make the laparoscopic approach for perforated duodenal ulcer more widely used.^[15,16]

After the first study of laparoscopic repair for perforated peptic ulcer at 1990,^[5] many studies (meta-analyses of randomized control trial, prospective, retrospective, observations) were favoring laparoscopic repair opposing the open technique.^[4] They claimed that laparoscopy identifies the location and pathology of the perforation easier and makes the peritoneal lavage and

Table 1: Details of the 17 clinical cases

Case	Age	Gender	Pain duration (hours)	Fever	Tachycardia (Y N)	Tachypnea (Y N)	Shock	Abdominal guarding/rigidity
1	23	F	3	N	Y	N	N	Y
2	27	M	4	N	N	N	N	Y
3	30	M	3	N	N	N	N	Y
4	36	M	13	Y	Y	Y	N	Y
5	21	F	2	N	Y	N	N	Y
6	26	M	4	N	N	N	N	Y
7	25	M	7	N	Y	Y	N	Y
8	29	M	4	N	N	N	N	Y
9	25	M	5	N	N	N	N	Y
10	23	M	8	N	Y	Y	N	Y
11	33	M	5	N	N	N	N	Y
12	29	M	8	N	Y	N	N	Y
13	22	F	1	N	Y	N	N	Y
14	26	M	9	Y	Y	Y	N	Y
15	27	M	5	N	N	N	N	Y
16	25	M	5	N	N	N	N	Y
17	30	M	2	N	N	N	N	Y

perforation closure faster. In addition, laparoscopic repair correlated with a less post-operative pain, shorter hospital stay, and less post-operative complications.^[17]

In the laparoscopic era, there is a debate to use omental patch or not in perforated duodenal ulcers patients. There are studies supporting the omental patch technique; they used it to prevent suture tearing and potential leakage. Yet, laparoscopic omental patch requires technical skill and longer operative time.^[17-19]

On the other hand, there are many studies reporting the efficiency and safety of the laparoscopic simple closure option for the management of the perforated ulcer. Seelig *et al.* at 2003 compared laparoscopic simple closure to open simple repair,^[20] Ates *et al.* at 2007 compared laparoscopic simple closure to open omental patch repair,^[21] Lin *et al.* at 2017 compared laparoscopic simple closure to laparoscopic omental patch repair,^[17] and the conclusion from these studies are supportive the simple closure technique results.

However, most of the previous studies included all ages, and there are no publications about simple laparoscopic repair of perforated duodenal ulcer in young age group only.

Recent studies of peptic ulcer perforation from non-western countries^[22,23] reported that the maximum incidence of peptic ulcer perforation was found in the young age group (<40 years).

In our trial, perforated peptic ulcer disease commonly affected young age group where the most common age at presentation was between 21 and 36 years with a mean of 26.9 years, and only five patients were above 40 years (43–64 years) during the study period (not include in this study), which is contrary to the literature from develop societies.^[8]

Males predominated in our study (82%) giving a male-to-female ratio of 4:1 which is comparable with other studies in developing countries.^[23,24]

The interval between perforation and beginning of treatment is the main predictor of outcome. In this study, most of patients

presented <6 h from the start of symptoms, which is in contrast to other studies from developing countries.^[25] This early presentation is a reflection of easy accessibility to health-care facilities in the country.

In the present study, three (17.6%) patients had a history of peptic ulcer disease for the duration varying from 2 weeks to 7 months, and only two (11.8%) patients had diagnosis of *H. pylori* infection before the perforation. These results are in accordance with Ates *et al.*^[21] and Lee *et al.*^[26] study results.

The operative time in our study is comparable and in consistence with other studies^[13,27] without increasing the complication.

Boey *et al.* at 1987 developed score (Boey score) in which three risk factors (major medical illness, pre-operative shock, and longstanding perforation) can predicted the outcome in perforated duodenal ulcers patients.^[28] They dictated that mortality rate increased progressively with increasing numbers of risk factors from 0% in no risk factors to 100% in patients with three risk factors. All patients in this study were of zero score, consisting with Siu *et al.* report, that laparoscopic repair is safe in cases of zero score.^[18]

Wacha and Linder in 1983 developed Mannheim peritonitis index, it is a specific score, and it used to predict mortality in patients with peritonitis.^[29] Patients with a score more than 26 defined as having a high mortality rate, and fortunately, in our young male group, the mean was only 12.

Although the number of used cases is limited, it could be concluded that laparoscopic simple closure for perforated duodenal ulcer in young adults is safe. Further studies with bigger numbers may be needed to verify this notion.

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