

# The Causes of Conversion from Laparoscopy to Laparotomy in Patients with Laparoscopic Repair of Perforated Peptic Ulcer

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## Abstract

**Purpose:** Perforated peptic ulcer is an emergency condition. Laparoscopic ulcer repair is a feasible and safe procedure. The aim of this study was to research the efficacy of laparoscopic repair of peptic ulcer and to discuss the causes of conversion from laparoscopy to laparotomy. **Methods:** We collected 34 patients with perforated peptic ulcer underwent laparoscopic surgery from October 2003 to October 2008. Thirty four patients with perforated peptic ulcer underwent laparoscopic intervention and 6 cases were converted to laparotomy. The demographics, laboratory data, perioperative data, morbidity and mortality were compared. **Results:** In demographics of two groups, there were no significant differences in sex, age, location, and mean duration of symptoms of acute abdominal pain. However, there were significant differences in median size of perforation, mean duration of history of peptic ulcer related pain, and the experiences of surgeon. There were no significant differences in the laboratory data and perioperative data of two groups. In morbidity and mortality of two groups, there were no significant differences in leakage, wound infection, intra-abdominal abscess, ileus, urinary tract infection, pneumonia, and mortality, but there was significant difference in overall morbidity in two groups. **Conclusions:** Laparoscopic repair of perforated peptic ulcer is safe and could be used in routine clinical practice. However, patients with larger perforations (>10 mm), longer duration of history peptic ulcer related pain (>2 years), and learning curve of surgeon could be associated with conversion rate. It is associated with higher morbidity in patients with conversion from laparoscopy to laparotomy.

## Keywords

Laparoscopy, Perforated Peptic Ulcer, Repair, Conversion Rate

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## 1. Introduction

Perforated peptic ulcer (PPU) is a common emergency and a major cause of death in elderly patients. It is usually treated by surgery, including laparotomy with simple closure or a definitive acid-reduction procedure, laparoscopic, or nonoperative treatment [1]-[3]. As we know that peptic ulcer is associated with *Helicobacter pylori* (Hp), simple closure followed by *Helicobacter pylori* eradication has become the most used procedure in perforated ulcer treatment [4]. Simple closure of PPU could be achieved by laparotomy and laparoscopy. Laparoscopic repair of PPU has been applied since 1990 [1]. Several studies have been reported that laparoscopic offers improved patient outcome with significantly less morbidity [5]. However, few studies have been reported to discuss the causes of conversion from laparoscopy to laparotomy. Herein, we reported our experience of laparoscopic repair of PPU about conversion from laparoscopy to laparotomy.

## 2. Patients and Methods

From October 2003 to October 2008, 164 patients with PPU and underwent surgical intervention at Show-Chwan Memorial Hospital were reviewed retrospectively.

34 patients underwent laparoscopic surgery, and 6 patients were converted to laparotomy. 130 patients underwent laparotomy initially were excluded, including septic shock (87 cases), serious associated cardiopulmonary diseases (23 cases), previous abdominal operations (12 cases), and gastric outlet obstruction (8 cases).

The 34 patients with PPU underwent laparoscopic surgery were divided into two groups: non-conversion group (28 cases) and conversion group (6 cases).

Five surgeons were involved these operations, including one surgeon with experience of no more 10 laparoscopic repair of PPU and four surgeons with experience of more than 10 cases of laparoscopic repair of PPU.

Patients underwent general anesthesia with muscle relaxation at operating room. Postoperative patients were routinely received treatment of nasogastric tube (NG) insertion, proton pump inhibitors and placement of abdominal drains. Abdominal drains were removed when the ascites were clear and no more amount of 50 ml per day.

NG was removed when the bowel sound recovered and no more amount of 200 ml per day. Patients presented with abdominal distension, absence of passage of flatus, nausea, abdominal pain or abdominal plain film showed bowel distension was defined as ileus.

## 3. Statistical Analysis

Student's t test was used for statistical analysis.  $P \leq 0.05$  was accepted as statistically significant.

## 4. Results

*The characteristics of the patients: (Table 1)*

There were 20 male and 14 female patients were enrolled. 28 patients were non-conversion group, 6 patients were conversion group. The mean age of non-conversion group was 56.2 years old; conversion group was 58.1 years old. The locations of perforation were duodenal (19/34; 16 in non-conversion group, 3 in conversion group), juxtapyloric (15/34; 12 in non-conversion group, 3 in conversion group), and stomach (1/34, one in non-conversion group). The median size of perforation was 5.5 mm (2 - 10) in non-conversion group, and 13.5 mm (5 - 30) in conversion group. There was significant difference between two groups. The mean duration of acute abdominal pain was 15.3 hours (4 - 24) in non-conversion group, and 21.5 hours (10 - 28) in conversion group. There was no significant difference between two groups. However, there was significant difference between two groups in mean duration of history of peptic ulcer related pain (non-conversion group: 6.3 months; conversion group: 23.5 months).

There were five surgeons included in studies, including one surgeon with the experience of no more than ten laparoscopic repair of PPU, and the other four surgeons with the experience of more than ten laparoscopic repair of PPU. There were significant differences between the two groups in the experience of surgeon.

*The laboratory data of the patients: (Table 2)*

The patient's hemotocrit (HCT) in non-conversion group is 35.5; and conversion group is 33.3 (%). The white blood cell (WBC) count in non-conversion group is 12,538 (/ul); and conversion group is 14,760 (/ul). The segment form of WBC is 84 (%) in non-conversion group; and 82.6 (%) in conversion group. The C-reactive protein

**Table 1.** The characteristics of two groups.

	Non-conversion	Conversion
No.	28	6
M:F	16:12	4:2
Mean age	56.2 (25 - 92)	58.1 (32 - 83)
Location:		
-Duodenal	16	3
-Juxtapyloric	12	3
-Stomach	1	0
Median size of perforation (mm)	5.5 (2 - 10)	13.5 (5 - 30)*
Mean duration of acute onset (Hour)	15.3 (4 - 24)	21.5 (10 - 28)
Mean duration of history of peptic ulcer related pain (chronic upper abdominal pain) (months)	6.3 (0.1 - 12)	23.5 (0.5 - 48)*
Experiences of Surgeon:		
- < 10	4/28	4/6*
- > 10	24/28	2/28

\* $P < 0.05$ .**Table 2.** The laboratory data of two groups.

	Non-conversion	Conversion
No.	28	6
Hct (%)	35.5 (28.2 - 46.3)	33.3 (30.2 - 42.6)
WBC (/ul)	12538 (8900 - 25800)	14760 (9200 - 26900)
-segment (%)	84 (62 - 94)	82.6 (77 - 94)
CRP (mg/dl)	2.6 (0.2 - 14.5)	4.7 (1.2 - 16.4)

\* $P < 0.05$ . Hct: hematocrit, WBC: white blood cell, CRP: C-reactive protein.

(CRP) of non-conversion group is 2.6 (mg/dl); and the conversion group is 4.7 (mg/dl). There were no significant difference between two groups in laboratory data, including HCT, WBC, segment form of WBC, and CRP.

*The perioperative data of the patients: (Table 3)*

The operative time in non-conversion group is 68.7 (min); and the conversion group is 72.3 (min). The retention of abdominal drains in non-conversion group is 4.2 (days); and the conversion group is 5.6 (days). The time to normal diet in non-conversion group is 4.5 (days); and the conversion group is 6.2 (days). The time to oral analgesia in non-conversion group is 3.4 (days); and the conversion group is 4.1 (days). The time to full mobilization in non-conversion group is 2.3 (days); and the conversion group is 3.8 (days). The hospital stay in non-conversion group is 6.8 (days); and the conversion group is 7.6 (days)

There were no significant differences between the two groups in perioperative data, including operative time, the retention of abdominal drains, the time to normal diet, the time to oral analgesia, the time to full mobilization, and the hospital stay.

*The morbidity and mortality of the patients: (Table 4)*

As Table 4 shows, there were no significant differences between the two groups in leakage, wound infection, intraabdominal abscess, ileus, urinary tract infection, pneumonia, mortality. However the overall morbidity of conversion group is significant higher than that of non-conversion group.

## 5. Discussion

Owing to the advances in the medical treatment of peptic ulcer disease, the number of elective ulcer surgeries

**Table 3.** The perioperative data of two groups.

	Non-conversion	Conversion
No.	28	6
Operative time (min)	68.7 (42 - 152)	72.3 (56 - 168)
Retention of abdominal drain (days)	4.2 (2.5 - 10.5)	5.6 (4.5 - 14.2)
Time to normal diet (days)	4.5 (3.2 - 13.0)	6.2 (5.1 - 14.2)
Time to oral analgesia (days)	3.4 (2 - 8.5)	4.1 (3.2 - 10.5)
Time to full mobilization (days)	2.3 (1.8 - 4.5)	3.8 (2.8 - 8.4)
Hospital stay (days)	6.8 (4 - 14)	7.6 (6 - 15)

\* $P < 0.05$ .**Table 4.** The morbidity and mortality of two groups.

	Non-conversion	Conversion
No.	28	6
Leakage	1	1
Wound infection	4	2
Intraabdominal abscess	1	1
Ileus	2	1
UTI	1	0
Pneumonia	1	1
Overall morbidity	5/28	4/6*
Mortality	1	1

\* $P < 0.05$  UTI: urinary tract infection.

decreased. However, the number of patients requiring surgical intervention for complications such as perforations remains relatively unchanged [1] [2] [6]-[9]. However, simple closure followed by *Helicobacter pylori* eradication has become the most used procedure in perforated ulcer treatment [4]. Laparoscopic repair for PPU could be routinely used and different techniques has been tried. It could provide decrease postoperative wound pain and encourages early mobilization and return to normal daily activities. The benefit of early discharge and early return to work may outweigh the consumable cost incurred in the execution of laparoscopic procedures. However, there is 13% - 21.5% rate of conversion [1] [10]. The causes of conversion include perforated nonpyloric gastric ulcers, unidentifiable perforations, perforations larger than 10 mm, and bleeding during suturing [1]. In our study, the causes of conversion may include size of perforation, mean duration of history of peptic ulcer related pain, and the experience of surgeons.

As Siu WT, *et al.* [1] reported, the majority of the ulcer perforations were small. Perforations more than 10 mm may be associated with rate of conversion. In our study, the conversion group has larger median size of perforation than non-conversion group, and the median size of perforation in conversion group is over 10 mm. It means that larger size of perforation would increase the rate of conversion, especially the size is over 10 mm.

Besides, in our study, patients with longer history of peptic ulcer or peptic ulcer related pain may increase the possibility of conversion, especially for patients with history of peptic ulcer for more than two years.

There were five surgeons involved in this study, only one surgeon has experience of no more ten cases of laparoscopic repair of PPU. The other four surgeons have experience of more than ten cases of laparoscopic repair of PPU. It means that learning curve may be associated with the rate of conversion.

Besides, we found the rate of leakage, wound infection, intra-abdominal abscess, ileus, urinary tract infection, and pneumonia were not increased in patients with conversion from laparoscopy to laparotomy. However, that

the overall morbidity would increase once the patients underwent conversion from laparoscopy to laparotomy, but it will not increase the rate of mortality.

## 6. Conclusion

We think that laparoscopic repair of PPU is a safe alternative treatment. However, several conditions were associated with rate of conversion, including larger perforations (>10 mm), longer duration of history peptic ulcer related pain (>2 years), and learning curve of surgeon. Once conversion from laparoscopy to laparotomy, it will increase the overall morbidity.

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