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Laparoscopic repair of perforated peptic ulcer: simple closure *versus* omentopexy

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ABSTRACT

Background: This report presents our experience with laparoscopic repair performed in 118 consecutive patients diagnosed with a perforated peptic ulcer (PPU). We compared the surgical outcome of simple closure with modified Cellan-Jones omentopexy and report the safety and benefit of simple closure.

Methods: From January 2010 to December 2014, 118 patients with PPU underwent laparoscopic repair with simple closure ($n = 27$) or omentopexy ($n = 91$). Charts were retrospectively reviewed for demographic characteristics and outcome. The data were compared by Fisher's exact test, Mann-Whitney *U* test, Pearson's chi-square test, and the Kruskal-Wallis test. The results were considered statistically significant if $P < 0.05$.

Results: No patients died, whereas three incurred leakage. After matching, the simple closure and omentopexy groups had similarity in sex, systolic blood pressure, pulse rate, respiratory rate, Boey score, Charlson comorbidity index, Mannheim peritonitis index, and leakage. There were statistically significant differences in age, length of hospital stay, perforated size, and operating time. Comparison of the operating time in the ≤4.0 mm and 5.0-12 mm groups revealed that the simple closure took less time than omentopexy in both groups (≤4.0 mm, 76 *versus* 133 minutes, $P < 0.0001$; 5.0-12 mm, 97 *versus* 139.5 minutes; $P = 0.006$).

Conclusions: Compared to the omentopexy, laparoscopic simple closure is a safe procedure and shortens the operating time.

Introduction

Laparoscopic repair has been used to treat perforated peptic ulcer (PPU) since 1990,[1] and this approach has been widely accepted as an effective method. In most institutions, the standard laparoscopic repair for PPU is closure with an omental patch.[2] An omental patch is covered to secure the perforation closure and prevent leakage. Adding an omental patch requires technical skill and is time consuming. However, is it safe to repair the perforation without an omental patch to shorten the operating time? A review of the literature revealed a few studies that have reported on the safety of simple closure and compared its outcomes *versus* those of omental patches.[3-5] Thus, the aim of this study was to report our experience with laparoscopic repair in 118 patients with PPU, analyze the clinical characteristics and surgical outcomes of simple closure *versus* modified Cellan-Jones omentopexy, and discuss the safety and benefit of simple closure.

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Material and methods

This study was approved by the Institutional Review Board of Chang Gung Memorial Hospital. From January 2010 to December 2014, 518 patients with a clinical diagnosis of PPU underwent surgery in our department; of them, 136 underwent the laparoscopic approach. For the prevention of selection bias of patients who did or did not undergo the laparoscopic method, patients with shock, generalized peritonitis, previous upper-abdominal surgery, nonjuxtapyloric gastric ulcers, perforations >12 mm, and concomitant ulcer bleeding or gastric outlet obstruction were excluded. Eighteen patients with big perforation and/or technical difficulties were converted to open method, while the remaining 118 patients (22.8% PPU patients) eventually underwent laparoscopic repair and were included in this study. Depending on the personal experiences and skill, 27 patients underwent simple closure by the author (B.-C.L.), whereas the other 91 underwent repair using an omental by other surgeons. The patients were placed in a 15- to 20-degree reverse Trendelenburg position. The surgeon and the camera operator stood on the patient's left side with an assistant on the other side. Carbon dioxide pneumoperitoneum (12 mmHg) was established through an umbilical incision with a Veress needle or Hasson technique, whereas a 0- or 30-degree-angled laparoscope was introduced through the 11-mm port. One 11-mm port for the surgical needle was placed at the left lateral abdomen, and a third 5-mm port was placed at the right lateral abdomen. In some patients, additional 5-mm port was placed in the right costal margin to elevate the liver. The whole peritoneal cavity was examined, and the perforation was identified. Of the 27 simple closure patients, the stitch was placed on the point 5-6 mm from both edges of the perforation with whole-layer intracorporeal knot-tying. The numbers of stitches were chosen according to perforation size. The intraoperative field of a 50-year-old man who underwent simple closure is shown in Figure. A modified Cellan-Jones omentopexy was chosen in 91 patients for reinforcement. Full-thickness bites and kont-tying as for simple closure and without cutting these sutures, a vascularized omental segment was mobilized on top of the closed perforation. The same sutures were used to tie down the omental patch over the already approximated perforation with a second level of knots. A meticulous lavage was performed with at least 3 L of saline, and a drain was placed routinely. Age, sex, systolic blood pressure (SBP), pulse rate, respiratory rate, Boey score,[6] Charlson comorbidity index (CCI),[7] Mannheim peritonitis index (MPI) (Table 1),[8] operating time, length of hospital stay (LOS), and leakage were analyzed. The statistical analysis used Fisher's exact test (for Boey score and leakage), the Mann-Whitney *U* test (compares the medians of two groups [e.g., age, SBP, pulse rate, respiratory rate, CCI, MPI, operating time, LOS, and perforation size]), Pearson's chi-square test (for categorical variables [e.g., sex]), and the Kruskal-Wallis test. The results were considered statistically significant at values of $P < 0.05$.

Results

Table 1 shows the demographic data and surgical outcomes of the simple closure and omentopexy patients. The two groups were similar in terms of age ($P = 0.683$), SBP ($P = 0.997$), pulse rate ($P = 0.739$), respiratory rate ($P = 0.731$), Boey score ($P = 0.734$), CCI ($P = 0.293$), MPI ($P = 0.186$), and leakage ($P = 0.545$). No patients died, whereas three incurred leakage (simple closure, $n = 1$; omentopexy, $n = 2$) that eventually required a laparotomy. Another patient treated with an omentopexy developed an intraabdominal abscess. There were statistically significant differences in age (49.0 *versus* 53.0 years; $P = 0.029$), LOS (7.0 *versus* 8.0 days; $P = 0.022$), perforation size (4.0 *versus* 5.0 mm; $P < 0.001$), and operating time (90.0 *versus* 139 minutes; $P < 0.0001$). We analyzed the effect of perforation size on operating time and chose 4.0 mm (median perforation size of the simple closure group) as a cut point and divided the patients into 2 groups (≤4.0 mm and 5.0-12 mm). Table 2 reflects that the simple closure took less operating time than the omentopexy in both groups (≤4.0 mm, 76.0 *versus* 133 minutes, $P < 0.0001$; 5.0-12 mm, 97.0 *versus* 139.5 minutes, $P = 0.006$).

Discussion

Laparoscopic surgery has mainly been used for elective surgery since the late 1980s; however, the influence of the pneumoperitoneum on the acute abdomen with peritonitis

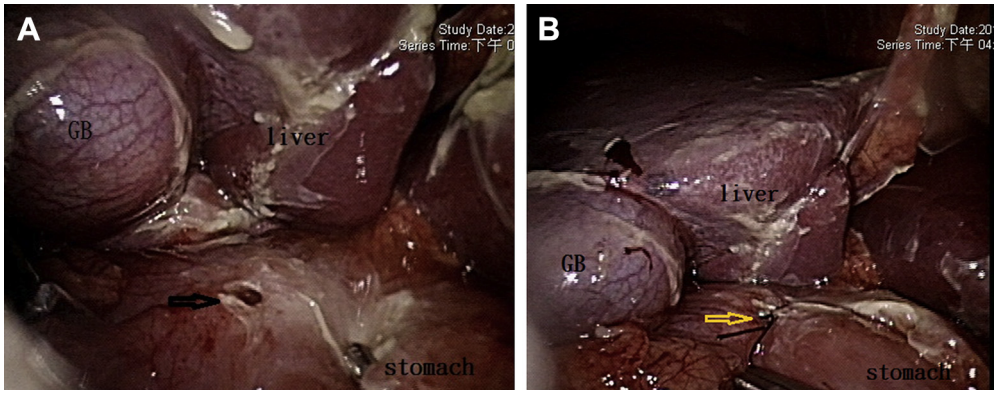

Fig – (A) Intraoperative field of a 50-year-old man with perforated pyloric ulcer underwent laparoscopic management, showing a 3 × 3 mm^2 perforation (arrow); (B) laparoscopic view of the same patient, showing simple one-stitch repair (arrow) without omentum. GB, gallbladder. (Color version of figure is available online.)