

Diagnostic and therapeutic role of laparoscopy in perforated peptic ulcer in the elderly patients

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SUMMARY: Diagnostic and therapeutic role of laparoscopy in perforated peptic ulcer in the elderly patients.

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Aim. The purpose of this study is to analyze the outcome of elderly patients with perforated peptic ulcer comparing laparoscopic treatment versus open approach.

Methods. In our General and Emergency Surgery Unit in the last 3 years, 20 elderly patients with perforated peptic ulcer were performed. We considered elderly all patients over the age of 65 years (10 females and 10 males; the mean age was 75 years). 16 patients (80%) were submitted to laparoscopic repair with omentoplasty and 4 (20%) to open repair. The patients were classified using the Boye's score which influenced the choice of surgical treatment and the out-

me. The two groups were compared in terms of operative surgery times, complication rate, mortality and postoperative outcomes.

Discussion. Perforated peptic ulcer is a common abdominal disease that is treated by surgery. The potential advantages of laparoscopy, both in terms of diagnosis and therapy, are clear and the major advantages may be observed in cases with peritonitis secondary as a perforated peptic ulcer where laparoscopy allows the confirmation of the diagnosis, the identification of the position of the ulcer and the repair. With the age the risks of comorbidities increases multidisease syndrome. Elderly patients suffer from frailty syndrome. All these factors make the elderly patient a major challenge for a laparoscopy treatment.

Conclusion. The laparoscopic approach is an effective method for treatment of perforated peptic ulcer in the elderly with a great diagnostic and therapeutic role. Nowadays more prospective randomized studies are needed to evaluate the effectiveness of laparoscopic versus open repair.

KEY WORDS: Laparoscopic - Ulcer - Peptic - Perforation - Elderly - Frailty.

Introduction

Perforated peptic ulcer (PPU) is a common abdominal disease that is treated by surgery. Although the incidence of PPU drastically decreased after the identification of *Helicobacter pylori* as the prime cause with the subsequent introduction of proton pump inhibitor therapy in clinical practice, the diagnosis of PPU has been increasing over the past decade possibly due to the larger-scale use of nonsteroidal anti-inflammatory drugs (FANS) (1). The incidence of peptic ulcer ranges from 7 to 10 cases per 100,000 population. Of these patients 2% to 14% evolves in PPU (2-4). The incidence of PPU in-

creases with the age. In fact in the most cases the patients are elderly with considerable comorbidity, a high mortality rate (10-30%) and morbidity rate of up to 50% (4, 5). Consequently, PPU remains a frequent challenge to surgeons and optimal treatment strategies are needed. The development of laparoscopic surgery had changed the way to treat such abdominal surgical emergencies. The potential advantages of laparoscopy, both in terms of diagnosis and therapy, are clear and the major advantages may be observed in cases with peritonitis secondary as PPU where laparoscopy allows the confirmation of the diagnosis, the identification of the position of the ulcer and repair with effective peritoneal washout. This is complemented by the common advantage of laparoscopy versus open treatment as the faster recovery, less postoperative pain, early mobilization (6). The number of patients presenting as an emergency

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with a general surgical condition increases with age. Up to one quarter of all emergency admissions to hospital may be for general surgical conditions (7). Frailty is the most problematic expression of the aging of the population. It is a state of homeostatic vulnerability after a stressful event as a consequence of the decline of many physiological systems (8).

Methods

In our General and Emergency Surgery Unit between January 2016 and December 2018, 20 elderly patients with PPU were admitted. We considered elderly all patients over the age of 65 years. Demographic data were retrospectively collected from medical records. Statistical significance was set at $P < 0.05$ and resulting P values were adjusted according to Bonferroni correction method. Data were analysed using the SPSS statistical software, IBM® (New York, United States).

All patients admitted at our Emergency Department were evaluated by clinical, biochemical and radiological assessment. A Ct scan to identify the perforation site and estimate its size in coronal views by programming the exact surgical approach were performed. But in 4 (20%) cases showed no signs of bowel perforation and the laparoscopy had diagnos-

tic beyond that therapeutic role.

Elderly patients had multiple and similar comorbidities in term of cardiovascular, pulmonary comorbidities or tumors. There were two scoring systems – American Society of Anesthesiologists (ASA) class and Boey score – were used for evaluation of the patients' condition. The Boey score, used for evaluation of the severity of the disease, is based on the available information of the following three criteria: shock at admission (systolic blood pressure < 90 mm Hg), severe medical illness (ASA III-V), and delayed presentation (duration of symptoms > 24 h). For this scoring system, the patient is given one point for each positive criterion, with possible scores of 0-3. Patients with a Boey score of 0-2 were subjected to laparoscopy or laparotomy at the discretion of the consulting surgeon. Patients with a Boey score of 3 were considered for laparotomy. The characteristics of the patients are presented in Table 1 and 2.

Two groups of patients were compared: the PPU laparoscopic repair (LR group) that included 16 (80%) patients, and PPU open repair (OR group) that included 4 (20%) patients. Groups were compared in terms of operative surgery times, complication rate, mortality and postoperative outcomes.

From our study we excluded patients undergoing gastric resection by posterior ulcer location that prevented adequate suture (3 cases).

TABLE 1 - GENERAL CHARACTERISTICS OF PPU PATIENTS.

General Characteristics	Patients number (20,10M, 10F)
Mean Age (years)	75 (range 65-82)
Ulcer site	11 gastric ulcer (8 antral, 3 corpus)9 duodenal ulcer
Ulcer mean size (mm)	7 (range 4-15 mm)
Surgical approach	16 (80%) laparoscopic repair4 (20%) open repair
Ulcer risk factors	13 FANS 4 Steroidal anti-inflammatory drugs 3 Helicobacter pylori

TABLE 2 - PATIENTS' BOEY'S SCORE.

Boey's score	LR group (16)	OR group (4)
0-1	14	0
2	2	3
3	0	1

In all LR cases we used the Lloyd-Davies position with reverse Trendelenburg tilt. All the procedures were performed by surgeons experienced in laparoscopy and intracorporeal suturing. The surgeon stood between the patient's legs, and the camera operator stood at the patient's left side. Pneumoperitoneum was created with open Hasson's technique

(pressure of 12-14 mm Hg) in the infraumbilical region. After confirmation of the diagnosis, 2 or 3 additional working trocars were placed. After checking the abdominal cavity and identification of the perforation site, the ulcer was repaired with a PDS 3-0 or Vycril 3-0 stitch by a round body needle tied over an omental patch with the aid of fibrine glue. Procedures were completed with methylene blue leak testing. After repair of the perforation site, the abdominal cavity was irrigated with 4-6 liters of normal saline solution. The abdominal cavity was drained routinely with 1 or 2 drainages removed in 3-4 postoperative days. In none of laparoscopic repair it was necessary conversion.

In the same period we performed 4 OR of perforated ulcers with omentoplasty. Open procedures were performed by upper median laparotomy. Of these patients 3 cases were a story of supramesocolic surgery and severe comorbidities which prevented laparoscopic access while 1 was in septic shock (Boey 3).

In the postoperative period all patients received intravenous fluids, broad-spectrum antibiotics, intravenous proton pump inhibitors (PPI) and analgesic.

A X-ray with Gastrografin in the fourth postoperative day were performed for all patients and didn't show possible leak. Therefore it was removed the nasogastric tube aspiration and the patient had started to eat. PPI therapy was continued in all patients for 30 days and the next endoscopic control at 30-45 days didn't show any alteration of the gastric or duodenal mucosa. After a median follow-up of 12 months, no ulcer recurrence or cancer were noticed.

Results

Over the 4 year study period 20 patients with PPU were performed. 16 of these patients were submitted to laparoscopic repair (LR) and 4 to open repair (OR). There were 11 cases of perforated gastric ulcer and 9 cases of perforated duodenal ulcer. The mean age of these patients was 75 years old (range 65-82 years). 10 patients were males and 10 were females. All patients had risk factors for peptic ulcer, in particular FANS chronic use, or it had been affected in the past.

The mean size of ulcer were 7 mm (range 4-15 mm). 8 of 11 gastric ulcer were localized in gastric antral and 3 in gastric corpus; the 9 cases of duodenal ulcer were placed in duodenal bulb.

Mean blood loss was 90 ml (range 30-155 ml) of LR versus 145 ml of OR (range 100-205 ml) (p 0.0780). The LR mean operative time was 92 minutes (range 58-145 minutes) versus 110 minutes (range 75-160 minutes) (p 0.062). Mean postoperative hospital stay of LR was 6 days (range 5-10 days) and all patients had a good control of postoperative analgesia with suspension of analgesic therapy during the second day. Conversely the mean postoperative hospital stay of OR group was 10 days (range 7-15 days) (p 0.039) with poor pain control for median laparotomy and prolonged postoperative use of opioids.

Postoperative complications occurred in 5 patients (25%). There were only 1 postoperative complication after LR (1/16, 6.25%), a case of gastric hemorrhage endoscopic treated. In the 4 patients underwent to OR we had recorded 1 case of pulmonary infection, and 1 case of abdominal wall abscess (2/4 50%) (p 0.0688). The patient in septic shock died on 2 postoperative day for multi-organ failure (1/4, 25%). No deaths occurred in the LR group (0%, p 0.043) 30 days postoperative mortality was 5% (1/20) causes arise from myocardial infarction in 1 patient of OR group. We have summarized the postoperative patients outcomes in Table 3.

Discussion

The incidence of PPU increased with the age. In fact in the most cases the patients are elderly with considerable comorbidity, a high mortality rate (10-30%) and morbidity rate of up to 50% (4, 5).

The development of laparoscopic surgery has changed the way to treat such abdominal surgical emergencies. The potential advantages of laparoscopy, both in terms of diagnosis and therapy, are clear and the major advantages may be observed in cases with peritonitis secondary as PPU where laparoscopy allows the confirmation of the diagnosis, the identification of the position of the ulcer and repair with effective peritoneal washout. This is complemented by the common advantage of laparoscopy

TABLE 3 - RESULTS OF LAPAROSCOPIC REPAIR VERSUS OPEN APPROACH.

	LR group (16, 80%)	OR group (4, 20%)	P value
Mean Blood less (ml)	90 (range 30-155)	145 (range 100-205)	0.078
Mean operative time (min)	92 (range 58-145)	110 (range 75-160)	0.062
Hospital stay (days)	6 (range 5-10)	10 (range 7-15)	0.039
Postoperative complication (n)	1 (6.25%)	2 (50%)	0.068
Mortality (n)	0 (0%)	1 (25%)	0.043

versus open treatment as the faster recovery, less postoperative pain, early mobilization (6-9). Some studies also confirm that the mini-invasive surgical approach in the elderly would improve cognitive function by reducing postoperative delirium rates (10). The number of patients presenting as an emergency with a general surgical condition increases with age. Up to one quarter of all emergency admissions to hospital may be for general surgical conditions (7). Numerous retrospective studies have identified 40/50% of the cases of intestinal occlusion as the most frequent causes of abdominal pathology requiring urgent surgical treatment in the elderly; 30-40% of cases are peritonitis (from complicated diverticular disease, cholecystitis, appendicitis and PPU); 5% from intestinal ischemia and 10% from bleeding problems. Among these diseases, especially cholecystitis and appendicitis, the gold standard to date for treatment is laparoscopy (11).

Laparoscopy in the management of PPU has increased also due to the large diffusion of adequate skills among surgeons, as it happened to other surgical procedures that are actually mainly managed by minimal invasive approach (12). Recent review and meta-analysis on the use of laparoscopic repair for PPU have found no statistically significant differences between laparoscopic and open surgery in the proportion of abdominal septic complications, pulmonary complications and number of septic abdominal complications. If there were less early postoperative pain with less analgesic therapy, blood less, a shorter hospital stay, a lower rate of wound infection, a lower mortality rate and earlier return to work after laparoscopic repair, as in our study, Authors stated that laparoscopic surgery results were

not clinically different of open surgery (12-14).

Patients' selection for laparoscopic PPU repair is still disputable. Some Authors suggest reserving laparotomy for high risk patients who had septic shock on admission, severe cardiopulmonary comorbidities, history of upper abdominal surgery, large perforations, inadequate surgical skills (2, 15, 16).

Several predictive scores were proposed over time for PPU even if most of them, as the Mannheim Peritonitis Index, were general scores often needing operative data. But The Boey's score was the specific PPU score due to its simplicity and high predictive values. Some papers reported a progressive increase in both morbidity and mortality related to increasing Boey's score (11%, 47%, 75% and 77% for morbidity and of 1%, 8%, 33% and 38% for mortality) (17-19).

Our data showed that patients operated with open technique have higher morbidity rates (50% vs 6.25%) even if not statistically significant difference was proved ($p = 0.062$). The mortality rate was high in the OR group due to severe comorbidities, with statistically difference between the two groups (LR 0%, OR 25%, $p0.043$). However, in our opinion this high rate of morbidity and mortality should be correlated to the inclusion in the open group of patients with higher Boey's score who were not managed laparoscopically.

Surgical assistance on elderly patients is complex due to the presence of multiple comorbidities that can lead to increased postoperative complications. Frailty is the most problematic expression of the aging of the population. It is a state of homeostatic vulnerability after a stressful event as a consequence of the decline of many physiological systems (8).

The progressive increase of elderly population suffering from PPU often with frank peritonitis may represent an obstacle to a more rapid discharge and to an immediate resumption of normal activities (20). The study reported by Mirabella et al. (18) showed a statistically significant difference in morbidity and mortality between patients < 70 and > 70 years old ($p = 0.000$; $p = 0.002$) irrespective of the used technique.

Conversion was mainly associated with technical difficulties which were impossible to predict before the operation. In some studies it reaches 7.9–21.5% and causes of conversion were: ulcer >1 cm, technical difficulties, fragility of the ulcer margins, difficult ulcer localizations, associated hemorrhage and unidentifiable perforations (2, 12, 21). In our series, fortunately, we didn't have any conversions, while, on the basis of the diameter of the ulcer, the surgical repair was tailored looking at the dimension not necessarily as a reason to convert.

In many studies the average duration of surgery of laparoscopic repair was 65–95 min (range: 25–190 min) (22, 23) and in some studies duration of the operation was significantly longer in the laparoscopic group. Moreover in our study the average duration of the operation was significantly shorter in the laparoscopy group versus open group thanks the high laparoscopic skill of our surgeon.

Perforated gastric cancer is a rare occurrence comprising only 0.3–3% of all gastro-duodenal perforation and the incidence increased with the age

(24). Diagnosis of cancer was made pre or intraoperatively in only one third of cases: in the majority of cases diagnosis is made postoperatively with endoscopic biopsy after 4–6 weeks (25). Some Authors recommended to treat urgently the perforation with simple suture closure if was possible, followed by a second-stage oncological resection in patients who have a resectable cancer (2–24).

Conclusion

The laparoscopic approach is an effective method for treatment of perforated peptic ulcer in the elderly patients with a great diagnostic and therapeutic role and postoperative outcome but the data don't show a statistically significant difference from open surgery, as reported in literature. Elderly patients suffer from frailty syndrome. All these factors make the elderly patient a major challenge for a laparoscopy treatment. Morbidity and mortality resulted statistically related to Boey's score, while only mortality was statistically related to the surgical technique being laparoscopy not used in high risk Boey's score patients. In this regard, it would be interesting to evaluate the safety and usefulness of laparoscopic surgery in high risk patients. Future high-quality multicenter prospective randomized studies with large sample size and long follow up should be undertaken to further assess the safety and efficacy of laparoscopic repair for peptic ulcer disease.

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