Laparoscopic Repair of Perforated Peptic Ulcer

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11.1 Introduction

Save for perforated appendicitis, perforated peptic ulcer (PPU) is the most common intra-abdominal hollow viscus perforation that requires surgical intervention [1]. The estimated annual incidence is approximately 5–10/100,000 [2, 3]. Perforation occurs in 2–10 % of patients with peptic ulcer disease and is the leading cause of death due to PUD [3].

Ulcer perforation is most commonly found in the anterior portion of the first part of the duodenum and usually is of a diameter smaller than 5 mm [3].

11.2 Clinical Presentation and Diagnosis

Patients with perforated peptic ulcers most commonly present with sudden severe epigastric pain that may radiate to the shoulder and is often associated with nausea and vomiting [3]. Presentation also typically entails acute abdomen, peritonitis and free air in abdominal plain films and/or in computerized tomography. Diagnosis is made both clinically and radiologically.

11.3 Pre-operative Management

Patients diagnosed with PPU should receive a well-monitored fluid resuscitation as well as intravenous antibiotics [4]. A naso-gastric tube is commonly recommended and narcotics may be administered for pain after the diagnosis is made. Following these initial stabilizing measures these patients should be promptly taken to the operating room.

11.4 Patient Selection

The Boey's shock score on admission (i.e. blood pressure below 90 mmHg, ASA class III or IV, and symptoms present for over 24 h) has been found reliable in selecting patients inappropriate for a laparoscopic intervention. If the patient has a Boey's score of 3, is over 70 years old or if symptoms have been present for over 24 h regardless of Boey's score, intervention by laparotomy should be considered [5].

11.5 Patient Positioning and Room Preparation

Positioning for PPU repair is similar to that used in laparoscopic cholecystectomy. A comfortable supine position with slight reverse Trendelenburg draws the operative field from under the costal margin and avoids leakage of gastric contents into the subphrenic space. Some authors advocate the use of a Lloyd-Davis position allowing for the surgeon to stand between the patient's legs [4] (Fig. 11.1).

11.6 Trocar Position and Laparoscope Angle

A 10 mm Trocar should be placed in the umbilicus for the video laparoscope. Additional working ports should be placed in the right and left midclavicular lines at the level of the transpyloric plain [4, 6] (Fig. 11.2). If needed an additional subxiphoid or right lateral subcostal trocar can be inserted for liver retraction. Alternatively a totally internal liver retractor such as the Endolift can be used [7]. An angled laparoscope (30° or 45°) is more commonly preferred for optimal visualization [4].

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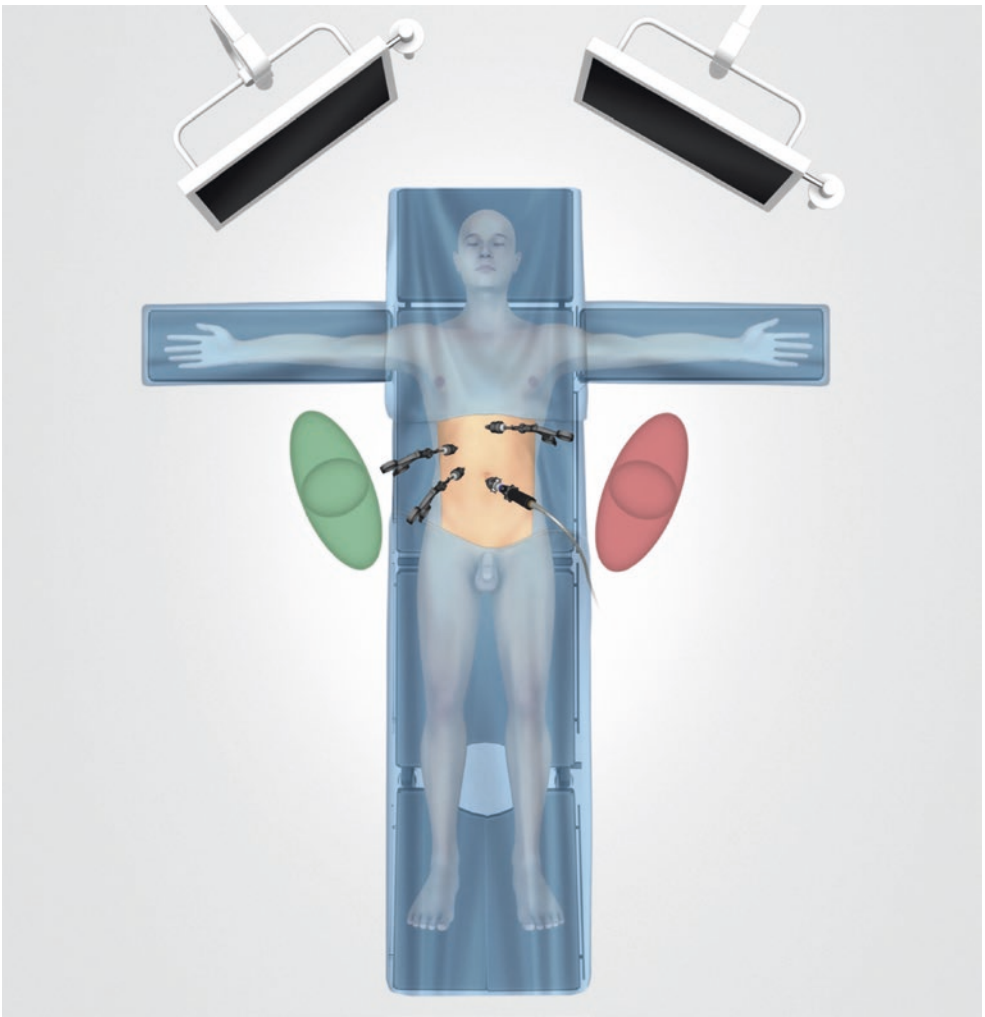

Fig. 11.1 Patient positioning for laparoscopic repair of perforated duodenal ulcer

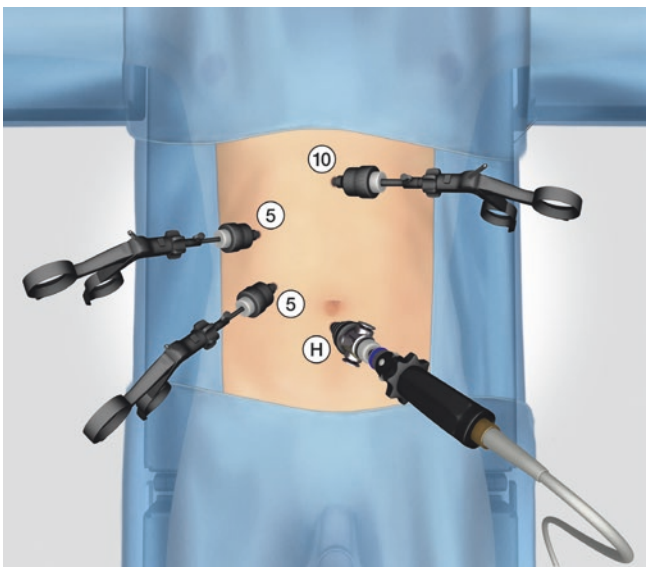

Fig. 11.2 Trocar positioning for laparoscopic closure of perforated duodenal ulcer

11.7 Details of the Procedure

The entire abdominal cavity should be thoroughly explored and the abdominal fluid sampled for microbiological culture. A warm isotonic solution should be used in large quantities to carefully lavage the abdominal cavity and suction out all exudate and food particles. Special care should be taken to expose and lavage the pelvis and subphrenic spaces, and open and drain possible inter-loop pockets of debris. If the omentum or liver have sealed off the perforation, it is advisable not to move them until lavage of the entire abdominal cavity has been performed in order to avoid any unnecessary soiling. The area of perforation should be thoroughly irrigated to wash off any fibrin or debris.

Gentle dissection should be used to expose the pyloroduodenal area to identify the perforation and any attached omentum or liver gently pulled off. Gentle compression of the antrum with an atraumatic instrument may aid in finding the location of the perforation by causing air bubbles to escape through it.

Identifying a perforation may not be straightforward. For example, a perforation of the dorsal stomach body may only become apparent after entering the lesser sac through the gastro-colic ligament. In many cases it is advisable to insert a liver retractor, which may entail insertion of an additional trocar as previously explained.

After the site of perforation has been verified, the size and probable etiology of the perforation is assessed. Due to the likelihood of a malignant perforation in gastric ulcers, a small biopsy from the margin of the ulcer should be taken before repair. If an obvious tumor is visualized and the patient's condition permits, a definitive procedure should be considered.

Two techniques are commonly used to close the perforation. In perforations smaller than 5 mm, a primary closure may be used with additional placement of omentum on top of the repair. In larger perforations it is commonly impossible to close the perforation by sutures because of edema and tissue fragility, and an omentopexy is required. A pedicled omental flap is placed on top of the perforation and secured with 3 or 4 horizontal sutures 10 mm from the edge of the ulcer. The sutures should be placed parallel to the pyloric plain in order to avoid stenosis or stricture. A pedicled flap from the falciform ligament may be used if the omentum is insufficient [8]. After completion of the omentopexy, air should be insufflated via naso-gastric tube to assess patency of the closure. In most cases it is advisable to leave a soft drain near the repair. If the perforation is bigger than 10 mm, is extra-pyloric or if technical difficulties are encountered consider conversion to laparotomy.

11.8 Post-operative Management

The patient is placed in Fowler's position. Naso-gastric suctioning and intravenous antibiotics are continued for several days until there is reasonable assurance that the pylorus is not obstructed by edema. Intravenous proton pump inhibitors are given as well. Fluid volume is maintained by intravenous fluids. After 72 h some perform upper gastro-intestinal radiography, if normal the patient can resume oral nutrition.

Abdominal abscesses can often complicate the post-operative period and should be treated accordingly. 6–8 weeks after surgery an esophago-gastro-duodenoscopy should be performed to assess ulcer healing and presence of Helicobacter Pylori (H. Pylori). Consider biopsy if healing is not adequate to rule out malignancy and eradicate H. Pylori if found.

If multiple ulcers were found in surgery, or if hypercalcemia is noted on laboratory results, consider eventual gastrin measurement. For accurate gastrin level testing the patient should not be taking any proton pump inhibitors.

11.9 Complications

30 day post-operative mortality is estimated at around 10 % for hospitalized patients with PPU [9], but can be as high as 50 % for patients with a Boey's score of 3 [9]. Morbidity is estimated at around 30 %, the most common complications being respiratory deterioration, abdominal abscess and wound infection [9]. Additional common complications include ileus and post-operative ventral hernia. Suboptimal surgical technique can cause gastric outlet obstruction. Conversion rate to laparotomy is around 10 % [1, 6]. Common reasons for conversion are inability to find or clearly visualize the ulcer defect and a large perforation diameter [6].

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