LAPAROSCOPIC MANAGEMENT OF PERFORATED DUODENAL ULCER

An Essay

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in General Surgery

By

Montaser Ibraheem Gelany Osman
M.B.,B.Ch.

Supervised By

Prof. Dr. Ismail Abdel Hakeem Qotb
Professor of General Surgery
Faculty of Medicine - Ain Shams University

Prof. Dr. Ali Mohamed El Anwar
Assist. Prof. of general surgery
Faculty of Medicine - Ain Shams University

Dr. Mohamed Abdel Moneim Marzouk
Lecturer of general surgery
Faculty of medicine - Ain Shams University

Faculty of Medicine
Ain Shams University

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List of Abbreviations

APACHE II Score...:	Acute physiology and chronic health evaluation II score
CT scan ..... :	Computed Tomography scan
DU ..... :	Duodenal ulcer
EAES ..... :	European Association for Endoscopic Surgery
GI tract..... :	Gastro-intestinal tract
GU ..... :	Gastric ulcer
HP ..... :	Helicobacter Pylori
LSPS ..... :	Laparoscopic single port surgery
MPI ..... :	Mannheim Peritoneal Index
NOTES ..... :	Natural orifice transluminal endoscopic surgery
NSAIDs ..... :	Non-steroidal anti-inflammatory drugs
PEG-tube ..... :	Percutaneous endoscopic gastrostomy tube
PPU..... :	Perforated peptic ulcer
PPUD..... :	Perforated peptic ulcer disease
PUD ..... :	Peptic ulcer disease
RUQ..... :	Right upper quadrant
SMA..... :	Superior mesenteric artery

INTRODUCTION

Peptic ulcer disease (PUD; gastric and duodenal ulcers) remains one of the most prevalent and costly gastro-intestinal diseases. The annual incidence of peptic ulcer ranges from ٠,١٪ to ٠,٣٪. Internationally, the frequency varies among countries but there are two major precipitating factors: Helicobacter pylori infection and the consumption of non-steroidal anti-inflammatory drugs (NSAIDs). Ulcer incidence increases with age for both duodenal ulcers (DUs) and gastric ulcers (GUs) and DUs emerge two decades earlier than GUs, particularly in men. Complications (bleeding, perforation, obstruction) can occur in patients with peptic ulcers of any etiology. Perforation occurs in about ٥٪ to ١٠٪ of patients with active ulcer disease. Duodenal, antral and gastric body ulcers account for ٦٠٪, ٢٠٪ and ٢٠٪ of perforations, respectively, of peptic ulcers *(Karangelis et al., ٢٠١٠).*

A history of intermittent abdominal pain or gastro-esophageal reflux is common. Additionally, known peptic ulcer disease that has been inadequately treated or with ongoing symptoms and sudden exacerbation of pain can be an indication of perforation. Patients with gastroduodenal perforation usually present with abdominal pain and peritoneal irritation from leakage of acidic gastric contents *(Lui and Davis, ٢٠١٠).*

The evaluation of patients suspected of having a perforated duodenal ulcer routinely involves a thorough physical examination, white blood cell count, and abdominal films. Some centers perform abdominal ultrasonography, or computerized tomography (CT) scans. With current radiological techniques, ٨٠٪ to ٩٠٪ of cases are correctly diagnosed in most institutions. Approximately ٥٪ to ١٠٪ of patients experience shock, with a mean arterial pressure of less than ٨٠ mm Hg. This group of patients must be resuscitated, and the final decision regarding the mode of intervention made after assessing the response to the resuscitation efforts *(Lagoo et al., ٢٠٠٢).*

Perforated duodenal ulcers can be managed using various types of surgical options, However as the efficacy of gastric anti-secretory medication and eradication of Helicobacter Pylori have improved, the preferred surgical method for the treatment of perforated duodenal ulcers has shifted from definite ulcer surgery to primary repair of the perforation *(Lee et al., ٢٠١١).*

For open surgery, after an upper midline incision, the ulcer was repaired transversely with an omental patch *(Ates et al., ٢٠٠٧).*

Various surgical techniques had been attempted for the treatment of perforated peptic ulcer (PPU). These

included stapled omental patch, gastroscopy aided insertion of the ligamentum teres, or omental plug. However, these techniques were either used only in small case series or tend to have high rates of re-operation. Laparoscopic suture closure, initially reported by Nathanson et al., was considered to be a procedure as safe as open approach. Laparoscopic repair confers benefits including reduced postoperative pain, less pulmonary infection, shorter hospital stay, and earlier return to normal activities. In nowadays, the two most commonly accepted laparoscopic procedures for PPU are simple closure with or without an omental patch to cover the repaired ulcer. The rationale to add an omental patch is based on the assumption that it may decrease the probability of leakage and provide a further sense of security *(Lo et al., ٢٠١١).*

Drawbacks are a prolonged operating time, higher incidence of re-operations due to leakage at the repair site and a higher incidence of intra-abdominal collection secondary to inadequate lavage *(Bertleff and Lange, ٢٠١٠).*

AIM OF THE WORK

To evaluate the role of laparoscope in management of perforated duodenal ulcer as regard the possibility of replacing classic open surgery by minimally invasive surgery.

Chapter (١)

ANATOMY AND LAPAROSCOPIC ANATOMY OF DUODENUM

The adult duodenum is ٢٠-٢٥cm long and is the shortest, widest and most predictably placed part of small intestine. The duodenum forms an elongated "c"shape that lies between the level of first and third lumbar vertebrae in the supine position. The lower limb of the C extends further to the left of the midline than the upper limb. The head and uncinate process of the pancreas lie within the concavity of the C. The duodenum lies entirely above the level of the umbilicus and is described as having four parts *(Standring et al., ٢٠٠٤).*

Parts of the duodenum:

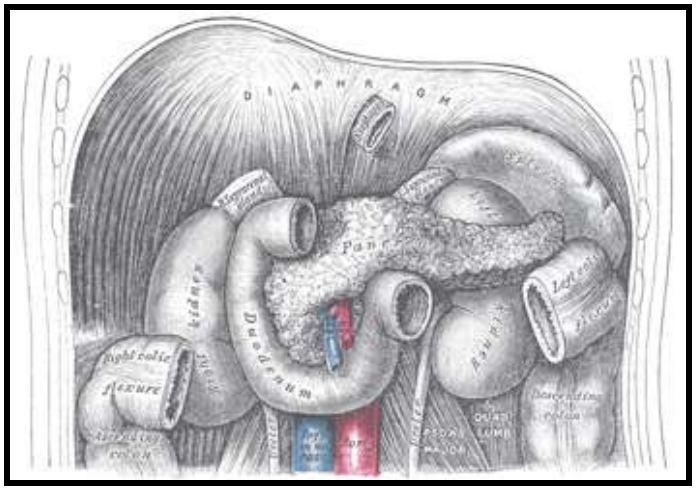

Fig. (١): Parts and relationship of the duodenum *(Standring et al., ٢٠٠٤).*

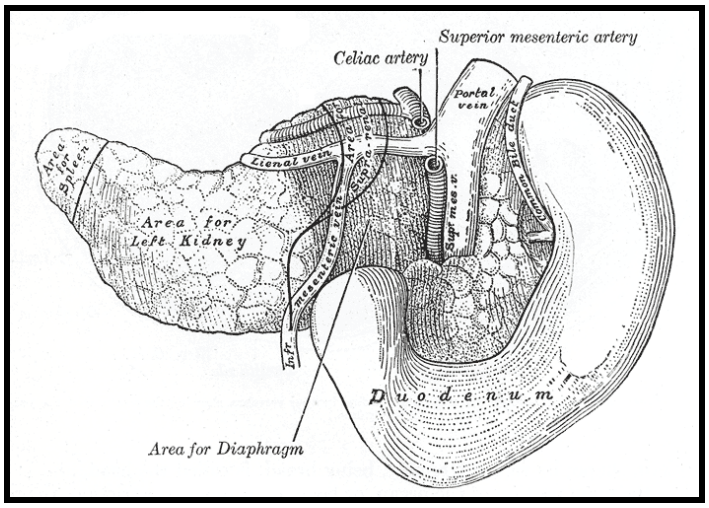

Fig. (٢): Pancreas and duodenum from behind *(Standring et al., ٢٠٠٤).*

First part:

The first part of the duodenum is ٥ cm long and starts as a continuation of the duodenal end of the pylorus. it is the most mobile portion of the duodenum. Close to the pylorus, peritoneum covers the anterior, superior and upper part of the posterior aspect where the duodenum forms part of the anterior wall of the epiploic foramen. Here the lesser omentum is attached to its upper border and the greater omentum is attached to its lower border. The first part then passes superiorly, posteriorly and laterlly for ٥ cm before curving sharply inferiorly into superior duodenal flexure, which marks the end of the first part. At the junction with the second part of the duodenum it lies posterior to the neck of the gallbladder. The first part of the duodenum lies anterior

to the gastroduodenal artery, common bile duct and portal vein and anterosuperior to the head and neck of the pancreas. The gastroduodenal artery lies immediately posterior to the outer muscular layers of the posterior wall of the first part *(Standring et al., ٢٠٠٤).*

Peptic ulceration is commonly found on the posterior wall in this region and penetration of the wall with erosion of the gastroduodenal artery may lead to dramatic haemorrhage. Penetrating peptic ulceration in the anterior wall may lead to free perforation into peritoneal cavity because the anterior surface of the first part is covered only by peritoneum *(Standring et al., ٢٠٠٤).*

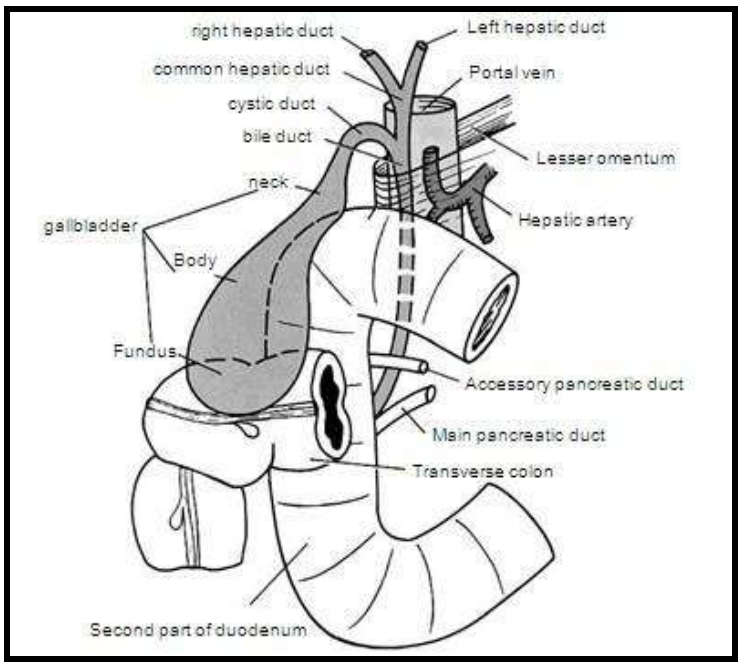

Fig. (٣): Relations of first part of the duodenum *(Standring et al., ٢٠٠٤).*

Second part:

The second Part (Descending) is ٧,٥ cm long. It extends from the neck of the gallbladder to the upper border of L٤. This part of the duodenum is crossed by the transverse colon and the mesocolon and consists, therefore, of a supramesocolic portion and an infra-mesocolic portion. The parts above and below the attachment of the transverse colon are covered with visceral peritoneum. The first and second parts of the duodenum join behind the costal margin a little above and medial to the tip of the ninth costal cartilage and on the right side of the first lumbar vertebra *(Skandalakis et al., ٢٠٠٧).*

The second part of the duodenum forms an acute angle with the first part, and descends from the neck of the gallbladder anterior to the hilum of the right kidney, the right ureter, the right renal vessels, the psoas major, and the edge of the inferior vena cava. It is related anteriorly to the right lobe of the liver, the transverse colon, and the jejunum. At about the midpoint of the second part of the duodenum, the pancreatico-biliary tract opens into its concave posteromedial side. The right side is related to the ascending colon and the right colic flexure *(Skandalakis et al., ٢٠٠٧).*

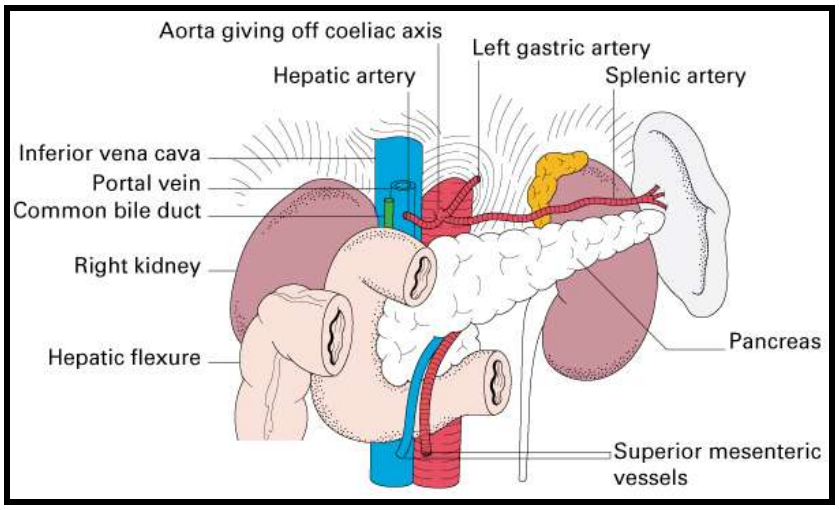

Fig. (٤): Relations of the second part of the duodenum ***(Skandalakis et al., ٢٠٠٧).***

Third part:

Third Part (Horizontal or Inferior) ١٠ cm long. It extends from the right side of L٣ or L٤ to the left side of the aorta. The third part of the duodenum begins about ٥ cm from the midline, to the right of the lower end of the third lumbar vertebra, at about the level of the subcostal plane. The third, or transverse, part passes to the left, anterior to the ureter, the right gonadal vessels, the psoas muscle, the inferior vena cava, the lumbar vertebral column, and the aorta. It ends to the left of the third lumbar vertebra ***(Skandalakis et al., ٢٠٠٧).***

This inframesocolic portion of the duodenum is covered anteriorly by the peritoneum. It is crossed anteriorly by the superior mesenteric vessels and, near its termination, by the root of the mesentery of the small