The use of laparoscopy in management of duodenal ulcer

Essay
Submitted for partial fulfillment of the
Master degree in General Surgery

By

Mohamed Osama Abd EL-Aziz El-Kayal
M.B,B.CH.,MS
General Surgery

Under the supervision of

PROF. Dr. Fateen Abd El-Monem Anous

Professor of General Surgery
Faculty of Medicine - Ain Shams University

Dr. Sherif Abd El-Halim Ahmed

Lecturer in General Surgery
Faculty of Medicine - Ain Shams University

Faculty of Medicine - Ain Shams University

2010

استخدام منظار البطن في علاج قرحة الاثني عشر

رسالة توطئة للحصول علي درجة الماجستير في الجراحة العامة

مقدمة من

الطبيب/ محمد أسامة عبد العزيز الكيال

بكلوريوس الطب والجراحة

كلية الطب جامعة المنصورة

تحت إشراف

الاستاذ الدكتور/ فطين عبد المنعم عانوس

أستاذ الجراحة العامة

كلية الطب جامعة عين شمس

الدكتور/ شريف عبد الحليم أحمد

مدرس الجراحة العامة

كلية الطب جامعة عين شمس

كلية الطب

جامعة عين شمس

٢٠١٠

Summary

Peptic ulcer disease can be divided into gastric and duodenal ulcers. Both types tend to occur near mucosal junctions. Duodenal ulcers usually occur at the duodenal pyloric junction.

It is now believed that 90% of duodenal ulcers are associated with H. pylori infection. If this organism is eradicated as part of ulcer treatment, ulcer recurrence is extremely rare.

After H. pylori infection, ingestion of NSAIDs is the most common cause of peptic ulcer disease.Most of the increased NSAID utilization has occurred in patients older than 50 years of age, which is also the group with the increase in bleeding gastric ulcers. Consequently, the ingestion of NSAIDs remains an important factor in ulcer pathogenesis, especially in relationship to the development of complications and death.

The safety of a laparoscopic procedure relies upon a careful preoperative patient assessment, with recognition of any contraindication to the laparoscopic approach.

Although recent advances in technology have made the use of laparoscopic procedures more widely practicable, the benefits of these minimally invasive operations must be

Acknowledgement

First of all, I have to thank God, the most gracious and merciful for helping me throughout this work.

I wish to express my deep thanks and gratitude to Prof. Dr. Fateen Abd El-Monem Anous, Professor of General Surgery, Faculty of Medicine, Ain Shams University, for his kind supervision, valuable guidance, hearted support and continuous encouragement during the work.

I would also like to express my heartly appreciation and thankfulness to Dr. Sherif Abd El-Halim, Lecturer of General Surgery, Faculty of Medicine, Ain Sham University for his constructive criticism, scientific instructions and discussion throughout this work.

Finally, I owe a special dept of gratitude to my dear family for their help, support and patience from the first moment.

Mohamed Osama El-Kayal

List of contents

No.	Title	Page
1	Anatomy and Histology	**1**
2	Pathogenesis	**20**
3	Management	**35**
4	Role of laparoscopy and limitations of its use	**61**
5	Operative techniques	**81**
6	Summary and Conclusion	**118**
7	References	**123**
8	Arabic summary	

List of Abbreviations

ASGE	American Society for gastrointestinal endoscopy.
BI	Billroth type 1.
COX-2	Cyclo oxygenase-2.
DVT	Deep venous thrombosis.
GE junction	Gastroesophageal junction.
GIA	Gastro intestinal anastomosis stapler.
IgG	Immuno globulin G.
T6	6^{th} thoracic vertebra
T12	12^{th} thoracic vertebra
L2	2^{nd} lumber vertebra
L3	3^{rd} lumber vertebra
L4	4^{th} lumber vertebra
MALT	Mucosa associated lymphoid tissue.
MAO	Mono amino oxidase.
MEN	Multiple endocrine neoplasia.
NSAIDs	Non steroidal anti-inflammatory drugs.
PCV	Parietal cell vagotomy.
PUD	Peptic ulcer disease.
TEE	Transoesophageal echocardiography.

List of Figures

Figure Number		Page Number
(1)	**Anterior view of the relationships of the duodenum and pancreas.**	3
(2)	**Major arterial supply to the duodenum.**	7
(3)	**Anterior view of arterial supply of the duodenum and pancreas.**	8
(4)	**Posterior view of arterial supply of duodenum and pancreas.**	9
(5)	**Diagrammatic presentation of duodenal lymphatics.**	12
(6)	**Truncal Vagotomy and pyloroplasty.**	50
(7)	**Truncal Vagotomy and Antrectomy. Hemigastrectomy with Billroth 1 (gastroduodenal) anastomosis.**	53
(8)	**A, Total gastrectomy with a Roux-en-Y anastomosis. B, Subtotal gastrectomy with a Billroth II anastomosis.**	54
(9)	**Sites of trocars in Laparoscopic Partial Gastrectomy.**	81
(10)	**Division of omentum and omental branches of gastroepiploic artery.**	83

(11)	**Mobilization of stomach with dissection on posterior aspect.**	84
(12)	**Division of lesser omentum.**	85
(13)	**Small 5-cm open upper midline abdominal Incision for stomach exteriorization.**	86
(14)	**Proximal division of stomach.**	89
(15)	**Proximal transaction of stomach for laparoscopic gastrectomy.**	91
(16)	**Loop gastrojejunostomy joined laparoscopically with GIA.**	93
(17)	**Closure of enterotomies.**	95
(18)	**Laparoscopic wedge resection.**	97
(19)	**Operation room setup.**	104
(20)	**Trocar placement in Laparoscopic Highly Selective Vagotomy.**	107
(21)	**Dissection of the anterior vagus nerve.**	108
(22)	**Dissection of the posterior vagus nerve.**	110

Anatomy of the duodenum

Embryogenesis

The foregut and the midgut are responsible for the genesis of the three parts of the small bowel (duodenum, jejunum, and ileum). The approximate junction of the foregut and midgut lies just distal to the ampulla of Vater. The demarcation of the small bowel into three parts takes place by the start of the third week of embryonic life **(O'Rahilly R et al, 1996).**

Early in the second month of gestation, the intestines, which elongate faster than the abdominal cavity expands, push a loop out into the umbilical cord. This is the "midgut" of the embryologist, not the "midgut" of the surgeon. The herniated segment extends from approximately the distal one-third of the duodenum through the proximal one-third of the transverse colon **(O'Rahilly R et al, 1996).**

Rotation of the intestinal loop counterclockwise through 90° brings the future duodenum and proximal small intestine to the right of the future colon. The axis of this rotation is the superior mesenteric artery. The intestines continue to elongate in the umbilical cord. In the tenth week, they rather suddenly return to the abdomen **(O'Rahilly R et al, 1996).**

Surgical Anatomy of the Duodenum

Topography and Relations

Relations of the Duodenum

- First Part (Superior) is 5 cm long. The proximal half is mobile while the distal half is fixed.

The duodenum passes upward from the pylorus to the neck of the gallbladder. It is related (1) posteriorly to the common bile duct, portal vein, inferior vena cava, and gastroduodenal artery; (2) anteriorly to the quadrate lobe of the liver; (3) superiorly to the epiploic foramen; and (4) inferiorly to the head of the pancreas **(Androulakis J et al, 2000).**

The initial 2.5 cm is freely movable and is covered by the same two layers of peritoneum that invest the stomach. The hepatoduodenal portion of the lesser omentum attaches to the superior border of the duodenum; the greater omentum attaches to its inferior border. The distal 2.5 cm is covered with peritoneum only on the anterior surface of the organ, so that the posterior surface is in intimate contact with the bile duct, the portal vein, and the gastroduodenal artery. The duodenum is separated from the inferior vena cava by a small amount of connective tissue **(Androulakis J et al, 2000)**.

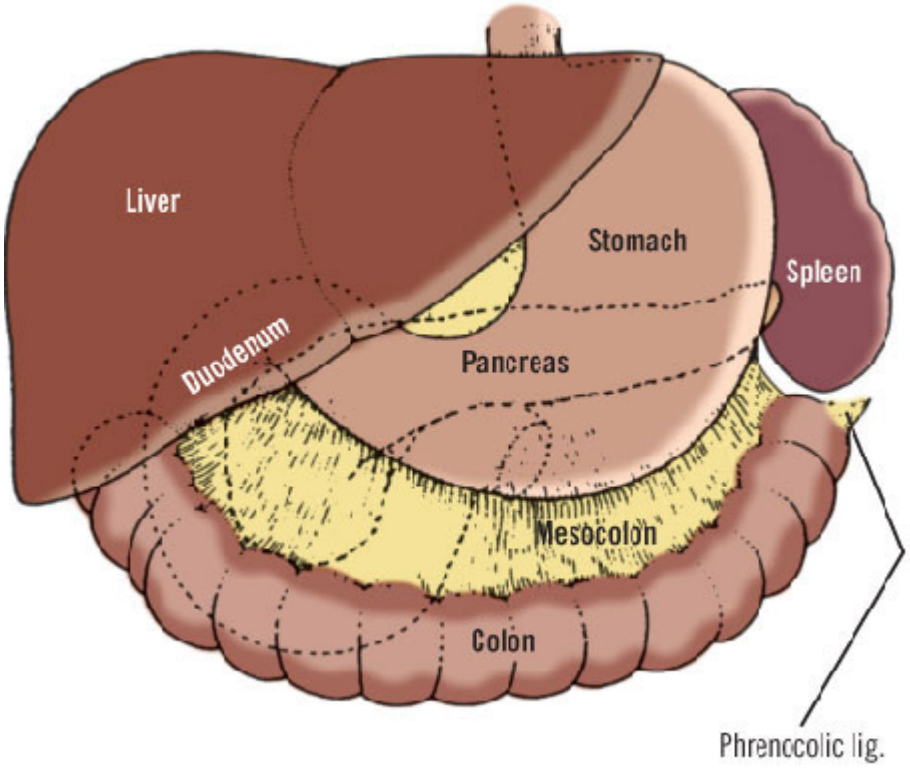

Fig. (1) : Anterior view of the relationships of the duodenum and pancreas

- Second Part (Descending): 7.5 cm long. It extends from the neck of the gallbladder to the upper border of L4.

This part of the duodenum is crossed by the transverse colon and the mesocolon and consists, therefore, of a supramesocolic portion and an inframesocolic 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 **(Androulakis J et al, 2000)**.

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 pancreaticobiliary tract opens into its concave posteromedial side. The right side is related to the ascending colon and the right colic flexure **(Androulakis J et al, 2000)**.

- Third Part (Horizontal or Inferior): 10 cm long. It extends from the right side of L3 or L4 to the left side of the aorta.

The third part of the duodenum begins about 5 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 **(Androulakis J et al, 2000)**.

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 intestine. The third part is related superiorly to the head and uncinate process of the pancreas. The inferior pancreaticoduodenal artery lies in a groove at the interface of the pancreas and the duodenum. Anteriorly and inferiorly, this part of the duodenum is related to the small bowel, primarily to the jejunum **(Androulakis J et al, 2000)**.

- Fourth Part (Ascending): 2.5 cm long. It extends from the left side of the aorta to the left upper border of L2.

The fourth, or ascending, part of the duodenum is directed obliquely upward. It ends at the duodenojejunal junction to the left and at the level of the second lumbar vertebra at the root of the transverse mesocolon. This junction occurs at about 4 cm below and medial to the tip of the ninth costal cartilage. The fourth part is related posteriorly to the left sympathetic trunk, the psoas muscle, and the left renal and gonadal vessels. Its termination is very close to the terminal part of the inferior mesenteric vein, to the left ureter, and to the left kidney. The upper end of the root of the mesentery also attaches here. The duodenojejunal junction is suspended by the

ligament of Treitz, a remnant of the dorsal mesentery, which extends from the duodenojejunal flexure to the right crus of the diaphragm **(Androulakis J et al, 2000)**.

Vascular Supply

Arteries

The blood supply of the duodenum is confusing due to the diverse possibilities of origin, distribution, and individual variations. This is especially true of the blood supply of the first portion of the duodenum. The advice is to use good surgical technique when surgery is definitely required, and not take an overenthusiastic approach when dealing with benign disease **(Griffith CA, 1986).**

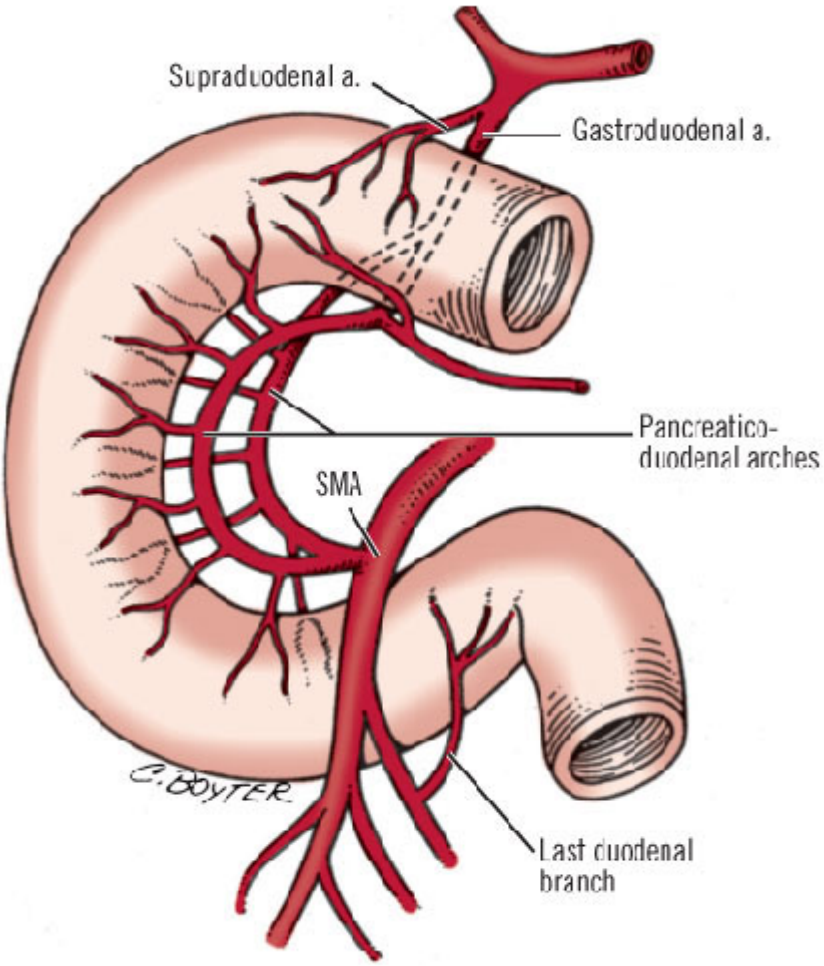

Fig. (2): Major arterial supply to the duodenum

The first part of the duodenum is supplied by the supraduodenal artery and the posterior superior pancreaticoduodenal branch of the gastroduodenal artery (retroduodenal artery as described by Edwards, Michels, and Wilkie), which is a branch of the common hepatic artery.