

Recent Advances In Management of Mesenteric Ischaemia An Essay

Submitted for partial fulfillment of Master Degree in General Surgery

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Ain Shams University 2010

الجديد في تشخيص وعلاج قصور الشرايين والأوردة المسارية

رسالة توطئة للحصول على درجة الماجستير في الجراحة العامة

مقدم من

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بكالوريوس الطب والجراحة

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Introduction

Mesenteric ischaemia may be defined as a reduction in blood flow to the intestinal circulation of sufficient magnitude to compromise the metabolic requirements and potentially threaten the viability of the affected organs (*Jarvinen, et al.,1995*).

Antonio Benivieni first described mesenteric ischemia in the 15th century. It became more intensely studied in the mid 19th century after case reports by Virchow and others. The first successful surgery to repair a case of acute mesenteric ischemia was performed by Elliot who, in 1895, resected agangrenous portion of bowel and reanastomosed the viable bowel; Acute mesenteric ischemia is a morbid condition that has progressively become more prevalent in recent decades with a current estimated incidence of 1 in 1000 hospital admissions (*Kougiavel,al 2007*).

Acute mesenteric ischemia (AMI) is a potentially lifethreatening condition that has been recognized as a cause of catastrophic abdominal events. Known etiologies of this condition include mesenteric occlusion due to underlying atherosclerosis, mesenteric embolism, nonocclusive ischemia secondary to generalized visceral vasospasm, and mesenteric vein thrombosis (*Kougiavel et al., 2007*).

The classic presentation for patients with embolic disease of the mesenteric vessels is sudden-onset midabdominal pain that is described as being out of proportion to the physical findings and is associated with immediate bowel evacuation (*Souba et al., 2007*).

Patients with thrombotic mesenteric occlusion also present with sudden- Patients with non occlusive mesenteric ischemia (NOMI) present somewhat differently. onset severe midabdominal pain that is out of proportion to the physical findings, they typically have a history of chronic postprandial abdominal pain and significant weight loss **(Souba et al., 2007)**.

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Patients with thrombotic mesenteric occlusion also present with sudden- Patients with non occlusive mesenteric ischemia (NOMI) present somewhat differently. onset severe midabdominal pain that is out of proportion to the physical findings, they typically have a history of chronic postprandial abdominal pain and significant weight loss **(Souba et al., 2007)**.

threatening surgical emergency in which the outcome is closely dependent on the elapsed time to diagnosis and treatment. The diagnosis is typically difficult and delayed due to non-specific results of biological and radiological tests **(Abboud et al., 2008)**.

Clinicians must maintain a high index of suspicion because a prompt diagnosis and early aggressive treatment before the onset of bowel infarction results in reduced mortality. The most important clue to an early diagnosis is the sudden onset of severe abdominal pain in a patient with atrial filbrillation or atherosclerosis. Persistent vomiting and defecation occurs early with the subsequent passage of altered blood. Hypovolaemic shock rapidly occurs **(Berland and Oldenburg, 2008)**.

The treatment needs to be tailored to the individual. Conservative management including; " aggressive rehydration

and the use of antibiotics, anticoagulation, vasodilators and inhibitors of reperfusion injury" may be sufficient in selected cases; more often laparotomy is required and can be life saving **(Berland and Oldenburg, 2008).**

The outcome of mesenteric ischaemia depends on early diagnosis and management, If the intestine still viable: good prognosis; If the patient proceed ischaemia and gangrene : resection-anastomosis will be done and the prognosis of the case will depend on the length of the intestine involved; so resection of large amount of the intestine may cause Short bowel syndrome **(Park et al;2002).**

Aim of the work

The aim of the work is to study the recent trend and outcome in diagnosis, treatment, and prognosis of such cases of mesenteric vascular ischaemia.

Surgical Anatomy

Intestinal blood supply occurs predominantly through three major branches of the abdominal aorta; the celiac axis, the superior mesenteric artery(SMA), and the inferior mesenteric artery (IMA). Anastomotic connections between branches of these three major trunks play an important role in maintaining adequate visceral perfusion in patients with significant mesenteric arterial-occlusive disease. All three vessels originate anteriorly from the aorta.

Embryology of the abdominal aorta and mesentric vessels:

The formation of the aorta begins at the third week of embryologic development, when two strands of cells migrate dorsally from the endocardial mesenchyme and elongate caudally along the neural groove to become the dorsal aortas. These two dorsal aortas remain separate for approximately 1 week but eventually fuse to form a single aortic trunk that descends caudally **(Lin and Chaikof, 2000)**.

The left dorsal aorta gives rise to the descending thoracic aorta, whereas the right dorsal aorta eventually becomes the right subclavian artery. Numerous segmental arteries arise from the primitive dorsal aortas and join with one another to form successive segments. The second segmental artery, for instance, gives rise to the hypoglossal artery, and the seventh segmental artery forms the vertebral artery **(Lin and Chaikof, 2000)**.

The mesenteric vessels arise from the primitive ventral segmental arteries. As development proceeds, there is regression of all but three primitive communications, with only the precursors to the three major mesenteric vessels remaining. The 10th segmental artery gives rise to the celiac artery that supplies the foregut, the 13th artery gives rise to the superior mesenteric artery (SMA) to supply the midgut, and the 21st or 22nd artery gives rise to the inferior mesenteric artery (IMA) to supply the hindgut. Most variations in vascular anatomy can be traced to either persistence or incomplete regression of primitive segments. (Lippincott&wilkins 2003).

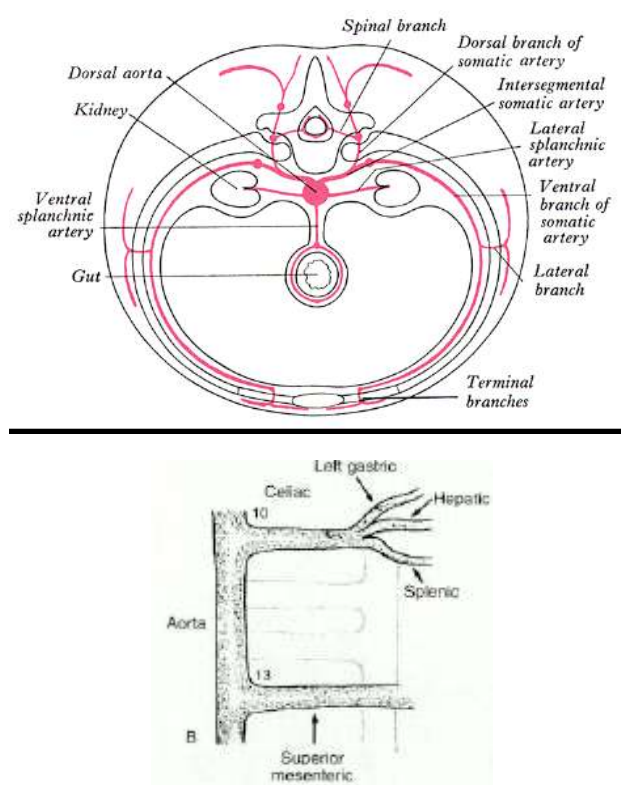


Figure1- 1 Diagram of the segmental and intersegmental arteries. Note the position of the longitudinal anastomoses. (Quoted from Gray's Anatomy 38th edition., 1995, P.218) edition., 1995, p.218)

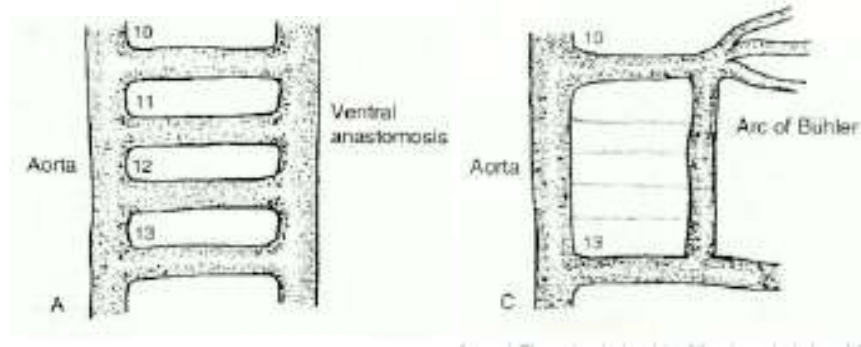


Figure1- 2. The embryologic origin of the visceral arteries. A, Primitive ventral segmental arteries. B, Normal anatomy demonstrating the celiac trunk arising from the tenth segmental artery and the SMA arising from the thirteenth. C, The arc of Buhler represents residual communication between the tenth and thirteenth segmental arteries **(Quoted from Lin and Chaikof, 2000).**

Coeliac Trunk:

The coeliac trunk, a wide ventral branch, about 1.25 cm long, just below the aortic hiatus, passes almost horizontally forwards and slightly to the right above the pancreas and splenic vein, dividing into:

- Left gastric
- Common hepatic
- Splenic arteries

It may also give off one or both inferior phrenic arteries. The superior mesenteric may arise with the coeliac trunk, or the later's usual branches may be direct independent branches of the aorta **(Lin and Chaikof; 2001).**

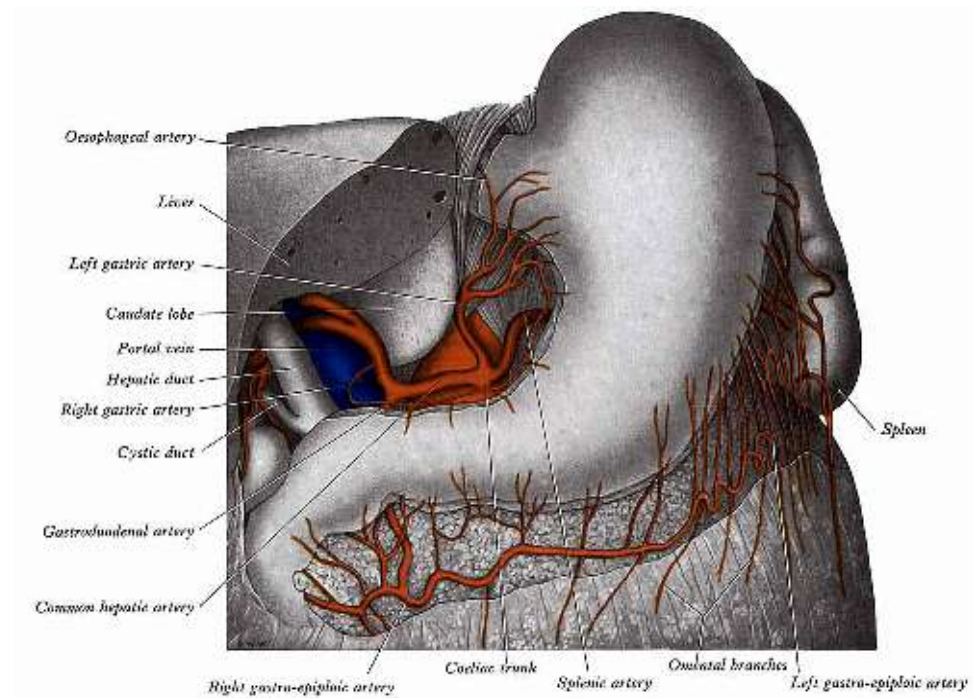


Figure 1- 3: The coeliac trunk and its branches. Part of the liver and all the lesser omentum have been removed, as well as the posterior wall of the omental bursa and part of the anterior layer of the greater omentum (**Quoted from Gabella et al; 1995**).

Relations:

Anterior is the omental bursa (lesser sac); the coeliac plexus surrounds the trunk, sending extensions along its branches. Right lateral are the right coeliac ganglion, right crus and hepatic caudate process; left lateral are the left coeliac ganglion, left crus and cardiac end of the stomach. The right crus may compress the origin of the coeliac trunk, giving the appearance of a stricture. Symptoms have been attributed to

this (the 'coeliac axis compression syndrome), and operations designed to relieve it, but the concept is of doubtful validity. Inferior are the pancreas and splenic vein. The duodenum's suspensory muscle may encircle the coeliac artery but is usually on its left (Lin and Chaikof; 2000).

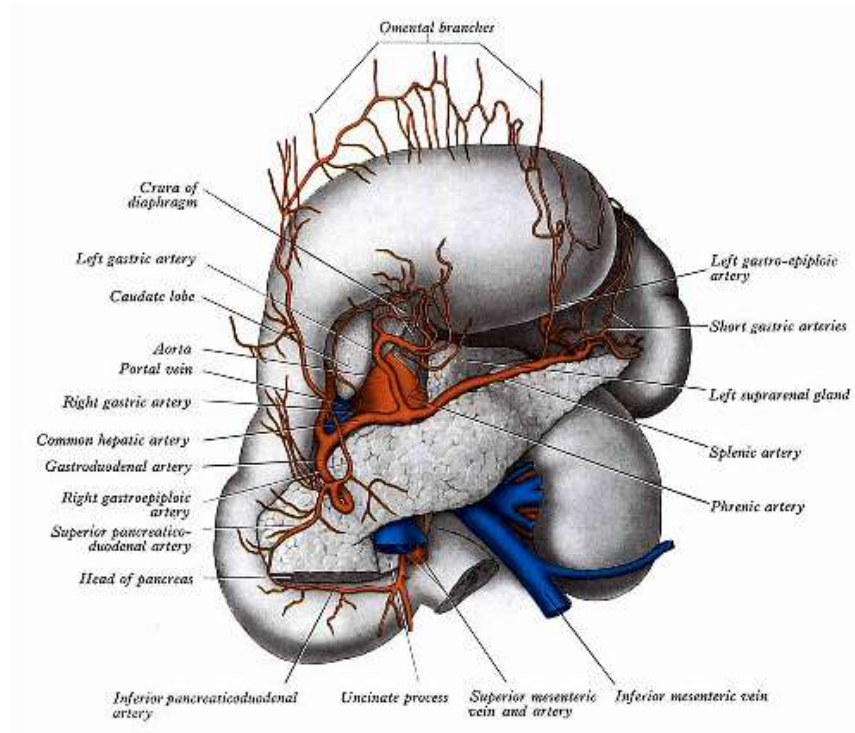


Fig1.4 The coeliac trunk and its branches exposed by turning the stomach upwards and removing the peritoneum on the posterior abdominal wall (Quoted from Gabella et al; 1995).

1) The Left Gastric Artery the smallest of the three branches of the celiac artery passes upward and to the left, posterior to the omental bursa, to the cardiac orifice of the stomach.

Here it distributes branches to the esophagus, which anastomose with the aortic esophageal arteries; others supply the cardiac part of the stomach, anastomosing with branches of the lienal artery. It then runs from left to right, along the lesser curvature of the stomach to the pylorus, between the layers of the lesser omentum, it gives branches to both surfaces of the stomach and anastomoses with the right gastric artery **(Jackson, 2005)**.

2) The Hepatic Artery in the adult is intermediate in size between the left gastric and lienal, in the fetus it is the largest of the three branches of the celiac artery, It is first directed forward and to the right, to the upper margin of the superior part of the duodenum, forming the lower boundary of the epiploic foramen (foramen of Winslow), It then crosses the portal vein anteriorly and ascends between the layers of the lesser omentum , and in front of the epiploic foramen, to the porta hepatis , where it divides into two branches, right and left, which supply the corresponding lobes of the liver, accompanying the ramifications of the portal vein and hepatic ducts Its branches are The right gastric artery , The gastroduodenal artery and The cystic artery **(Uflacker et al., 2007)**.

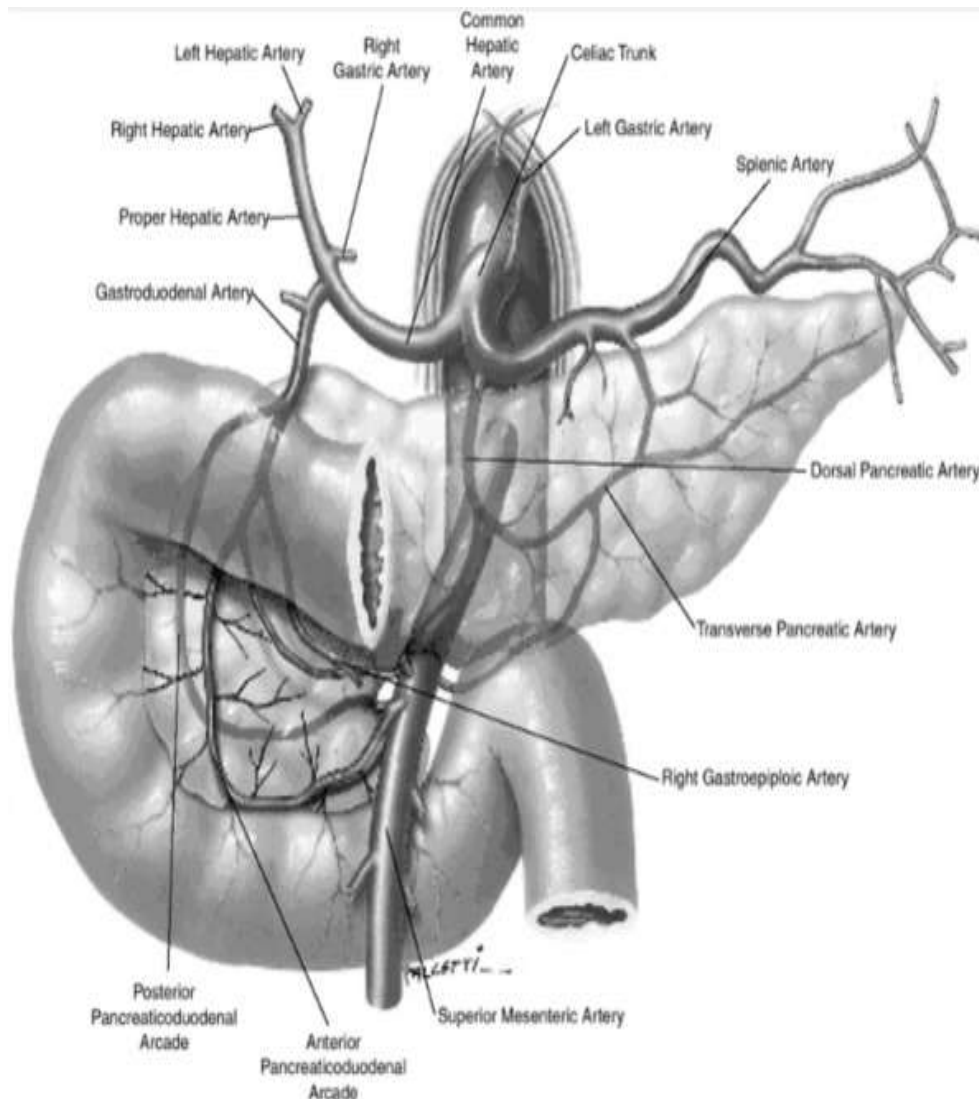


Fig1-5 The celiac artery and its branches (Quoted from Uflacker., 2007).

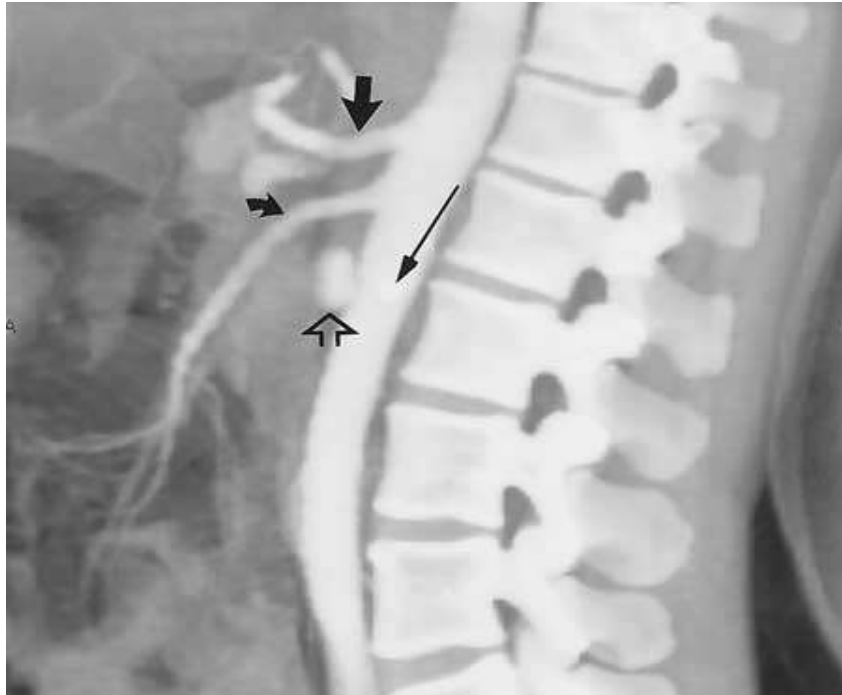


Fig1- 63D multi– detector row CT scan demonstrates the normal anatomy of the celiac axis (*Quoted fom Karen and elliot., 2002*).

- A) The right gastric artery** arises from the hepatic, above the pylorus, descends to the pyloric end of the stomach, and passes from right to left along its lesser curvature, supplying it with branches, and anastomosing with the left gastric artery (*Jackson, 2005*).
- B) The gastroduodenal artery** is a short but large branch, which descends, near the pylorus, between the superior part of the duodenum and the neck of the pancreas, and divides at the lower border of the duodenum into two branches, the right