Update Management of Mesenteric Ischaemia

An Essay

Submitted for partial fulfillment of Master Degree

in General Surgery

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2009

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List of abbreviations

AMI: acute mesenteric ischaemia.

aPTT: activated partial thromboplastin time.

CA: celiac artery.

CMI: chronic mesenteric ischaemia.

CT: computerized tomography.

EDV: end diastolic velocity.

FSI: focal segmental ischaemia.

IMA: inferior mesenteric artery.

IMV: inferior mesenteric vein.

MDCT: multidirector row computed tomog-raphy

MRI: magnetic resonance imaging.

MVT: mesenteric venous thrombosis.

NOMI: non-occlusive mesenteric ischaemia.

PSV: peak systolic velocity.

PTA: per-cutaneous trans-luminal angioplasty.

SBS: short-bowel syndrome.

SMA: superior mesenteric artery.

SMAE: superior mesenteric artery embolism.

SMAT: superior mesenteric artery thrombosis.

SMV: superior mesenteric vein.

TPN: total parenteral nutrition.

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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).

Mesenteric vascular disease may be classified as acute intestinal ischaemia – occlusive or non- occlusive – or chronic, venous or arterial, centeral or peripheral. The superior mesenteric vessles are the visceral vessels most likely to be affected by embolization or thrombosis, with the former being most common. Inferior mesenteric involvement is usually clinically silent owing to a better collateral circulation. (Winslet , 2004).

Acute mesenteric ischaemia is a serious disease in old age with low incidence but with a very high mortality rate (60% - 70%). The aetiology is either primary [embolism or thrombosis of mesenteric arteries or veins, non-occlusive mesenteric ischemia] or secondary [mechanical obstruction such as intestinal volvulus, intussusception, tumour-caused compression]. Independent of the origin of the illness, the clinical – pathological picture is the same: intestinal ischemia with subsequent necrosis. (Vokurka, et al.,2008).

Acute mesenteric ischameia is a life- threatening surgical emergency in which the outcome is closely dependent on the elasped 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).

Chronic occlusive mesenteric ischaemia is usually a long-standing process characterized by post-prandial abdominal pain, progressive food intolerance and weight loss and if untreated; it

can lead to progressive disability and failure to thrive. (Wain and Hines , 2008).

Ischaemic colitis describes the structural changes which occur in the colon as a result of the deprivation of blood. They are most common in the splenic flexure, whose blood supply is particularly tenuous. (Winslet, 2004).

Aim of the work

The aim of the work is to review the recent trends in the diagnosis and management of mesenteric ischemia.

Applied Anatomy of Mesenteric Vasculature

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).

Coeliac Trunk:

The coeliac trunk (Fig.1-1,1-3),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;2000]

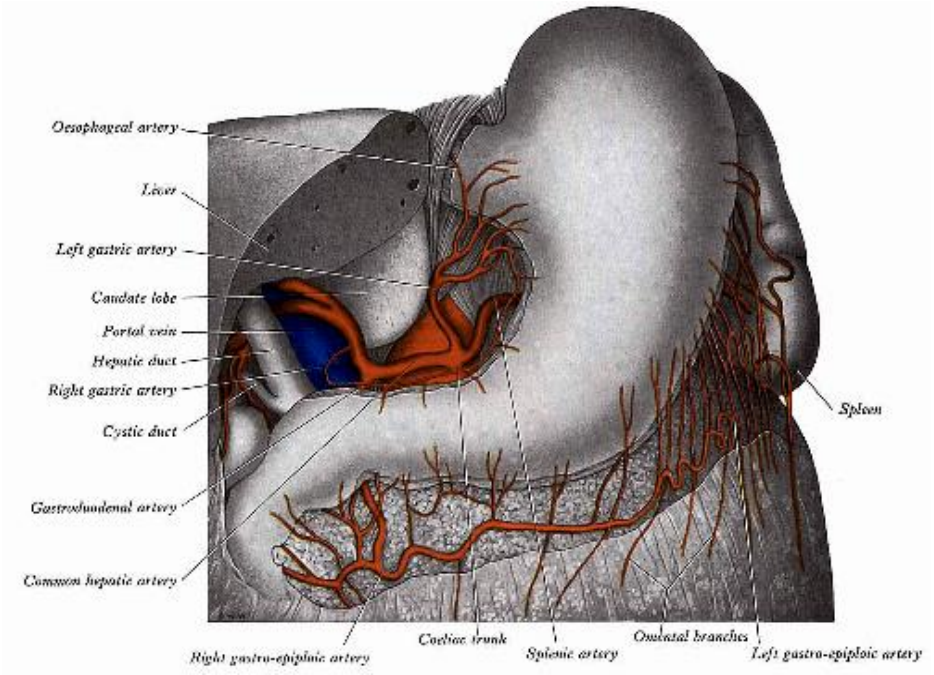

Fig.1-1 The coeliac trunk and its branches. Part of the liver and all the lesser omentum have been removed, as well as the posterior wall of the omental bursa and part of the anterior layer of the greater omentum.From Gabella et al;1995

Relations: (Fig.1-2)

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]

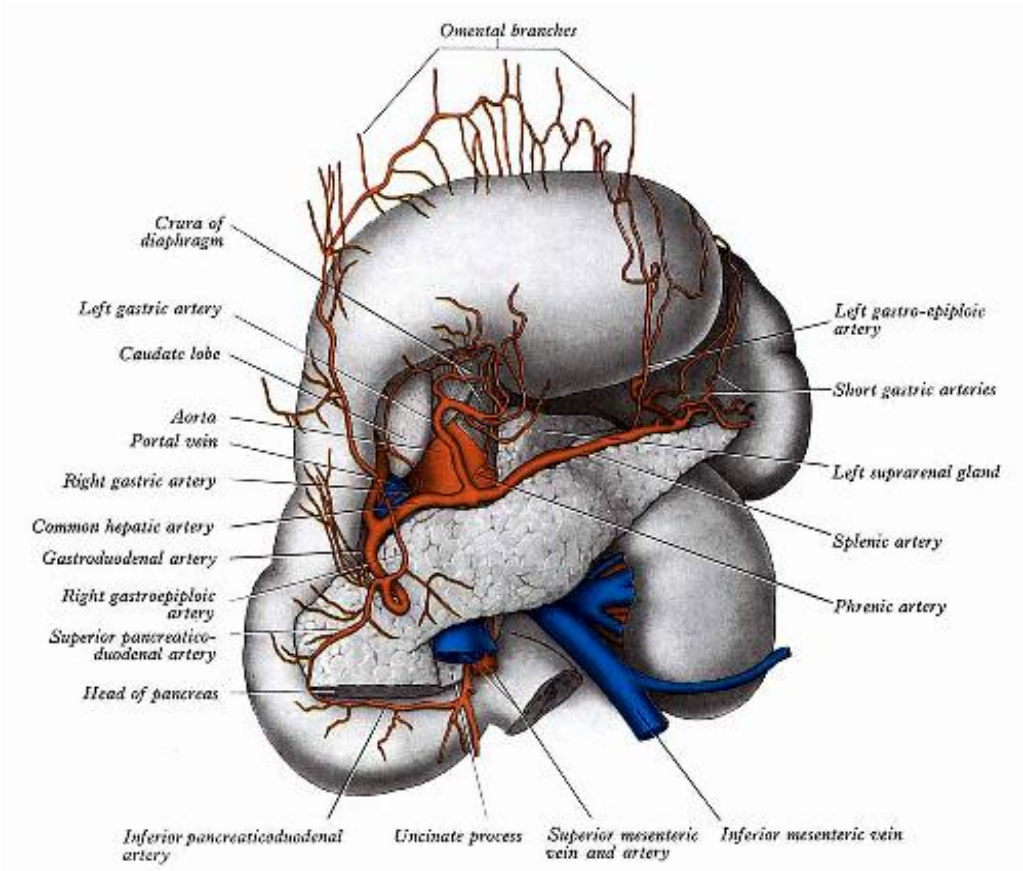

Fig.1-2 The coeliac trunk and its branches exposed by turning the stomach upwards and removing the peritoneum on the posterior abdominal wall.From Gabella et al; 1995

Left Gastric Artery:

The left gastric artery, the smallest coeliac branch, ascends to the left, posterior to the omental bursa, to the cardiac end of the stomach. It is near the left inferior phrenic artery and medial or anterior to the left suprarenal gland. Near the stomach two or three oesophageal branches ascend through the oesophageal opening to anastomose with the aortic oesophageal branches; others supply the cardiac part of the stomach and anastomose with the splenic branches. The artery then turns antero-inferiorly into the left gastropancreatic fold to run (often doubled) curving to the right near the gastric lesser curvature to the pylorus between layers of the lesser omentum; it supplies both gastric surfaces and anastomoses with the right gastric artery. [Rosenplum et al;1997]

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Hepatic Artery: **(Fig.1-4)**

The hepatic artery is intermediate in size between the left gastric and splenic arteries; but in later fetal and early postnatal life it is the largest coeliac branch . Accompanied by the hepatic autonomic plexus it first passes forwards and right, below the epiploic foramen to the upper aspect of the superior part of the duodenum. Crossing the portal vein, it ascends between layers of