

Chronic mesenteric ischemia

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Chronic mesenteric ischemia (CMI) is a relatively uncommon syndrome characterized by post prandial abdominal pain that leads to a fear of food and to weight loss. If progressive, it can eventually lead to acute ischemia and bowel infarction. A chronic progressive course may lead to severe negative nitrogen balance, inanition and death. Other manifestations may include bouts of diarrhea and chronic intermittent abdominal pain. Mortality of untreated mesenteric ischemia is in the range of 60 to 80%. The syndrome is characterized by ostial atherosclerotic stenotic disease or occlusion. The clinical sequelae results from the loss of oxygen supply to the tissues. Because the symptoms may not be characteristic, there is often a delay in diagnosis.

Clinical History

The clinical presentation is seen in patients mostly between 60 and 80 years old, with or without concurrent disease in other vascular beds. This manifestation of systemic arteriosclerosis carries the risk factors of: smoking, hypertension, dyslipidemia, and coronary artery disease. Some of these patients have associated comorbidities including COPD, diabetes, AAA, and peripheral vascular disease. The severity of the clinical presentation depends on: 1. The site, grade and cause of vascular obstruction; 2. The degree of collateralization; and 3. The stage of the disease.⁽¹⁾

Anatomy

The classic dictum for symptomatic CMI is involvement of at least two of the three mesenteric arteries: the celiac (CA), the superior mesenteric artery (SMA) and/or the inferior mesenteric artery (IMA). However, based on perhaps the largest ongoing study on CMI (locally at Swedish Medical Center/Providence campus), symptomatic CMI can occur in significant SMA stenosis with intact CA & IMA.⁽⁸⁾ With significant obstruction, common arterial collateral pathways develop. These include:

1. Arc of Riolan-principal pathway between proximal branches of the IMA and the SMA;
2. Marginal artery of Drummond-connections between the distal branches of SMA & IMA;
3. Arc of Barkow: SMA & gastroepiploic artery connections;
4. Arc of Buhler: Persistent embryonal ventral anastomoses.

Acute Ischemia

Acute mesenteric ischemia may follow CMI or may be related to hypercoagulable states, thrombosis, and vasculitis. Embolic sources include cardiac valvular disease, atrial fibrillation, s/p CABG, cholesterol emboli, and paradoxical embolus with patent foramen ovale(PFO).

In the workup of these acute patients, the results of diagnostic studies to exclude more common diseases are usually unremarkable (ie, normal radiographs, endoscopy, CT and GI contrast studies).

Diagnostic Studies

In the past few years, duplex ultrasound has played a significant role in the diagnosis of CA and SMA stenosis/occlusion. At least 3 good sized validation studies have confirmed that duplex velocity criteria is accurate in the identification of mesenteric occlusive disease. Experienced technologists can perform diagnostic studies >90% of the time. The limitations of ultrasound are truncal obesity and gaseous abdominal distension. These preclude good penetration of the ultrasound. Some vascular anomalies can be identified with ultrasound. The criteria for grading lesions has been well documented.

Criteria for Grading Lesions

For the SMA, a peak systolic velocity of >300cms/sec has a 100% specificity however, low sensitivity, and overall accuracy of 81%. In order to further define the lesion an end diastolic velocity measurement of >45cm/sec has an overall accuracy of 91% in prediction of a severe lesion.⁽²⁾

For CA, retrograde common hepatic artery flow direction was 100% predictive of severe CA stenosis or occlusion. PSV .200cms/sec or no signal also has excellent accuracy (93%).⁽²⁾

Current Magnetic Resonance Angiography (MRA) techniques with contrast enhancement provide high resolution, high contrast reproducible images of the arterial and venous vasculature. Cine phase contrast MRA can provide additional information about the rate and volume of flow within the major mesenteric arteries and veins. In addition, real time MRI can provide interactive visualization of the mesenteric vessels in any plane. MR oximetry allows oxygen saturation of the mesenteric circulation to be determined. Therefore, it can provide excellent anatomic and functional information of the mesenteric circulation. Limitations of MRI include cost, claustrophobia, clips in certain locations and certain valves precluding MR imaging owing to magnetic susceptibility.⁽⁷⁾

CT angiography is another noninvasive study that uses nonionic contrast for spiral volume acquisition study that can be reformatted and reconstructed into 2D & 3D images. It is performed with intravenous radioiodinated contrast agent. Contraindications included patients with renal failure.⁽⁶⁾

The gold standard for diagnosis is biplanar (AP & Lat) Abdominal aortogram, selective catheterization of CA, SMA & IMA.

(Continued on reverse)

Mesenteric ischemia

(continued from front)

Treatment of CMI

Medically, the patient must be stabilized prior to revascularization. The malnourished, low protein state of chronically ill patients should be corrected to improve outcome. Oral nutritional supplements must be avoided because of the increased metabolic demand placed on the intestine. Parenteral nutritional supplements improve the protein and electrolyte imbalances. Medications like digitalis, ergotamines, vasopressors, should be avoided.

Endovascular : PTA & Stents

In the past 5 years there have been numerous small studies that have proven the efficacy of percutaneous transarterial PTA with stenting of the SMA and CA from a transbrachial approach. One of the larger studies comes from Swedish Providence Campus demonstrating that stenting is safe and durable in revascularizing mesenteric arteries. Primary patency rates are in the range of 70-75% at one year and assisted patencies in the range of 75-85%. Typically mortality results from associated CAD and less likely intestinal ischemia. Overall length of stay in the hospital is 1.4 days compared to 4.8 days with surgery. The complications include: hematoma, dissection, and embolization. The incidence of major complications is <3%. In a study of 44

arteries we have demonstrated good patency, low complication rate and good clinical recovery.⁽⁸⁾

Q: When do you refer a patient for SMA stenting?

A: Patients in the early and mid stage of the disease when their manifestation is post prandial abdominal pain and weight loss, but prior to onset of signs of peritonitis (rigid tender abdomen with guarding) suggesting impending doom.

Surgery

The various surgical options for these patients are as follows:

1. Thromboembolectomy of SMA/CA;
2. Endarterectomy of SMA/CA;
3. Supraceliac aorta to SMA and or CA bypass graft;
4. Iliac to mid to distal SMA bypass graft.

Q: When is it time for the patient to have surgery?

- A:
- Patients with acute mesenteric ischemia with bowel infarction and signs of peritonitis.
 - Patients who have failed two rounds of stenting and redo angioplasty.
 - Patients with an embolic or thrombotic episode in the presence of peritoneal signs.
 - Patients with mid to distal long segment disease.
 - Patients with complete occlusions that cannot be recanalized.

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