A Case Report of Chronic Mesenteric Ischemia Secondary to Superior Mesenteric Artery Stenosis: A Rare Cause of Abdominal Pain

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Chronic Mesenteric Ischemia (CMI) is a rare cause of abdominal pain as vascular disorders tend to be last of the differential diagnoses considered in patients presenting with gastrointestinal symptoms. This is a case of a 58-year-old male who presented with a 2-year history of intermittent abdominal pain associated with sitophobia and undocumented weight loss. He had several in-hospital admissions and after a series of unremarkable diagnostic tests he was diagnosed with chronic mesenteric ischemia secondary to superior mesenteric artery stenosis as evidenced through computed tomography angiography. He underwent an aorto-SMA bypass with an 8mm Dacron graft. The main goals for revascularization of CMI are improving quality of life and prevention of bowel infarction. As CMI is a rare cause of abdominal pain, the patients tend to be victims of diagnostic delays. Early recognition and timely intervention are key in the management of this condition.

Key words: Mesenteric ischemia, abdominal pain, vascular diseases

Chronic Mesenteric Ischemia (CMI) is a rare cause of abdominal pain as gastrointestinal causes are the first to come to mind over vascular disorders. CMI is usually due to progressive atherosclerosis and in rare cases is due to median arcuate ligament syndrome (MALS) or fibromuscular dysplasia (FMD). Patients with CMI typically present in the fifth or sixth decades and females are more likely to be affected than males. A meta-analysis cited by Huber et al., involving 18,726 patients revealed a mean age of 68.7 years. A majority were female, smokers, hypertensive and had evidence of peripheral arterial occlusive disease.[1]

CMI is a rare diagnosis. In 1997, Moawad and Gewertz searched 20 years of literature and found only 330 cases.[2] In 2013, Pecoraro et al. included 1795 cases in their systematic review of 25 years of literature.[3] The actual prevalence of CMI could be much higher as only a select amount of cases are reported. Most are detected upon autopsy studies wherein about 30% of the patients who were found to have stenosis had a noted history of abdominal pain. No differences in frequency have been reported in various regions of the world. Described in this case report is a case of diagnostic delay as vascular disorders, CMI in particular, due to their rarity are not usually part of the initial differentials that come to mind when faced with chronic abdominal pain.

The objective of this report was to discuss the clinical scenario of a patient with chronic abdominal pain and how one should keep vascular disorders in mind as a potential consideration to prevent delay in treatment.

The Case

A 58-year-old male presented with a 2-year history of intermittent abdominal pain described as cramping radiating to the lumbar area. There were no associated episodes of nausea or vomiting and change in bowel movement, but food fear (sitophobia) and undocumented weight loss were noted. He underwent a colonoscopy which revealed colonic polyps in the ascending and

transverse colon and was diagnosed with irritable bowel syndrome and colonic polyps. He was treated medically which provided some relief of his symptoms although he was frequently readmitted thereafter. Due to persistent abdominal pain he underwent an exploratory laparotomy. Findings were unremarkable. Abdominal pain persisted with the same intensity until 4 months prior to admission when the pain increased to an intensity of 9/10 VAS which prompted ER consult. An esophagogastroduodenoscopy (EGD) was performed revealing gastric ulcers Forrest III antrum, distal atrophic gastropathy and a large hiatal hernia, sliding type. Due to non-diagnostic results, an abdominal CT scan with contrast was requested. The exam demonstrated short segment low to moderate grade stenosis of the proximal superior mesenteric artery and mesenteric collateral vessels. There was jejunal and ileal bowel wall thickening, multiple sub-centimeter mesenteric lymph nodes and minimal ascites suggestive of chronic ischemia. A CT scan with 3D reconstruction of the vasculature (Figures 1A & 1B) was performed to further visualize the mesenteric vasculature. Segmental atherosclerosis was noted along the aorta and iliac arteries. Narrowing was noted at the base take off of the celiac artery measuring 0.5 cm and the distal iliac segment at 0.8 cm and narrowing of the superior mesenteric artery at 0.5 cm with post-stenotic dilation of 1 cm.

The patient was referred to thoracic cardiovascular surgery for surgical intervention. Under general endotracheal anesthesia, through a midline subxiphoid to suprapubic incision, he underwent a side to side Aorto-SMA bypass at the area of the infrarenal aorta with the use of an 8 mm Dacron graft. (Figures 2 & 3)

The patient tolerated the procedure well. There were no intra-operative or post-operative complications. He was monitored closely in the ICU post-operatively and was discharged improved on the 7th hospital day. On follow up, the patient would still experience some post-prandial cramping abdominal pain. He was lost to subsequent follow-up.

Discussion

CMI patients may have a typical presentation of intestinal angina. After meals, there is greater demand on mesenteric circulation which could overwhelm
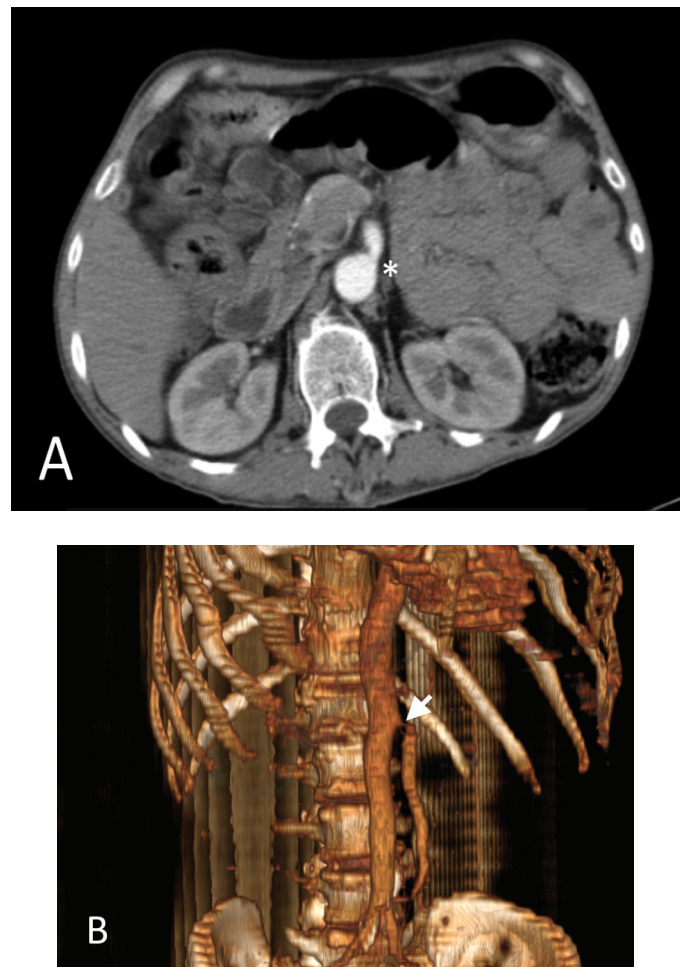

Figure 1 A. Narrowing of the superior mesenteric artery (asterisk) on CT imaging; **B.** Narrowing of superior mesenteric artery (arrow) demonstrated on 3D reconstructed angiographic CT images.
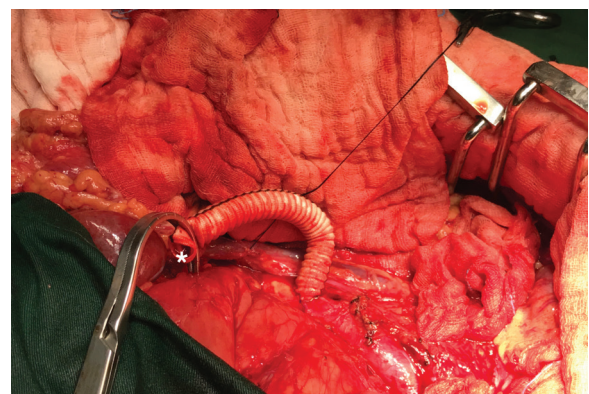

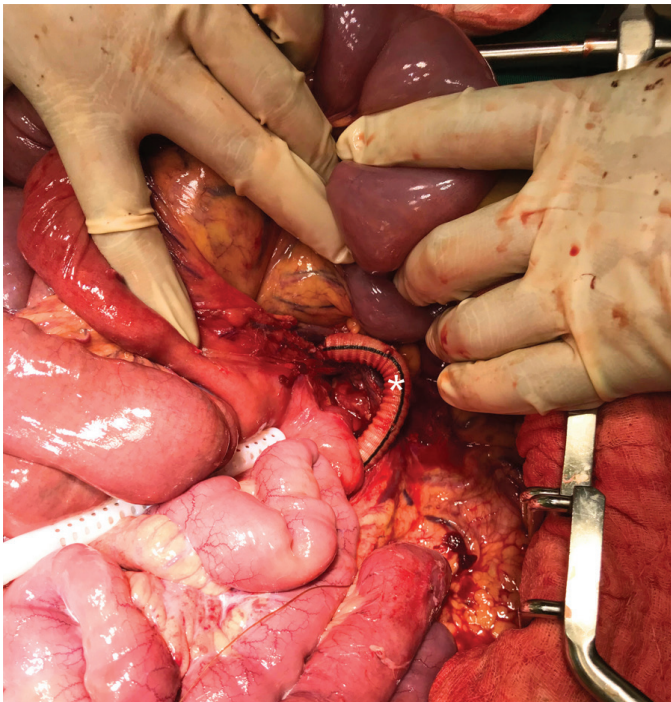**Figure 2.** Dacron graft (asterisk) pre-anastomosis

Figure 3. Dacron graft anastomosed (asterisk). Aorto-SMA bypass, side to side anastomosis at the area of the infrarenal aorta using an 8 mm Dacron graft.

collateral circulation or failure of provision of adequate intestinal blood flow. In CMI, with the presence of stenotic mesenteric arteries postprandial intestinal angina occurs. This pathophysiology brings about the classic description of abdominal pain namely in the epigastric area described as cramping or colicky pain. It typically begins 15–30 minutes after meals for an approximate duration of 2–3 hours. Post-prandial pain can result in sitophobia, as experienced by the patient, which lead to his compensating for this by eating smaller portions resulting in his weight loss.[4] The frequency of gastrointestinal mucosal lesions in chronic mesenteric ischemia is unknown. The EGD findings in this patient is consistent with the work of Barret, et al., which reported that 52.6% of the patients who had an endoscopic workup had mucosal lesions of the stomach or colon that were attributable to CMI.[5]

The superior mesenteric artery (SMA) is almost always involved in symptomatic cases like in this case. CMI can arise from single vessel or multiple vessels stenosis. In the elderly population, 17.5%-18% are evidenced to have significant stenosis in one of their splanchnic vessels. On the other hand 1.3% have stenosis in two or more splanchnic vessels.[6]

In the past, it was assumed that stenoses in at least 2 splanchnic vessels were required for a patient to develop CMI symptoms. It has been demonstrated that even the presence of single-vessel stenosis, symptoms could develop which would need treatment.[6] According to a study by Thomas et al., 86% of patients included in the study with a 3 vessel arterial disease presented with mesenteric ischemia, other gastrointestinal symptoms and death pushing the need for further investigation. One- or two-vessel disease, on the other hand, are speculative in terms of management as symptomatic cases were noted to be low.[7] Without revascularization of the intestine, CMI can ultimately progress to acute on chronic mesenteric ischemia with a high mortality rate of 90%.[8] This stresses the importance of recognition of chronic mesenteric ischemia to provide timely and effective revascularization to the patients.

Yeoh stressed that when presented with chronic diarrheal illness with nausea and weight loss, one needs to keep vascular disorders in mind. In this study, particular attention was placed on the sequence of cognitive errors leading to diagnostic delay.[9]

Clinical practice guidelines set by the Society of Vascular Surgery recommend that patients who present with abdominal pain, weight loss and food fear, similar to the case reported, to undergo an expedited workup to exclude GI malignancies and other potential causes. The workup includes EGD, colonoscopy, abdominal CT scan and abdominal ultrasound. These diagnostics were performed in this case recurrent admissions over a span of months. The discrepancies in the patient's symptoms, the wide differential possibilities for chronic abdominal pain with weight loss, and the low frequency of CMI in the general contribute to the delay in diagnosis. Delay is further protracted by the extensive diagnostics recommended prior to referral to a vascular specialist. Often, such as in this case, patients would have undergone extensive evaluation before arriving at a tentative diagnosis of CMI triggering a referral to the specialist.[1]

CMI accounts for less than 1 per 100,000 admissions, though it has been noted in the USA that there has been a gradual increase in reported cases. This may

not be reflective of an increase in prevalence but rather an increase in use of diagnostic modalities and interventions. Actual documentation of CMI can be done using the following assessment of tissue ischemia during endoscopy, measurement of gastrointestinal blood flow, measurement of decreased tissue PO_2 on increased tissue CO_2, measurement of ischemia specific biomarkers or laparotomy with histopathology.[10]

At present, the American College of Radiology recommends the use of computed tomography angiography (CTA) as the first-line method for exploring the possibility of CMI. CTA has a sensitivity of 96% and a specificity of 94% for the diagnosis of CMI, and provides 3-dimensional reconstruction to guide treatment. It also diagnoses potential complications, such as signs of critical or acute intestinal infarction, and enables a differential diagnosis, especially differentiating between chronic pancreatitis and retroperitoneal tumors. Magnetic resonance angiography (MRA) has a potential role in the imaging of CMI with a noted sensitivity and specificity were 100% and 95%. In recent studies, it has been evidenced that the quality of imaging mesenteric vessels has been shown to be more superior in CTA as compared to MRA. IMA and peripheral mesenteric vessels in particular are better seen on CTA.[11]

Treatment recommended is revascularization to reverse symptoms including sitophobia, weight loss, diarrhea and post-prandial pain and improve quality of life. The SMA is the primary target for revascularization, as chosen in this case. The celiac axis and inferior mesenteric artery are secondary targets should the SMA be unsuitable. The SMA on its own is sufficient for this procedure as it has an extensive mesenteric collateral network. The primary goal for revascularization is to optimize mesenteric perfusion. The best approach to be chosen should include the evaluation of the patient's anatomy, comorbidities, life expectancy, and individual care goals. Whether an endovascular or on open approach is superior, is debatable given the low overall quality of evidence taken from large studies. It is possible to surmise that the surgeon's skill set and patient's ability to comply with long term follow-up might best determine the best approach of treatment.[1]

Conclusions

CMI is a rare cause of abdominal pain. Patients tend to be victims of diagnostic delays. Early recognition of the disease is the key to timely intervention to improve quality of life and to prevent bowel infarction. Advances of technology and the increased health awareness among patients contribute to the increasing number of CMI cases uncovered. This case is an example of how we should be vigilant of the less common diagnoses of abdominal pain to prevent delays in the management and protracted patient suffering.

Conflicts of Interest Statement

The authors of this case report have no conflicts of interest to declare.

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