
Title: Chronic Mesenteric Ischemia Secondary to Atherosclerosis with Concomitant Median Arcuate Ligament Syndrome: A Tale of Two Stories

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Abstract

Background:

Abdominal pain is a common acute medical and /or surgical presentation to the emergency departments with myriad causes. Mesenteric angina secondary to mesenteric atherosclerosis is the most common cause while median arcuate ligament syndrome is a rare one. However, there are no reports of simultaneous occurrence of both etiologies in patients with mesenteric angina.

Clinical Case:

We describe a case of chronic mesenteric ischemia in a 53-year-old female patient who has had partial colectomy for Crohn's diseases with ligation of the inferior mesenteric artery. She presents with severe chronic intermittent post-prandial abdominal pain associated with nausea, vomiting and a 10% weight loss in addition to chronic persistent hyperlactatemia.

She was found to have an atherosclerotic plaque of the superior mesenteric artery associated with a concomitant median arcuate ligament. The diagnosis was made after abdominal angiogram with a successful angioplasty of the superior mesenteric artery.

Conclusion:

Mesenteric angina can be caused by either atherosclerosis and/or median arcuate ligament syndrome. It is rare to diagnose both simultaneously in patients with mesenteric angina. When you do, treatment should be tailored towards the highly possible etiology. In this case, mesenteric angina was successfully treated with angioplasty of the superior mesenteric artery.

Keywords: Median arcuate ligament syndrome, mesenteric angina, chronic mesenteric ischemia.

1. Introduction:

Abdominal pain is a common medical and or surgical presentation to the emergency departments with myriad causes. Mesenteric ischemia is one of the causes of abdominal pain that presents either acutely or chronically and is usually caused by atherosclerosis, blood clots or extra luminal compression either by a mass or fibrous band like the median arcuate ligament (MAL).

Acute mesenteric ischemia is a life-threatening condition with a mortality rate up to 80% due to intestinal necrosis and sepsis [1]. Most cases are caused mainly by thromboembolism. In the acute stage, Patients present with sudden post prandial abdominal pain, nausea and vomiting without any behavioral changes like food reduction or weight loss. However, in the chronic stage, patients present with chronic post prandial abdominal pain associated with behavioral changes such as food reduction leading to weight loss.

The gut is supplied by three main arteries: the celiac artery, the superior mesenteric artery (SMA) and the inferior mesenteric artery (IMA). The 3 arteries originate from the aorta and provide rich blood supply to the viscera by anastomotic system. It is perceived that chronic mesenteric ischemia does not become fully symptomatic until at least two of the three major arteries of the gut become severely stenosed [2].

The patient in this report has only two functional mesenteric vessels, the SMA and the celiac artery. The IMA was ligated in the past during colectomy for the complication of Crohn's disease.

MALS is a rare cause of chronic mesenteric angina that is caused by extraluminal compression of the celiac trunk which is the first branch of aorta that passes under the MAL and supplies blood to the upper gut and the abdominal organs such as the stomach, spleen, liver, pancreas, and the gall bladder. The prevalence of MALS is low. It affects approximately 2 per 100,000 people [3] and not all cases are symptomatic making it difficult for an early diagnosis.

We describe a rare case of chronic mesenteric ischemia caused by an atherosclerotic plaque of the SMA and a simultaneous occurrence of MALS of the celiac artery in a young patient who has had previous colectomy with ligation of IMA.

2. Clinical Case:

This was a 53-year-old female with a background of Chron's disease at the age of eighteen and has had a subtotal colectomy with ileostomy at the age of nineteen. She was on azathioprine as maintenance therapy for her Chron's disease. She has well controlled essential hypertension and type 2 diabetes mellitus with a blood pressure of 120-130/80-90 mmHg and a glycated hemoglobin A1c of 43 mmol/L respectively.

She presented to our emergency department with a 6 -month- history of post-prandial abdominal pain, nausea and vomiting associated with an unintentional weight loss of 12 kilograms in 6

months. She has had multiple hospital admissions in the last 6 months presenting with the same pain which always ended up being diagnosed and treated on every occasion as pain secondary to Crohn's flare despite normal inflammatory markers.

She described her abdominal pain as squeezing and was brought on approximately 30 - 60 minutes after eating. It was located mainly in the epigastric, umbilical and the right lumbar quadrants and radiated to the back with a severity of 8/10 on the numerical pain rating scale. She reported a reduction in her food intake and occasionally ceased eating to relieve herself from the pain.

On this admission, she presented with another episode of severe abdominal pain at the upper abdominal quadrants after a light meal at home. Her clinical examination was essentially normal with a BP 165/90 mmHg, HR 98/m, RR 16/m, SpO2 96 % on room air, weight 62 kg, BMI 25.2 kgm².

Her blood tests were unremarkable except for an isolated leukocytosis secondary to recent steroid therapy and persistent hyperlactatemia between 5 - 8 mmol/L without acidosis on serial venous blood gases that had no other obvious etiologies.

A computer tomography (CT) of abdomen and pelvis (CTAP) with contrast did not show any evidence of a Crohn's flare, pancreatitis or abdo-pelvic collection but did show changes suggestive of splenic infarcts, fatty changes in the liver and a non - obstructive calculus in the upper calyx of her right kidney.

She was reviewed by the local urology team who agreed that the patient's pain was not related to the renal calculus and that she will be followed up in their outpatient clinic. A computer tomographic angiography (CTA) of her abdomen was requested and it showed significant intraluminal narrowing of the superior mesenteric artery (SMA) associated with an extra luminal narrowing of the celiac artery at its origin, suggesting concomitant atherosclerotic narrowing of SMA and median arcuate ligament syndrome (MALS) of her celiac artery ([Fig.1](#)).

A vascular surgical multidisciplinary team (MDT) review was undertaken to decide which vascular stenosis was responsible for her symptoms and on the decision on treatment options: with open surgery for MALS or a trial of stenting of the atherosclerotic narrowing of the SMA. The MDT decided for the latter and the patient was transferred to the nearby University Hospital for endovascular intervention. She had an uneventful stenting of the SMA on same day of her transfer ([Figures 2,3,4](#)) and was discharged on the second day post stenting on dual antiplatelet therapy.

She was reviewed in the vascular clinic in the first, second and the fourth months, post stenting and was noted to be doing extremely well with no abdominal pain and satisfactory oral intake resulting in a gain of 5 kilograms of weight.

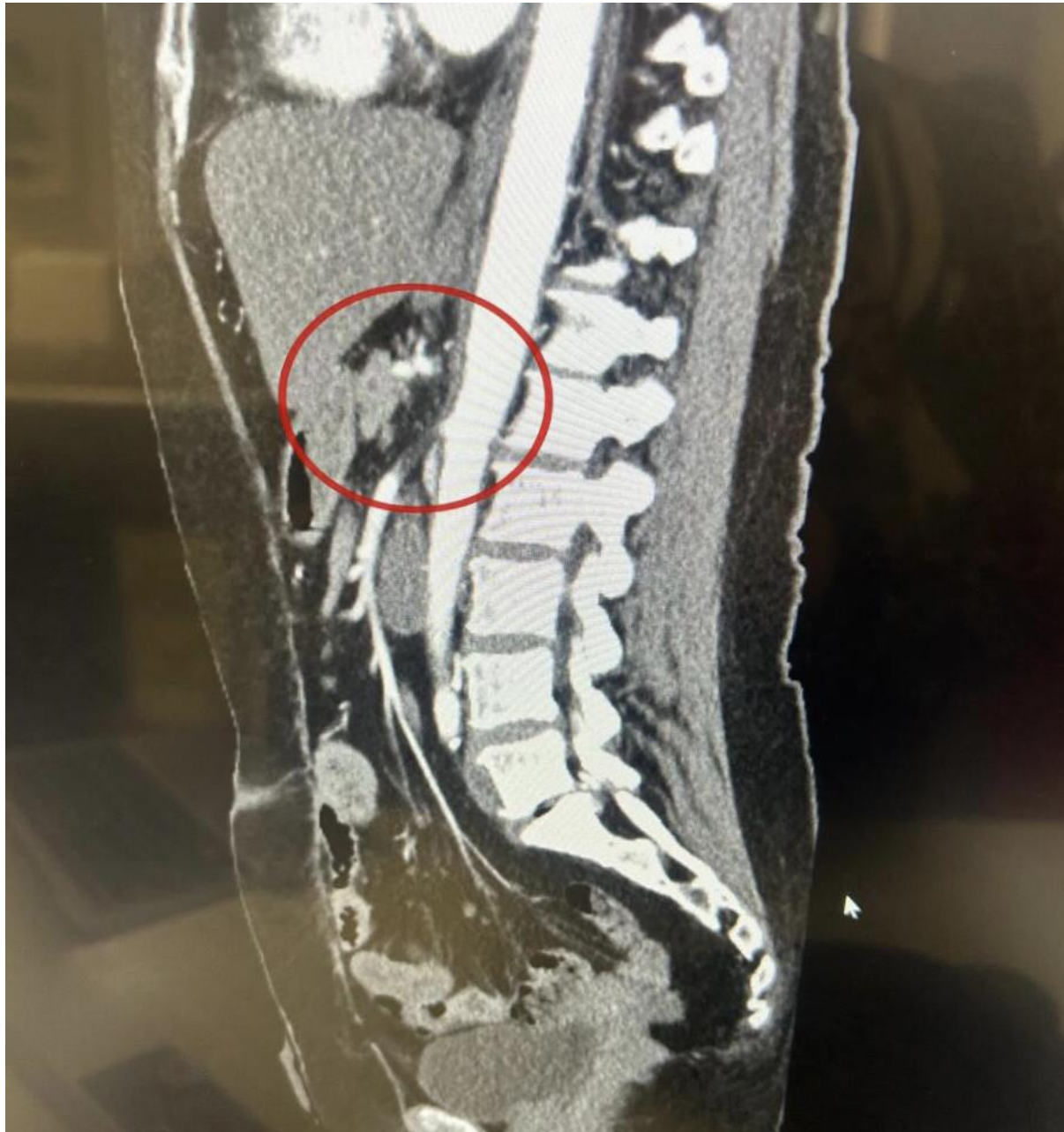


Figure 1: Initial abdominal CT angiogram showing significant luminal narrowing at both the origin of the celiac axis in and superior mesenteric artery

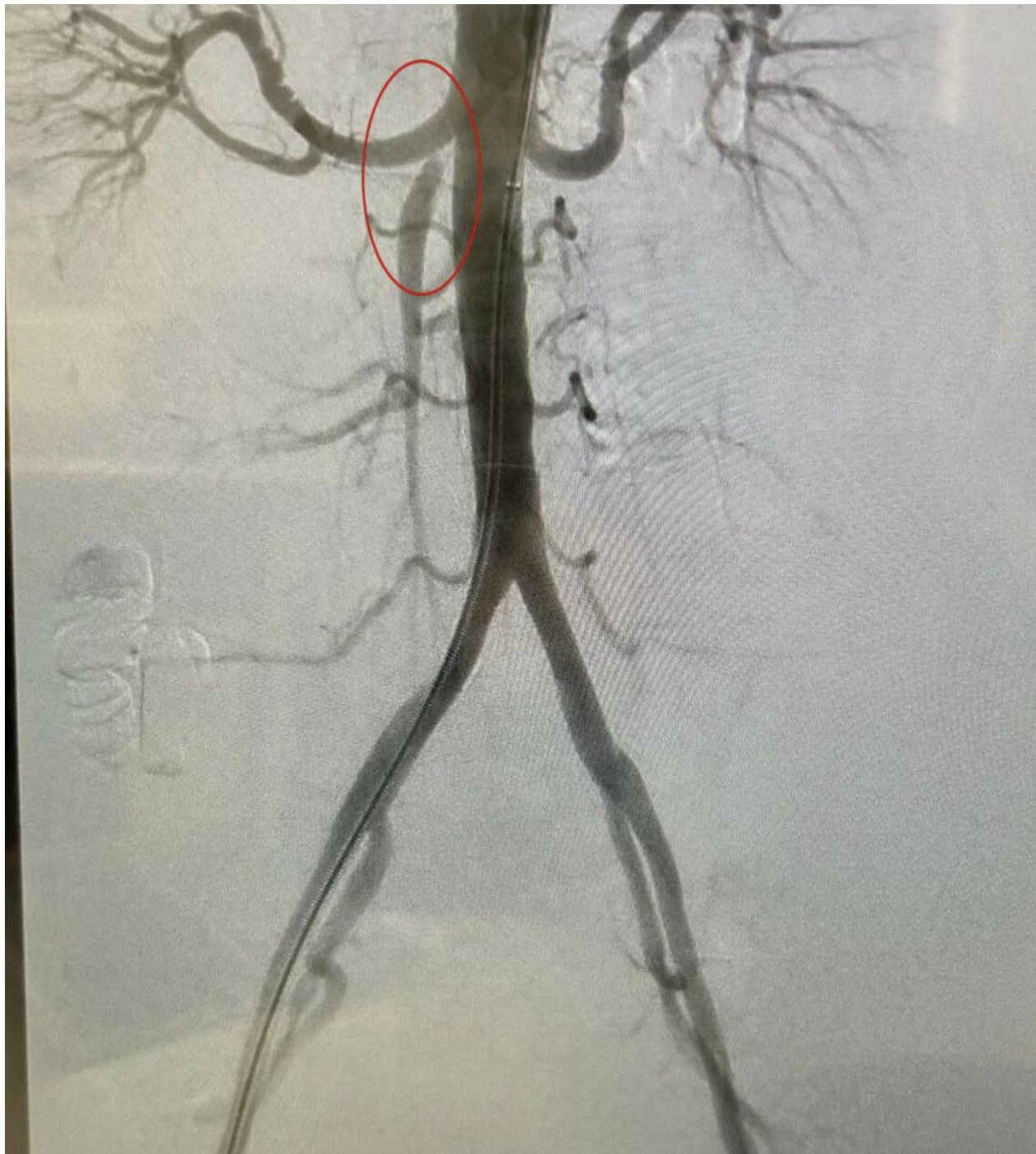


Figure 2: Pre-stenting angiogram showing significant narrowing of the superior mesenteric artery.



Figure 3. Treading of the stent across the compression (first image) and successful stenting (second image) of the superior mesenteric artery

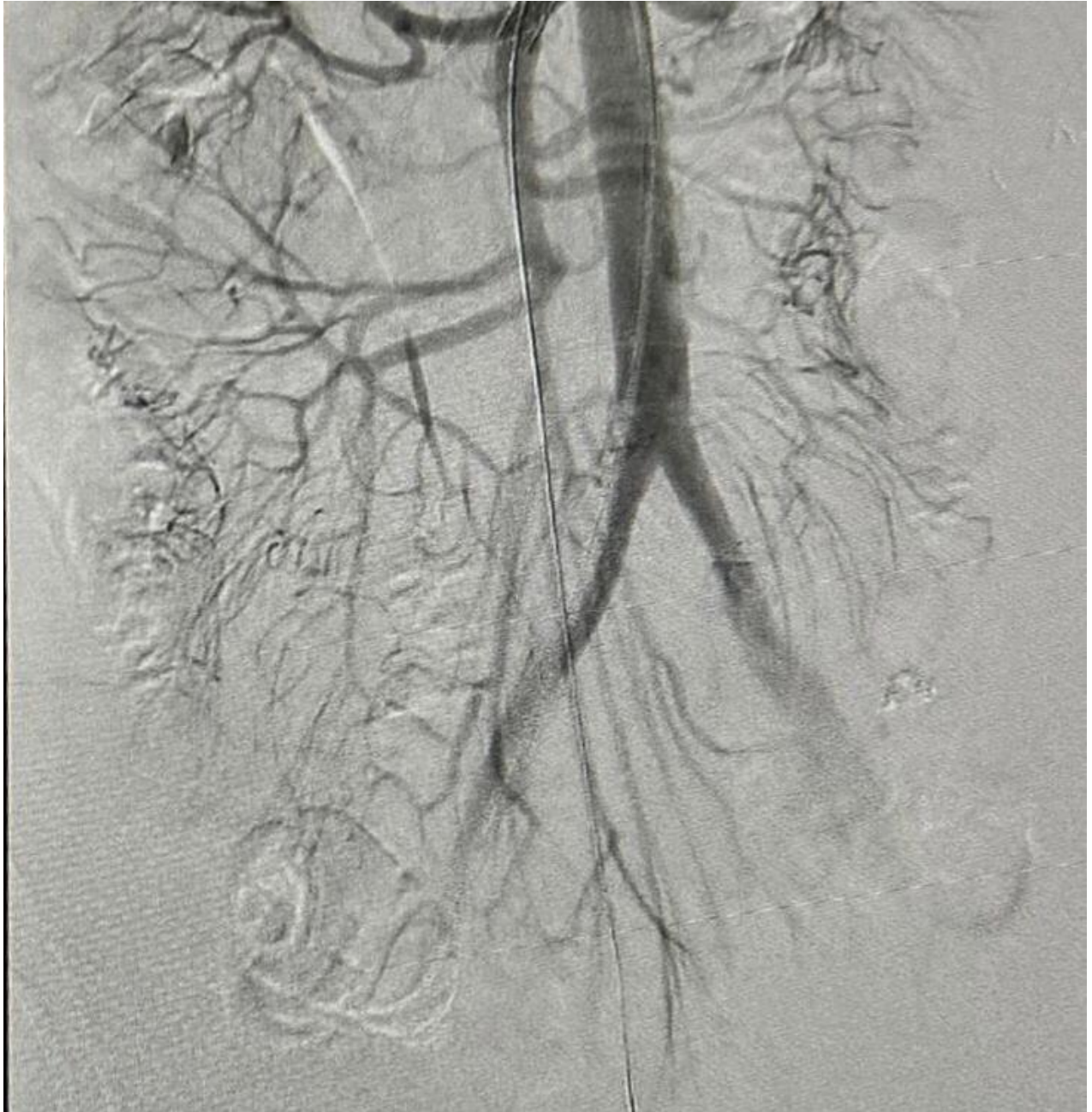


Figure 4. Final successful stenting of superior mesenteric artery

3. Discussion:

The diagnosis of chronic mesenteric ischemia can be challenging and require high level of clinical suspicion. The clinical triad of intermittent postprandial abdominal pain associated with nausea, vomiting and unintentional weight loss are classical clinical presentations. Although physical clinical examination is unremarkable, persistent hyperlactatemia on blood test is usually suspicious of chronic ischemia.

Atherosclerotic disease of the mesenteric vessels is the most common cause of mesenteric angina and usually manifests when there is significant stenosis of two of the three mesenteric arterial supplies. Diagnosis is made from the CTA, and stenting usually resolves the angina.

MALS on the other hand, is another rare cause of mesenteric angina with low prevalences [4]. There are no diagnostic criteria for diagnosing MALS and it is a diagnosis of exclusion. The diagnostic dilemma is compounded by the presence of concomitant abdominal pathologies. A report suggests an association of MALS in a patient with Chron's disease [5] and those who had surgical management for the complications of Chron's. Inflammatory bowel disease (IBD) has a greater prevalence among females in comparison to males and the association could be due to sex specific disease prevalence rather than an etiological association. Additionally, splenic infarcts [6], and persistent idiopathic hyperlactatemia are known associations.

MALS is common among females as compared to men in a ratio of 4:1 [4]. It can be suspected in patients with typical symptoms associated with a history of previous surgery, that potentially has masking effect on the diagnosis but could also serve as a risk factor rather than the cause of the abdominal pain in MALS. The underlying cause of this association is also unknown, but we postulate that the changes in abdominal architecture post-surgery could potentially result in the compression of celiac artery by MAL.

The prevalence of MALS is low. It affects approximately 2 per 100,000 people [3] and not all cases are symptomatic. These contribute to the rarity and difficulty in making an early clinical diagnosis. A high index of clinical suspicion is required to make a definitive diagnosis with angiogram which will help expedite the management either with open, robotic or laparoscopic surgery.

There is only one case report of concomitant MALS occluding the celiac artery with an acute thrombotic SMA occlusion resulting in necrosis of jejunum. It was managed by open surgical intervention relieving the MALS and with jejunectomy [7].

Further research is needed to determine the causes of the associations between MALS, Chron's disease, abdominal surgeries and splenic infarcts.

It is also difficult to predict which conditions cause mesenteric angina when there are simultaneous occurrences of atherosclerotic mesenteric angina and angina caused by MALS as in this case. In

such situations, initial vascular intervention before surgery could potentially relieve the angina. Additionally, surgery has more risks than stenting including prolonged hospitalization and other associated surgical complications.

4. Conclusion:

Mesenteric angina can be caused by either atherosclerosis and/or median arcuate ligament syndrome. Concomitant existence of both pathologies is rare and cause treatment dilemma. A multidisciplinary team could make an approximately correct decision for treatment tailored towards the highly possible etiology. In this case, mesenteric angina was successfully treated with angioplasty of the superior mesenteric artery.

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5.1 Authors Contributions:

AZ conceptualized, selected the case and wrote the first draft and helped in the edition of final draft . LBK edited and structured the final manuscript for publication.

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5.3 Conflict of Interest: None

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