Median Arcuate Ligament Release, A Benefit or Malefit?

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Introduction

Median arcuate ligament syndrome (MALS), a relatively rare condition that describes external compression of the celiac artery by the median arcuate ligament has historically been a poorly understood and somewhat controversial diagnosis, oftentimes a diagnosis of exclusion. The syndrome may manifest as symptoms of epigastric pain, nausea, vomiting, and subsequent food fear due to foregut ischemia and has been associated with comorbid conditions like anxiety and gastric dysmotility. Treatment options include non-operative symptom management or surgical release of the median arcuate ligament. The literature surrounding the efficacy of surgical treatment remains mixed with inconsistent reports of symptom improvement or alleviation, however some studies have described the risk of hyperplastic intimal changes secondary to chronic compression that may contribute to downstream aneurysmal disease if the anatomic variant is left untreated.

Patient Presentation

31 year old female with history of anxiety, migraines, and severe intermittent abdominal pain for 6 months who presented to the ED with severe epigastric abdominal pain, nausea, vomiting, and inability to tolerate oral intake. CTA on presentation was notable for focal stenosis at the origin of the celiac axis. Abdominal doppler ultrasound was notable for greater than 70% stenosis of the celiac artery on expiration consistent with median arcuate ligament syndrome. Given the patient's history of severe epigastric abdominal pain along with radiographic evidence of median arcuate ligament syndrome, she was offered surgical intervention.

Intervention and Operative Technique

The patient underwent robotic assisted laparoscopic median arcuate ligament release. Intraoperatively, the left gastric artery was identified and traced to its origin. The confluence of the left gastric, splenic, and common hepatic arteries was identified. The vascular structures were skeletonized. The median arcuate ligament and celiac ganglion plexus were divided using cautery along the origin of the celiac artery.

Intervention and Operative Technique

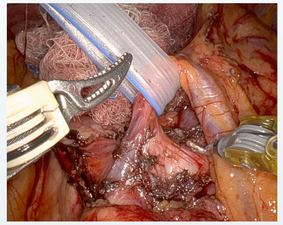

Figure 1 - the left gastric artery, splenic artery, and common hepatic artery have been skeletonized and the confluence at the origin of the celiac trunk is visible

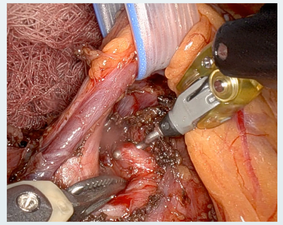

Figure 2 - The median arcuate ligament has been dissected and isolated from the surrounding vascular structures

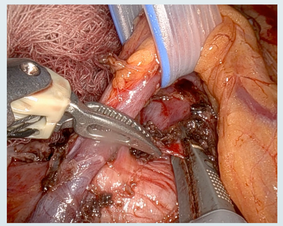

Figure 3 - the median arcuate ligament is transected

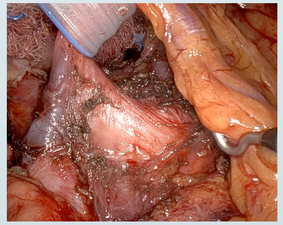

Figure 4 - the celiac trunk following transection of the median arcuate ligament

Imaging

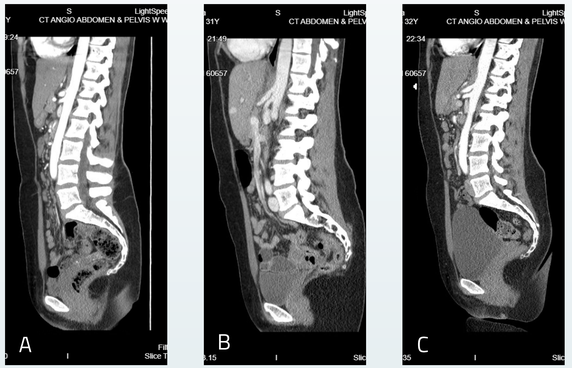

Image A: Pre-operative imaging at the time of presentation in ED showing severe stenosis at the origin of celiac artery
Image B: Post-operative imaging about 1 week post-op showing resolution of severe stenosis at origin of celiac artery
Image C: Post-operative imaging about 1 year year post-op showing continued wide watency at origin of celiac artery

Follow Up

The patient was discharged on post operative day one after tolerating a full liquid diet with instructions to advance her diet slowly as tolerated. She followed up at 1 week and 1 month post-op and reported that she had been tolerating some solid foods without pain, nausea, or vomiting.

However, over the course of one year following surgery, the patient has presented to various emergency departments and had multiple hospital admissions (12) for persistent abdominal pain, nausea, vomiting, and dehydration. She has seen gastroenterologists, other surgeons, undergone testing which confirmed a diagnosis of gastroparesis, and trialed various medications to manage her symptoms.

Although she reports her symptoms are improved and episodes of severe abdominal pain are less frequent than prior to surgery, she continues to struggle with weight loss and diet intolerance.

Discussion

Although MALS and surgical release of the MAL was first described in literature in 1963, the diagnosis of MALS remains controversial due to poor understanding surrounding the etiology of symptoms and evidence supporting both an ischemic and neurologic etiology has been described. From a neurologic perspective, there is thought that compression of the celiac plexus nerves or repetitive irritation of the celiac ganglion may cause abdominal pain and thus, performing a percutaneous celiac plexus block or celiac ganglionectomy alongside ligament release may produce relief in pain. In regards to an ischemic etiology, the literature describes evidence of mucosal ischemia (evaluated with gastric tonometry) in patients with MALS prior to surgical release.

Additionally, it is also important to note that there is a portion of the population who have radiographic evidence of celiac artery compression without any symptoms. This further adds to the confounding presentation of MALS and questions its legitimacy as a diagnosis.

In studies that have reviewed outcomes of patients with MALS who have undergone surgical release, the majority of patients report early/immediate symptom relief. However, additional studies have noted that there can be as high as a 48% rate of treatment failure at the three years follow-up.. Risk factors associated with treatment failure include robotic MAL release, history of gastroparesis, dysphagia, odynophagia, and increasing number of pain locations. Given the described high failure rates and known risk factors, each patient should be screened carefully in assessing candidacy for surgical release.

Conclusion

Median arcuate ligament syndrome continues to be a challenging diagnosis for surgeons to navigate. We report a patient with symptoms and imaging consistent with median arcuate ligament syndrome who underwent successful release as confirmed by post-operative imaging. Despite technical success, the patient reports persistent burdensome symptoms that impact her quality of life. Many decades after surgical treatment of MALS was first described, the syndrome continues to perplex clinicians and further research is needed to better understand its pathophysiology and best means to treat this debilitating condition.