IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 25, Issue 3 Ser. 2 (March. 2026), PP 12-15
www.iosrjournals.org

Laparoscopic Median Arcuate Ligament Syndrome (MALS) Management: A Case Report

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Abstract:
Background: *Median Arcuate Ligament Syndrome (MALS) or Dunbar syndrome is a rare occurrence of vascular disease characterized by extrinsic compression of the celiac artery by the median arcuate ligament. Chronic postprandial abdominal pain, nausea, vomiting and weight loss often follow these findings, and nonspecific symptoms can trigger a delay in the diagnosis.*
Case Presentation: *We present the case of a 26-year-old female with a 7-8 month history of postprandial epigastric pain and persistent vomiting, a recent deterioration in symptoms and significant weight loss (body weight 36.8 kg). Past medical history was unremarkable except for prior renal stone surgery. Laboratory studies were largely unremarkable. Contrast enhanced computed tomography (CECT) showed characteristic focal compression of the celiac axis with post-stenotic alterations, consistent with MALS. Upper gastrointestinal endoscopy ruled out other gastrointestinal causes of abdominal pain. A diagnosis of MALS was made on clinical signs and images.*
Intervention: *The median arcuate ligament was surgically released. Within the operating theatre, the celiac artery and its branches were dissected and the compressive ligament fibers were sliced by harmonic scalpel. Visual confirmation of adequate decompression of the celiac axis was obtained by restoration of pulsations.*
Results: *There were no intraoperative complications following the procedure. The postoperative course was uneventful, and the patient was discharged on postoperative day two. At one-month follow-up she described substantial symptomatic relief, her appetite increased, and she gained weight.*
Conclusion: *A laparoscopic median arcuate ligament release is a safe and effective, minimally invasive approach for symptomatic MALS. Early recognition with proper imaging and rapid surgical aid can result.*
Keywords: *Median Arcuate Ligament Syndrome, Celiac Artery Compression, Laparoscopic Decompression*

Date of Submission: 01-03-2026 Date of Acceptance: 11-03-2026

I. Introduction

Median Arcuate Ligament Syndrome (MALS), also known as Dunbar syndrome or celiac artery compression syndrome, is a rare vascular condition characterized by the extrinsic compression of the celiac artery and/or the surrounding celiac ganglion by the median arcuate ligament (MAL)[1]. This compression typically leads to a classic triad of symptoms: chronic postprandial abdominal pain, weight loss, and nausea or vomiting. MALS is often considered a diagnosis of exclusion due to its non-specific symptoms that can overlap with other gastrointestinal or vascular conditions [2]. Lipshutz was the first person to report the anatomical compression of the celiac artery in 1917. Median arcuate ligament syndrome was first described by Harolja in 1963 as a clinical entity. Dunbar reported the first clinical study on MALS in 1965.[3] The reported incidence is approximately 2 cases per 100,000 population, predominantly affecting lean, middle-aged women, though it can occur in males and pediatric patients as well [1]. The pathophysiology is debated, with theories focusing on foregut ischemia due to compromised blood flow or neuropathic pain resulting from celiac ganglion compression [4].

Accurate diagnosis relies on a combination of clinical suspicion and advanced imaging modalities, including computed tomography angiography (CTA) and Color Doppler ultrasound, to identify celiac artery stenosis and altered blood flow dynamics [5]. Surgical intervention, particularly laparoscopic release of the MAL, is the established treatment, aiming to decompress the celiac axis and alleviate symptoms [1]. This case report outlines the successful laparoscopic management of MALS in a young female patient presenting with characteristic symptoms.

II. Case Report

A 26-year-old female presented to the outpatient department with a history of epigastric (upper abdominal) pain and vomiting for 7–8 months. Her symptoms, initially insidious, had progressively worsened in intensity over the past 10 days. The pain was noted to be aggravated by food intake, non-radiating, and was accompanied by significant unintentional weight loss, with her weight recorded at 36.8 kg upon admission. The

patient had no history of hypertension, diabetes, thyroid disease, tuberculosis, or asthma. She underwent renal stone removal surgery in past.

On admission, her routine laboratory investigations revealed haemoglobin 11.8 g/dL, platelet count 1.04 lakh, and normal renal and liver function tests. Preoperative imaging played a crucial role in diagnosis. Contrast-enhanced computed tomography (CECT) of the abdomen revealed compression of the celiac axis (Fig.1). She underwent other investigations like upper gastrointestinal endoscopy to rule out other pathologies.

Based on the clinical presentation, diagnostic imaging and excluding other pathologies, a diagnosis of MALS was made, and laparoscopic release of the median arcuate ligament was planned. During the laparoscopic procedure, the left liver lobe was retracted to expose the operative field. The left gastric artery and common hepatic artery were identified and carefully separated from surrounding fatty tissue. Celiac artery dissected till compression. Abdominal aorta exposed. The median arcuate ligament fibers compressing the celiac artery were clearly identified and subsequently divided with help of harmonic scalpel (Fig. 3). Post release, complete celiac artery root visualised with pulsations. The procedure was uneventful, and successful decompression of the celiac axis was achieved without any intraoperative complications (Fig. 4). The patient had a stable postoperative recovery and was discharged in satisfactory condition on post operative day 2. A month after her follow-up, the patient was almost symptom-free and had improved her appetite and gained weight.

III. Discussion

Median Arcuate Ligament Syndrome (MALS) is a challenging condition to diagnose due to its protean symptoms that frequently mimic other more common gastrointestinal pathologies, leading to diagnostic delays.

This case presents typical symptoms of MALS in a young female with chronic postprandial abdominal pain, vomiting and significant weight loss. The small body weight of 36.8 kg also highlights the chronic manifestations and severity of the symptoms, corroborating with previous reported cases of MALS. [2,6] The diagnosis of MALS is generally based on objective examination of celiac artery compression with a consistent clinical picture and exclusion of other aetiologies.[7,8] In this patient, baseline investigations were largely unremarkable, removing multiple metabolic, hepatic, or infectious reasons for abdominal pain. Imaging modalities were crucial in confirming the diagnosis. Computed Tomography Angiography (CTA) showed the characteristic focal narrowing at the origin of the celiac trunk, an important hallmark of MALS. [9] Surgical intervention is the most appropriate therapy for symptomatic MALS. The primary aim is to relieve compression of the celiac artery and other neural structures by cutting along the median arcuate ligament.[10] Historically open surgery was more common, but laparoscopic surgery has become the standard treatment thanks to its minimally invasive nature, lower postoperative pain, shorter duration of hospital stay, and rapid rehabilitation of the patient. The laparoscopic approach provides for great visualization of the celiac axis and the MAL for proper dissection and release of compression fibers.[2] As evidenced here, this well-managed separation of MAL fibers occurred with minimal complications, demonstrating effective decompression. It is vital to properly dissect all cords of narrow fibrous bands, with the celiac ganglion, in order to ensure all bands of the fibers are released fully. Advanced laparoscopic dissection around major vessels is critically important to minimize the risk for complications.[1]

Lastly, this case emphasises the need for recognition of MALS in patients with long-standing, unexplained postprandial abdominal pain, particularly when other common conditions have been excluded. Early diagnosis and timely surgical intervention can prevent long term complications like the development of collateral circulation, aneurysms, or even dissection, as it has been reported in severe patients.

IV. Conclusion

Laparoscopic release of the median arcuate ligament is a safe and effective minimally invasive treatment for Median Arcuate Ligament Syndrome, often providing rapid symptom relief and recovery. Accurate diagnosis relies on clinical assessment and advanced imaging such as CTA and Colour Doppler ultrasound. Successful decompression of the celiac axis can improve patient outcomes but requires specialized laparoscopic skills to minimise complications.

Fig. 1: Sagittal section showing Median Arcuate ligament compressing the lumen of celiac axis at its origin.

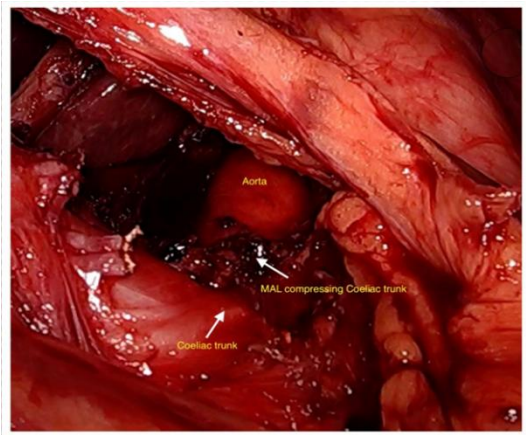

Fig. 2: Intraoperative view of the infradiaphragmatic area showing a large coeliac trunk with MAL (median arcuate ligament) compression of the coeliac trunk.

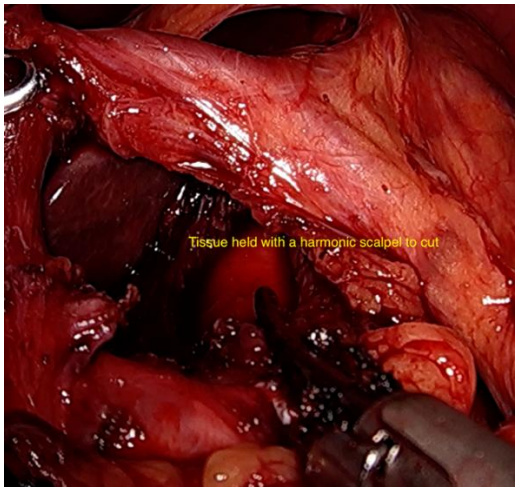

Fig. 3: Fibers of median arcuate ligament compressing Coeliac axis, held with the help harmonic scalpel.

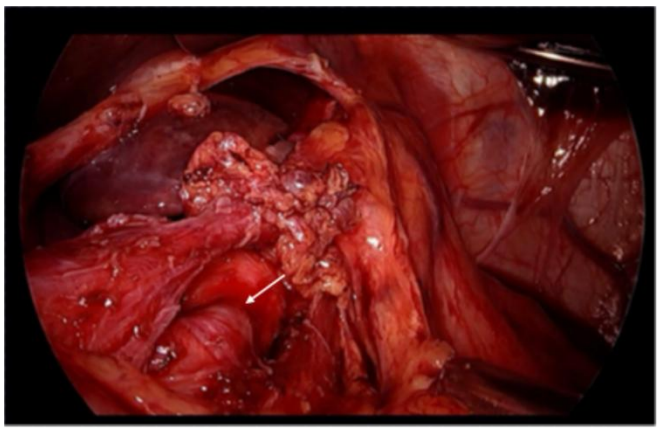

Fig. 4: root of celiac artery (white arrow), post release of median arcuate ligament

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