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A Tight Squeeze: Unpacking the Manifestations of Celiac Artery Compression Syndrome

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Abstract

Celiac Artery Compression Syndrome (CACS), or median arcuate ligament syndrome, is a rare cause of chronic abdominal pain due to compression of the celiac artery by the diaphragmatic ligament. The celiac trunk supplies blood to the stomach, liver, and spleen, and its compression may lead to ischemia. Diagnosis relies on contrast-enhanced CT (CECT), which reveals ligament thickness, vessel narrowing, and organ damage. This case series identified 7 CACS cases:

Case 1: A 26-year-old male with 40% celiac trunk narrowing and post-stenotic dilatation.

Case 2: A 14-year-old boy with mild narrowing and postprandial pain.

Case 3: A 35-year-old male with 80% narrowing, splenic/renal infarcts.

Case 4: A 35-year-old female with 90% narrowing, splenic infarcts, and Arc of Buhler.

Case 5: A 37-year-old male with pancreatitis and splenic vein thrombosis.

Case 6: A 50-year-old female with episodic vomiting and 60% celiac stenosis, has diffuse abdominal pain.

Case 7: A 22-year-old athlete with exercise-induced pain and collateral vessel formation due to chronic compression.

The median arcuate ligament's thickness (6.2–7.8 mm) correlated with stenosis severity. Symptoms often worsened during expiration due to increased compression. Complications ranged from asymptomatic narrowing to life-threatening infarcts or pancreatitis.

Conclusion: CACS manifests variably, necessitating prompt CECT for diagnosis. Early intervention can mitigate morbidity, though treatment strategies require further standardization.

Keywords: Median Arcuate Ligament, Celiac Trunk Stenosis, Splenic Infarcts, Contrast-Enhanced CT (CECT)

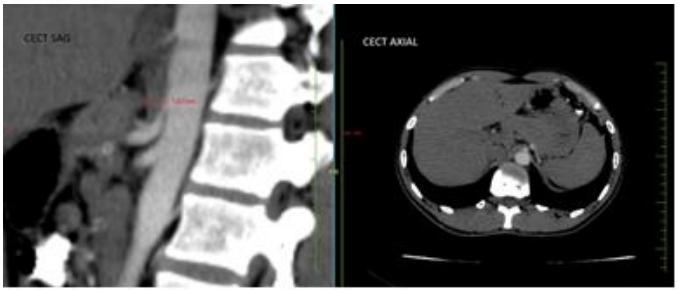
Introduction

Celiac artery compression syndrome, commonly referred to as Dunbar syndrome or median arcuate ligament

syndrome, is an uncommon condition that leads to intermittent abdominal pain. This occurs due to the compression of the celiac axis, a major blood vessel supplying the left gastric, splenic, and common hepatic arteries. The compression is typically caused by a fibrous band of tissue from the diaphragm called the median arcuate ligament. CECT of the abdomen is the best investigation to study the spectrum of manifestations of this condition as the median arcuate ligament, celiac axis, superior mesenteric artery and the organs supplied by these vessels are well delineated with this investigation. We review the different manifestations of celiac artery compression and resultant effect on various organs and severity of organ affection is emphasized.

Case 1: A 26 year old male patient presented with complaints of pain in upper abdomen exaggerating on deep inspiration.

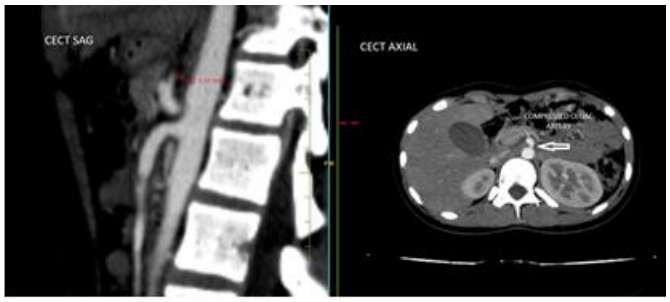
Figure 1:



CT findings appear to show indentation of median arcuate ligament on superior aspect of proximal celiac trunk causing focal narrowing (approximately 40%) of celiac trunk at a distance of 7 mm from its origin with mild post stenotic dilatation. Thickness of the median arcuate ligament measures 7.8 mm. Findings are consistent with celiac artery compression syndrome with median arcuate ligament thickening.

Case 2: A 14 year old boy presented with complaints of pain in upper right abdomen with postprandial abdominal pain and epigastric pain related to respiratory variations.

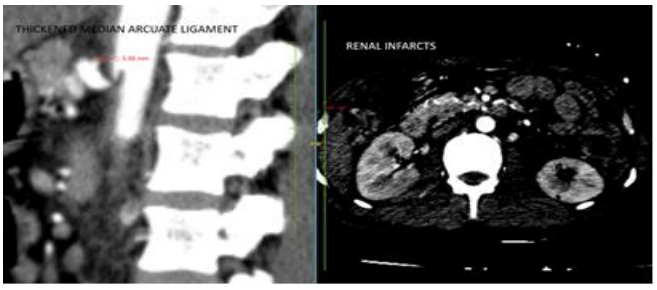
Figure 2:

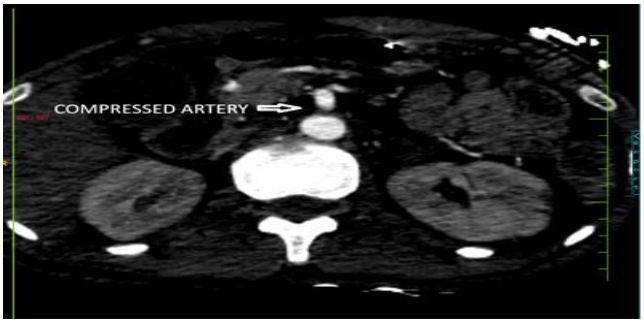


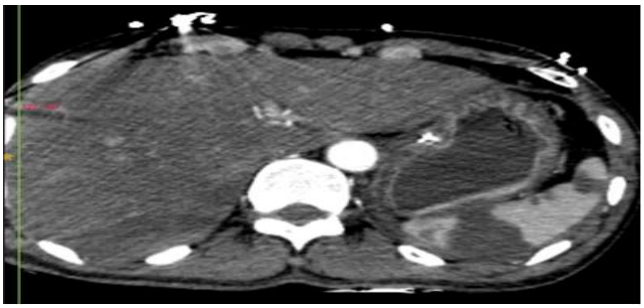
CT findings appear to show indentation of median arcuate ligament on superior aspect of proximal celiac trunk causing mild narrowing. Findings are consistent with celiac artery compression syndrome with median arcuate ligament thickening.

Case 3: A 35 year old male patient presented with complaints of pain and severe tenderness in upper abdomen predominantly in the left hypochondrium and lumbar regions.

Figure 3:







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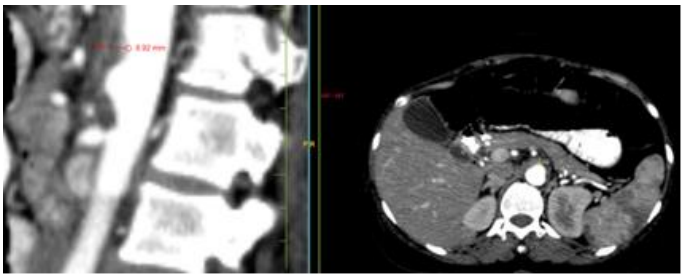
CT findings appear to show multiple large patchy hypodense wedge shaped non enhancing areas involving the splenic parenchyma suggestive of splenic infarcts. There also appear to be few small peripheral wedge-shaped hypodense areas involving mid poles of both kidneys, suggestive of renal infarcts. The median arcuate ligament appears to cause indentation on superior aspect of proximal celiac trunk causing significant short segment narrowing (approximately 80%) of celiac trunk. Thickness of the median arcuate ligament measures 6.2 mm. The median arcuate ligament also appears to cause mild indentation on superior aspect of proximal superior mesenteric artery causing mild focal narrowing (approximately 10 - 15 %) of superior mesenteric artery with mild post stenotic dilatation.

Case 4: A 35 year old female patient presented with complaints of pain in upper abdomen, nausea and vomiting, diarrhea, and weight loss.

Figure 4:



CT findings appear to show abnormal communication between the celiac axis and the superior mesenteric artery likely suggestive of Arc of Buhler.

The median arcuate ligament appears to cause indentation on superior aspect of proximal celiac trunk causing significant short segment narrowing (approximately 90%) of celiac trunk.

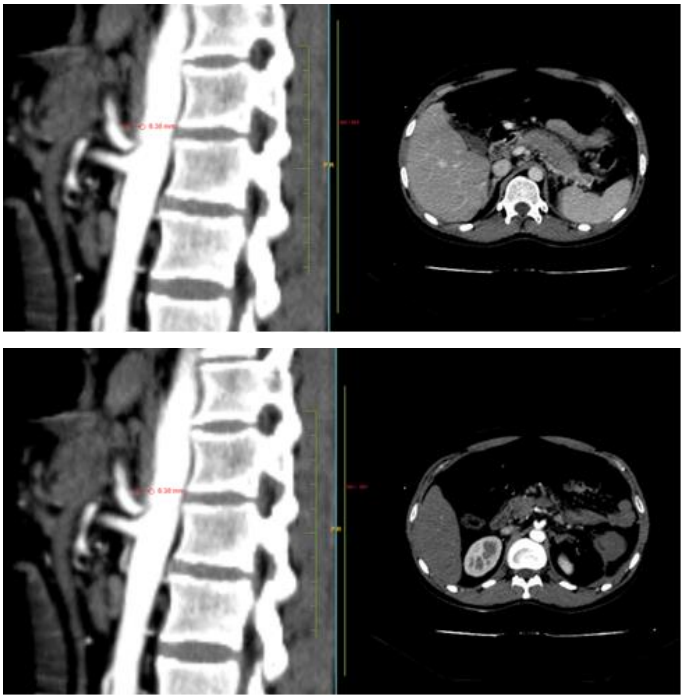
Thickness of the median arcuate ligament measures 7.8 mm.

The median arcuate ligament also appears to cause indentation on superior aspect of proximal superior mesenteric artery causing mild focal narrowing (approximately 40%) of superior mesenteric artery with post stenotic dilatation.

There are few patchy hypodense wedge shaped non enhancing areas involving peripheral aspect of the splenic parenchyma suggestive of splenic infarcts.

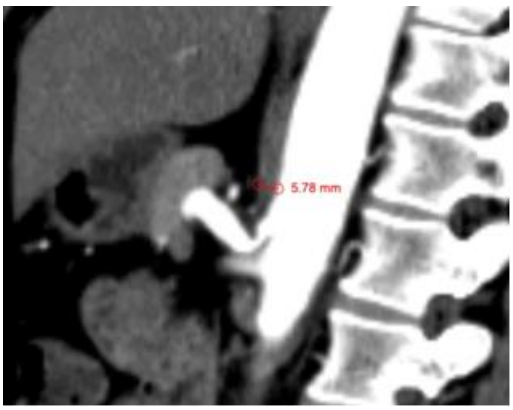
Case 5: A 37 year old male patient presented with complaints of pain and severe tenderness in upper abdomen with exercise-induced abdominal pain.

Figure 5:



Case 6: A 50-year-old female with episodic vomiting and 60% celiac stenosis, has diffuse abdominal pain.

Figure 6:



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The median arcuate ligament appears to cause indentation on superior aspect of proximal celiac trunk causing focal narrowing (approximately 70%) of celiac trunk at a distance of 6 mm from its origin with mild post stenotic dilatation.

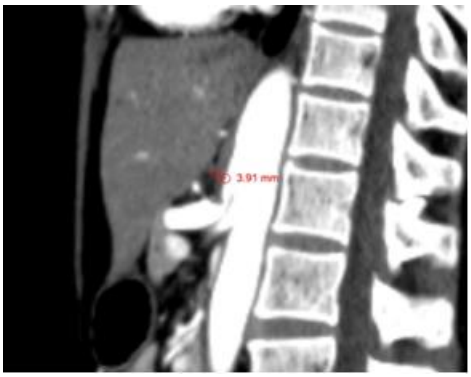
Thickness of the median arcuate ligament measures 5.8 mm.

Ill-defined areas of mesenteric fat stranding and multiple subcentimetric sized and enlarged mesenteric lymph nodes measuring upto 1cm and soft tissue density nodules are seen at the mesentery in the right mid abdomen suggestive of mesenteric panniculitis

The jejunal loops are seen on right side of abdomen with swirling of mesenteric vessels around the superior mesenteric artery suggestive of partial midgut malrotation.

Case 7: A 22-year-old athlete with exercise-induced pain and collateral vessel formation due to chronic compression.

Figure 7:



There is thickening of median arcuate ligament which is causing indentation and compression on superior aspect of proximal celiac trunk causing focal narrowing (approximately 50%) and mild inferior displacement of the course of the celiac trunk at a distance of 12 mm from its origin with mild post stenotic dilatation.

Thickness of the median arcuate ligament measures 5.1 mm.

Discussion

Celiac artery compression syndrome, commonly referred to as median arcuate ligament syndrome or Dunbar syndrome, is an uncommon cause of chronic mesenteric ischemia.[1] This condition arises from the external pressure exerted on the proximal celiac artery during breathing, especially during expiration, by the median arcuate ligament situated just beneath the diaphragm. [2, 3]

The diaphragmatic crura originate from the front surfaces of the L1 to L4 vertebrae on the right and from the first two or three lumbar vertebrae on the left. Additionally, they extend from the intervertebral discs and the anterior longitudinal ligament.[4] These crura ascend and move forward to encircle the aortic opening and connect to the diaphragm's central tendon. The median arcuate ligament is a fibrous structure that links the diaphragmatic crura on either side of the aortic hiatus. Typically, it arches over the aorta at the level of the first lumbar vertebra, just above where the celiac axis begins; however, in 10% to 24% of individuals, it may be positioned lower, crossing the proximal celiac axis and causing a characteristic indentation.[5] Due to the spatial relationships of these structures, there is a range from mild compression, which is often asymptomatic, to complete obstruction of the celiac artery. [6]

In patients with celiac artery compression syndrome, the celiac artery is compressed by the median arcuate ligament during expiration. Conversely, during inspiration, the artery moves downward in the abdominal cavity, resulting in a more vertical alignment that often alleviates the compression. When the patient is upright, the celiac artery descends further, enhancing its vertical orientation and further reducing the pressure from the median arcuate ligament. [7]

Because symptomatic individuals—predominantly females with an average age of 45—present with a wide

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range of symptoms, diagnosing and formulating a treatment strategy can be quite complex. This literature review concentrates on the most prevalent signs and symptoms, imaging characteristics, and treatment options and outcomes related to celiac artery compression syndrome. [8]

Conclusion

Celiac artery compression syndrome is a rare cause of chronic mesenteric ischemia. The most widely accepted etiology is compression of the proximal celiac trunk by the median arcuate ligament of the diaphragm during expiration. Definitive diagnosis of celiac artery compression syndrome is achieved with some form of contrast-based angiography.

There is a diverse array of manifestations of celiac artery compression due to median arcuate ligament thickening which vary from just celiac artery compression to some degree of renal infarcts and sometimes splenic infarcts. Prompt evaluation with contrast enhanced CT of the Abdomen should be done in suspected patients to delay the progression and morbidity/mortality due to these complications.

References

1. Harjola PT: A rare obstruction of the coeliac artery. Report of a case. Ann Chir Gynaecol Fenn 1963; 52:547–550.
2. Dunbar JD, Molnar W, Beman FF, Marable SA: Compression of the celliac trunk and abdominal angina. Am J Roentgenol Radium Ther Nucl Med 1965;95(3):731–744.
3. Gloviczki P, Duncan AA: Treatment of celiac artery compression syndrome: Does it really exist? Perspect Vasc Surg Endovasc Ther 2007;19(3):259–263.
4. Duncan AA: Median arcuate ligament syndrome. Curr Treat Options Cardiovasc Med 2008;10(2):112–116.
5. Chou JW, Lin CM, Feng CL, Ting CF, Cheng KS, Chen YF: Celiac artery compression syndrome: an experience in a single institution in Taiwan. Gastroenterol Res Pract 2012;2012:935721.
6. Ozel A, Toksoy G, Ozdogan O, Mahmutoglu AS, Karpat Z: Ultrasonographic diagnosis of median arcuate ligament syndrome: a report of two cases. Med Ultrasonogr 2012;14(2):154–157.
7. Horton KM, Talamini MA, Fishman EK: Median arcuate ligament syndrome: evaluation with CT angiography. Radiographics 2005;25(5):1177–1182.
8. Pellerito JS, Revzin MV, Tsang JC, Grebin CR, Naidich JB: Doppler sonographic criteria for the diagnosis of inferior mesenteric artery stenosis. J Ultrasound Med 2009;28(5):641–650.

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