

## Research Article

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# Celiac Axis Compression syndrome: laparoscopic approach in a strange case of chronic abdominal pain in 71 years old man

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**Abstract:** Celiac Axis Compression Syndrome by the Median Arcuate Ligament is a very rare condition characterized by chronic postprandial abdominal pain (angina abdominis), nausea, vomiting, which occurs mostly in young patients. The main treatment is a surgical procedure that consists of the division of the arcuate ligament combined with the section of the close diaphragmatic crus and the excision of the celiac plexus. Actually laparoscopic management is feasible and safe.

**Keywords:** Celiac artery compression syndrome, Median Arcuate Ligament, Syndrome Angina abdominis

**Abbreviations:** CACS = Celiac Axis Compression Syndrome, MAL = Median Arcuate Ligament

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## 1 Introduction

Celiac Axis Compression Syndrome (CACS) by the Median Arcuate Ligament (MAL) is a very rare condition characterized by chronic postprandial abdominal pain (angina abdominis), nausea, vomiting, which occurs mostly in young patients [1].

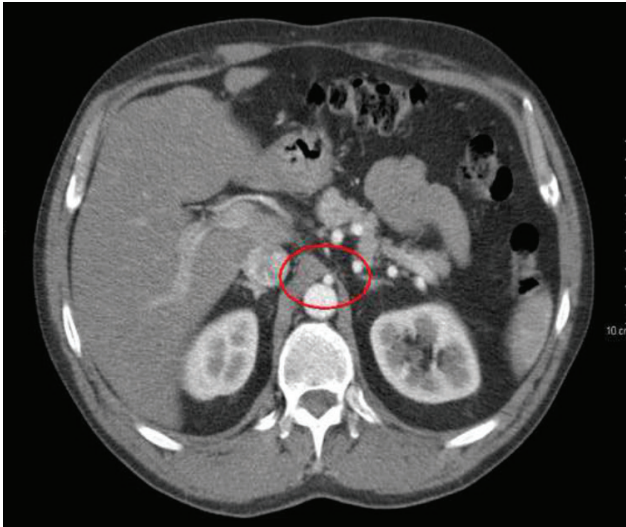
CACS poses diagnostic challenge to clinicians: making a definitive diagnosis in case of bowel ischemic syndromes can be difficult, because many anatomic pathologic entities can result in chronic abdominal pain [2]. Mesenteric ischemic syndromes can be divided as acute or chronic; the acute form is, most of the time, a result of embolic occlusion; chronic mesenteric ischemia is commonly due to the atherosclerosis disease. In a few patients chronic abdominal symptoms occur as the result of the isolated stenosis of the celiac artery due to an extrinsic compression by fibrous bands connecting the right and the left crus of the diaphragm: this condition is called Celiac Axis Compression Syndrome (CACS) [3,4]. The discomfort in CACS syndrome usually develops between fifteen and thirty minutes after eating and lasts from one to three hours. The severity and duration depend on the amount of food ingested [5]. Nausea, vomiting or diarrhea may occur causing reluctance in taking food; an epigastric bruit may be appreciated.

## 2 Case report

A healthy 71 years old male with an history of chronic abdominal pain went several time to the E.R. complaining a disabling and excruciating abdominal pain, located to the right side of the abdomen and radiates from the right side to the back. He was referred to our surgical department an year after the beginning of the symptoms, since the recurrence of the pain, that occurs not related with

meals, and remains even with a large therapy of pain killers. Palpation of the abdomen reveals no peritoneal signs. First it was suggested a symptomatic cholelithiasis. After blood test (normal count of WBC, normal serum chemistries), two US scan of the abdomen, one following the other, did not show gallstones. Since the symptomatology remained, urgent contrast-enhanced CT scan of the abdomen was recommended and a reconstruction of the celiac trunk was performed to specify the anatomy: we detected a “hook like” configuration of the celiac trunk at the emergence, suggesting possible persistence of MAL (Figure 1).

Subsequently the patient underwent a panoramic and selective angiography of the celiac trunk to demonstrate the haemodynamically significant stenosis. The



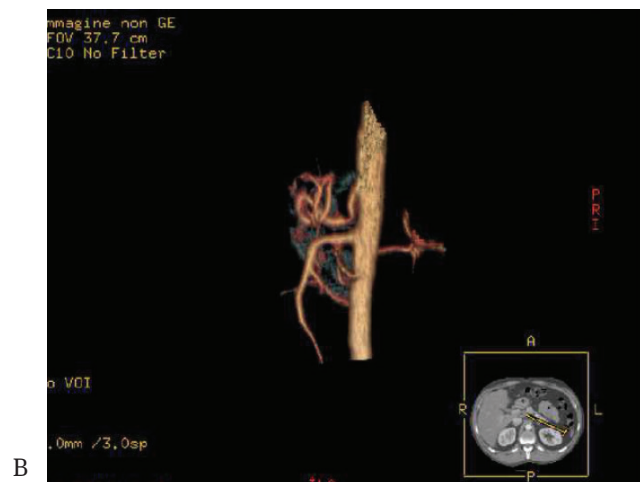
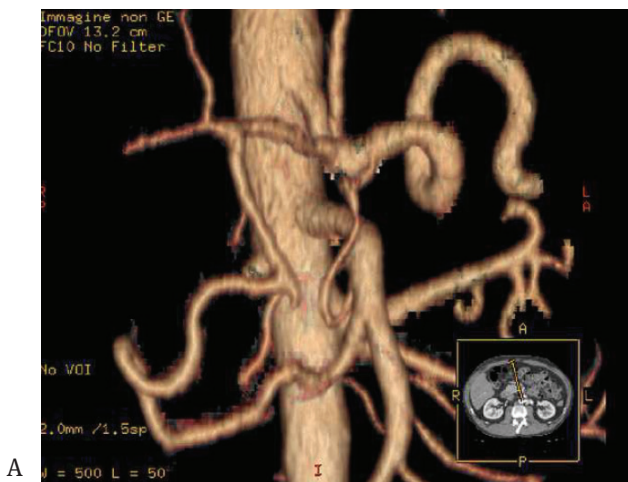
**Figure 1:** Celiac trunk at the emergence, suggesting possible persistence of median arcuate Ligament

images series showed an inversion blood flow through the pancreaticoduodenal arteries that became hypertrophic. Therefore we proposed laparoscopic treatment; selective angiography of the celiac trunk to demonstrate the haemodynamically significant stenosis (Figure 2a,b).

### 3 Methods

The patient was in supine position and in reverse Trendelenburg. His legs were slightly bent, abducted; surgeon stands between patient’s leg. We performed the procedure with four ports: the optical port was placed on the midline above the umbilicus, retracting port (to lift the left hepatic lobe) was inserted under the xifoid process, and two operating ports were placed in right and left hypochondria.

After section of the lesser omentum the diaphragmatic crura was isolated; then we identified the aorta below the diaphragm and the MAL that lay anterior to the celiac axis causing downward angulation, making very difficult its isolation. The dissection was started from the top to the bottom, identifying the aorta to trace the origin of the celiac trunk. Left gastric artery and liver artery were isolated in order to help us identify the exact origin of the celiac trunk from the aorta artery. The stomach was placed on the left to get a better exposure. The entire fibroadipose tissue on both sides of the origin of the celiac trunk was removed. Once these operations have been completed, the celiac trunk was clearly displayed without any residual twist and uniform throughout its course. The operative time was 100 minutes, with minimal blood loss (Figure 3a,b).



**Figure 2 a-b:** Pre operative angio CT Scan: The images series showed an inversion blood flow through the pancreaticoduodenal arteries became hypertrophic

A postoperative CT scan showed restoration of an adequate flow celiac artery. The postoperative course was uneventful and the patient was discharged on the fifth postoperative day (Figure 4a,b).

**Ethical approval:** The research related to human use has been complied with all the relevant national regulations, institutional policies and in accordance the tenets of the Helsinki Declaration, and has been approved by the authors' institutional review board.

**Informed consent:** Informed consent has been obtained from all individuals included in this study

## 4 Discussion

The syndrome of the median arcuate ligament (MAL) is a clinic-pathological entity and the diagnosis is made for exclusion. CACS is characterized by the clinical triad of

postprandial abdominal pain, weight loss and vomiting. The use of CT angiogram scan with 3D reconstruction confirmed the external compression of the celiac MAL that normally borders the aortic hiatus anteriorly [6-10].

The origin of the celiac axis undergoes to a variable caudal migration during embryogenesis, its position can vary from the eleventh dorsal vertebra to the first lumbar vertebra [11]. The arcuate ligament can compress the origin of the celiac artery. With inspiration, the celiac artery descends into the abdominal cavity, resulting in a vertical orientation which often relieves the pain caused by compression [12].

Some authors suggest that the interruption of sympathetic nerve fibers in the section of the arcuate ligament can 'help to relieve abdominal pain, because the perivascular sympathectomy and denervation of the celiac ganglion reduce vasospasm, then blood flow increases [13]. A few years ago, open surgery was the therapy of choice [14-17]. Since using minimally invasive surgery, this became a normal routine among surgeons, and an increasing

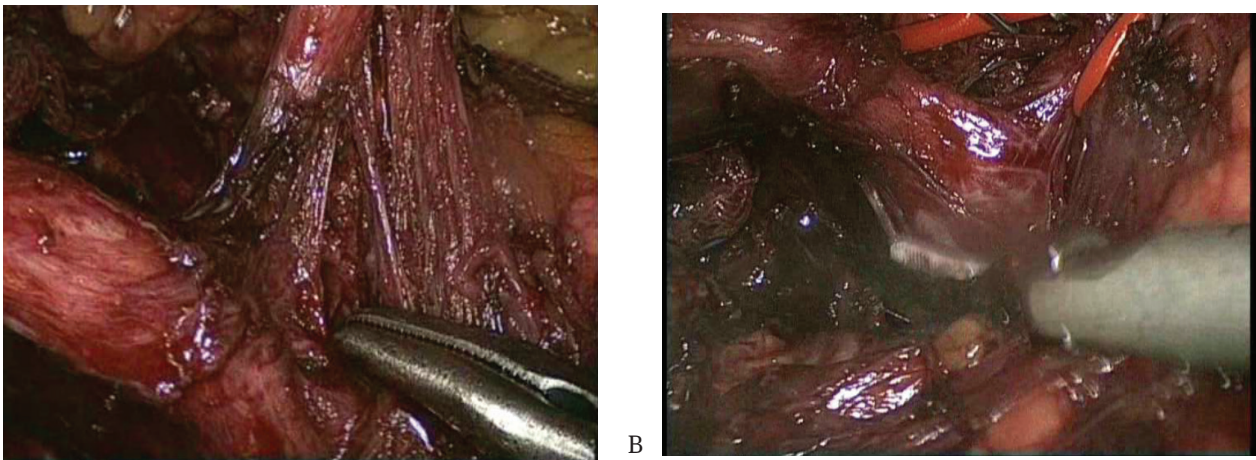


Figure 3 a-b: Dissection of fibro-adipose tissue of the origin of the celiac trunk

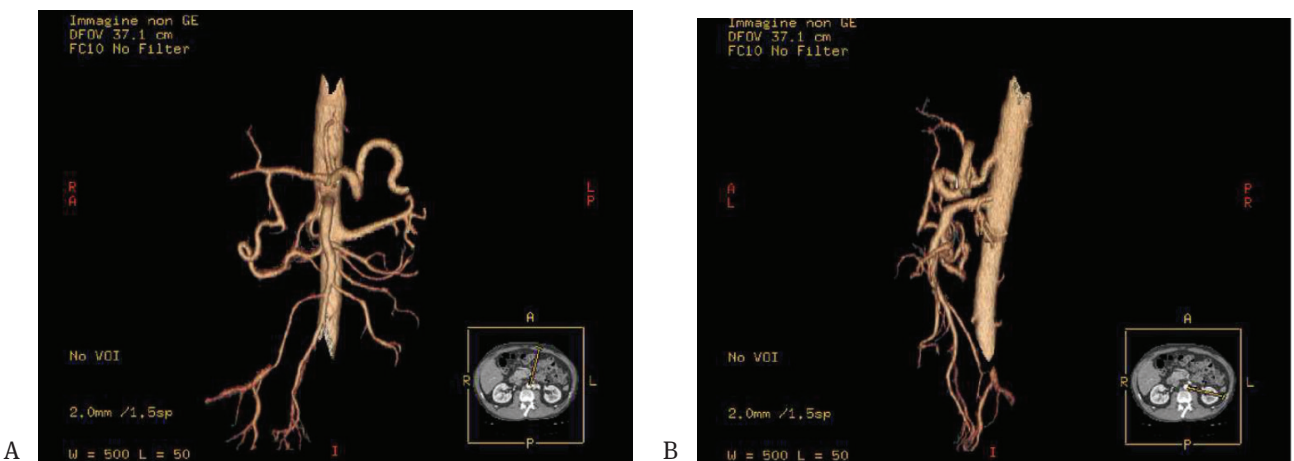


Figure 4 a-b: CT scan showed restoration of an adequate flow celiac artery



number of reports support the laparoscopic approach [18]. The technique of dissection of the MAL from bottom to top is more advantageous with the aid of mini-invasive techniques include a better view of the aortic region and the complete division of all the fibers of MAL, freeing the celiac axis, since this is the key for the successful resolution of symptoms [19]. Laparoscopic surgery at the end has a better result also for the patient because of the faster recovery, regaining normal eating habit, early discharge with low possibilities of infections. The only risk is an accidental injury to the aorta and to the great vessels with difficulty in controlling the bleeding, but in advanced laparoscopic surgery centers has proved a safe technique [20].

## 5 Conclusion

Because of good results of laparoscopy in emergency and in election, in young and elderly patients [21-25], the thin line between risks and benefits, every surgeon tends to prefer laparoscopic approach. We preferred laparoscopic approach also in CACS syndrome, because of the better view and the less global morbidity.

**Conflict of interest statement:** Authors state no conflict of interest

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