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CELIAC ARTERY COMPRESSION SYNDROME – MYTH AND REALITY: UNVEILING RADIOLOGICAL AND CLINICAL CONCORDANCE

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ABSTRACT

The objective of the study is to estimate the incidence of celiac artery compression (CAC) using computed tomography (CT) scans and to compare the results to the clinical symptoms of patients presenting for abdominal CT scan in a hospital. Contrast-enhanced CT abdomen scans of patients were reviewed between August 2022 and October 2022. If the celiac axis appeared to have a J-shaped or hooked morphology with stenosis, it was termed CAC. The clinical history of the patients was examined for information on food phobia, weight loss, and gastrointestinal symptoms (abdominal discomfort, nausea, vomiting, constipation, and diarrhea). Patients with CAC had a lower incidence of symptoms compared with those without CAC. However, CAC is not an uncommon CT finding in patients presenting for a CT scan.

Keywords: celiac artery compression syndrome, median arcuate ligament syndrome, stenosis, computed tomography.

Introduction

Celiac artery compression syndrome (CACS) is a controversial medical condition. Although the incidence of CACS is not fully known, patients with a lean body habitus, young adult females, and middle-aged women have been reported to be at higher risk. Postprandial epigastric pain, food fear that causes weight loss, and epigastric bruit are some of the characteristic features of CACS among others. While the reality of the illness is under question, celiac artery compression (CAC) is generally acknowledged as a real pathology. Numerous mechanisms are thought to contribute to CAC. The mechanism of extrinsic compression is possibly the most debated. The celiac ganglion, the surrounding fibrous tissue, or the median arcuate ligament (also known as median arcuate ligament syndrome) can all cause extrinsic compression. Other, less frequent causes of celiac artery occlusion include compression from an enlarged pancreas, tumor invasion, arterial dissection, and congenital etiology [1]. The occurrence of celiac artery compression is well known, but it is still unclear what causes CAC and what causes the symptoms of CACS. We believe that the abdominal symptoms of CACS are not always caused by radiological evidence of celiac artery compression. Our research is to determine whether there is a concordance between the signs and symptoms of CACS and CAC.

Methods

All computed tomography (CT) abdominal angiograms and contrast-enhanced computed tomography (CECT) scans performed at St. John's Medical College Hospital during the months of August to October 2022 were retrospectively examined alongside the patient's medical files. Patients without an adequate medical history or whose CT scans could not clearly depict the celiac trunk were not included in the study. A 124-slice CT scanner was used to perform the CT scans. Depending on the patient's body mass, 80 to 120 ml of contrast was administered. The patients were routinely asked to

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hold their breath at the end of inspiration. Longitudinal and cross-sectional views of the celiac, superior mesenteric, and inferior mesenteric arteries were analyzed for compression, stenosis, and/or calcification. If the celiac artery had a J-shape or hooked appearance on the arterial phase of CECT abdomen/ CT abdominal angiography, it was considered to be compressed [2]. The cross-sectional and longitudinal views of the arteries were visually inspected for areas of narrowing and calcification. Measurements of arterial diameter were taken at the point of narrowing and compared with the adjacent normal segment. Medical records at the time of presentation were reviewed. Data collection included abdominal pain and its characteristics, nausea, vomiting, diarrhea, weight loss, signs of malnutrition, and epigastric bruit.

Results

A total of 721 CT scans were reviewed. Only those patients with sufficient clinical history were included in the study. Ultimately, 442 patients were entered into the study. The mean age for all patients was 51.3 ± 1.2 years. There were 199 men (45%) and 243 (55%) women. Patients were divided into two groups. The first group consisted of patients with evidence of CAC whereas the second group included other patients without CAC. There was no significant difference between both groups in age and gender distribution. Out of 442 patients, 24 (5.4%) were found to have radiological evidence of celiac compression (Figure 1) whereas 418 patients did not have radiological evidence of celiac compression. CAC symptoms were present in 9 (37.5%) of the patients with celiac compression versus 184 (44%) of those without compression. Compression of the celiac artery occurred in 13 (54.2%) women and 11 (45.8%) men. Symptoms were reported by 129 (53.1%) women and 89 (44.7%) men.

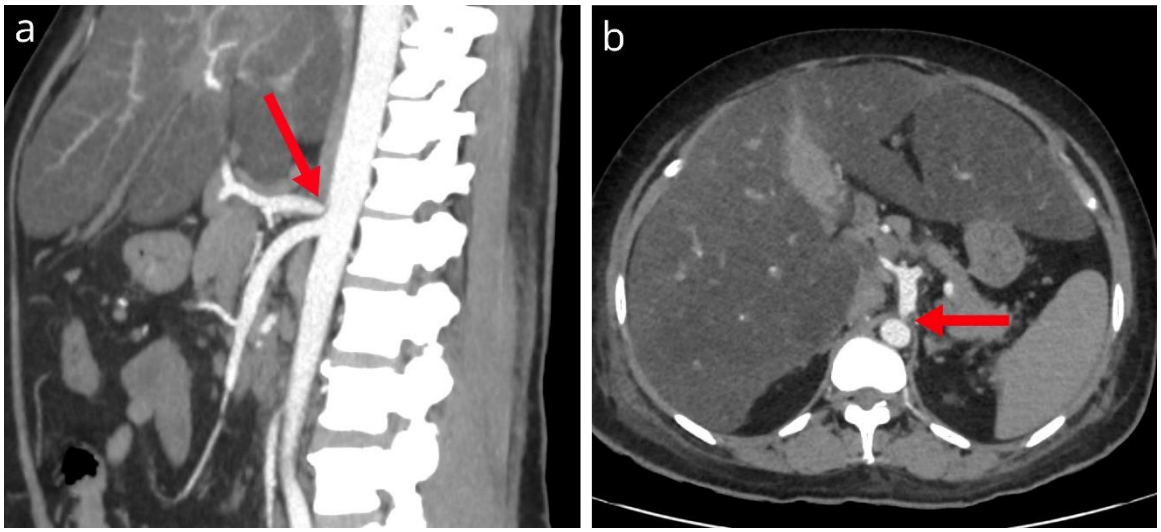

Figure 1. Sagittal Maximum Intensity Projection (MIP) and axial CECT images of the upper abdomen in the arterial phase of a 42-year-old male show a hooked or J-shaped appearance of the proximal segment of the celiac artery with more than 80% luminal compromise and post-stenotic dilatation. Incidentally detected hepatomegaly with diffuse fatty attenuation.

Generally, patients with CAC had a lower incidence of symptoms compared with those without CAC (37.5% versus 44%). Abdominal pain was less frequent in CAC (30.1% versus 44.5%). All other symptoms including postprandial pain, nausea/vomiting, food fear, and weight loss were similar between both groups. In addition, analysis was performed to determine the percentage of patients with severe stenosis of celiac. Of the 24 patients with celiac compression of 50% or more, 5 (20.8%) had a stenosis of at least 80%. Only 2 of the 5 complained of abdominal pain and nausea. The incidence of superior mesenteric artery (SMA) stenosis, celiac calcification, SMA calcification, and aneurysmal dilatation were similar between both groups.

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Discussion

An examination of CT scans from a sample of patients who were admitted to the hospital revealed a 5.4% (24 out of 442) incidence of CAC. In the majority of earlier research, women were shown to have a higher incidence of CAC than men; some even suggested a 4:1 female-to-male ratio [3]. We did not have a significant difference in incidence between men and women in our study population even though the total number of females with radiological evidence of CAC (13, i.e., 54.2%) was slightly more than males (11, i.e., 45.8%). Symptoms associated with CACS were reported by 129 (53.1%) women and 89 (44.7%) men. Patients without CACS-related signs or symptoms were found to have a higher incidence of CAC on CT scans than those with symptoms.

Most of our patients underwent abdominal CT for evaluation of abdominal symptoms such as nausea, vomiting, etc. It was discovered that the most distinctive CACS symptoms - postprandial discomfort, food anxiety, weight loss, malnutrition, and abdominal bruit - occurred less frequently than more general abdominal complaints like nausea, vomiting, and diarrhea. As a result, it is possible that the study's symptomatic individuals can't be compared to those who are thought to have CACS in the literature, which is a potential limitation.

Our findings are consistent with several earlier research studies that demonstrate that CAC may be more common in the general population. Rarely do symptoms and the emergence of CACS follow the presence of CAC. Some scholars have questioned the link between CAC and clinical symptoms [4,5]. Szilagyi et al., one of the most vocal critics, examined 165 surgically treated cases by a total of 26 different writers. Many of these reports were criticized for not gathering enough patient data and for having divergent approaches to diagnosis and therapy [6].

A total of 100 individuals who underwent magnetic resonance imaging (MRI) of the upper abdomen were investigated by Lee et al. In their patient population, 55 patients (57%) had mild artery stenosis at end-expiration. Out of the 55 patients, 40 (73%) had less narrowing at the end of the inspiratory phase while 11 (20%) had no change. The angle of the aorta in patients found to have mild to severe celiac artery narrowing was lower (41° ± 19°) than in those classified as having minimal to no narrowing (50° ± 19°). The information presented by Lee strongly suggests that in order to correctly detect CAC and avoid misdiagnosis, it is best to analyze the celiac artery axis at the end of inspiration [7]. Other methods, including spiral CT angiography, doppler ultrasound scan, selective catheter angiography, magnetic resonance angiography, and gastric exercise tonometry, have also been demonstrated to be effective in the diagnosis of CAC.

In 1965, Dunbar et al. published a report on their experience in surgically treating CAC patients by decompressing the celiac trunk [8]. Roayaie et al. presented a case study on laparoscopic decompression of the celiac axis in the year 2000 [9]. The laparoscopic decompression of the celiac artery has also been successful, according to other researchers like Vaziri et al [10]. In these patients, Van Petersen et al. disclosed using a unique retroperitoneal endoscopic technique [11]. Since then, more current accounts of minimally invasive techniques have been published.

Conclusion

It has been debatable whether or not the symptoms that make up the CACS are caused by compression of the celiac artery axis. There are numerous hypotheses on the underlying cause of the gastrointestinal symptoms experienced by patients who were found to have compression of the celiac artery. Surgeons have created minimally invasive procedures to treat their patients, and various diagnostic modalities have been demonstrated to be useful in diagnosing arterial compression. Although morphologic compression of the celiac trunk can commonly be seen on sagittal CT angiograms, clinical symptoms are rarely caused by this compression. Simple morphological compression does not require interventional or surgical treatment. Coexisting abdominal symptoms usually are not typical for gastrointestinal ischemia. In our study, CAC by CT scan was present in 5.4% of patients with little association with clinical symptoms indicating that CAC is more of a radiological finding than a clinical syndrome.

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Conflict of Interest

The authors declare that they do not have any conflict of interest.

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REFERENCES

1. Kim EN, Lamb K, Relles D, Moudgill N, DiMuzio PJ, Eisenberg JA. Median Arcuate Ligament Syndrome-Review of This Rare Disease. JAMA Surg. 2016 May 1;151(5):471-7.
2. Levin DC, Baltaxe HA. High incidence of celiac axis narrowing in asymptomatic individuals. Am J Roentgenol Radium Ther Nucl Med. 1972 Oct;116(2):426-9.
3. Sianesi M, Soliani P, Arcuri MF, Bezer L, Iapichino G, Del Rio P. Dunbar's syndrome and superior mesenteric artery's syndrome: a rare association. Dig Dis Sci. 2007 Jan;52(1):302-5.
4. Bron KM, Redman HC. Splanchnic artery stenosis and occlusion. Incidence; arteriographic and clinical manifestations. Radiology. 1969 Feb;92(2):323-8.
5. Cornell SH. Severe stenosis of the celiac artery. Analysis of patients with and without symptoms. Radiology. 1971 May;99(2):311-6.
6. Szilagyi DE, Rian RL, Elliott JP, Smith RF. The celiac artery compression syndrome: does it exist? Surgery. 1972 Dec;72(6):849-63.
7. Lee VS, Morgan JN, Tan AG, Pandharipande PV, Krinsky GA, Barker JA, Lo C, Weinreb JC. Celiac artery compression by the median arcuate ligament: a pitfall of end-expiratory MR imaging. Radiology. 2003 Aug;228(2):437-42.
8. Dunbar JD, Molnar W, Beman FF, Marable SA. Compression of the celiac trunk and abdominal angina. Am J Roentgenol Radium Ther Nucl Med. 1965 Nov;95(3):731-44.
9. Roayaie S, Jossart G, Gitlitz D, Lamparello P, Hollier L, Gagner M. Laparoscopic release of celiac artery compression syndrome facilitated by laparoscopic ultrasound scanning to confirm restoration of flow. J Vasc Surg. 2000 Oct;32(4):814-7.
10. Vaziri K, Hungness ES, Pearson EG, Soper NJ. Laparoscopic treatment of celiac artery compression syndrome: case series and review of current treatment modalities. J Gastrointest Surg. 2009 Feb;13(2):293-8.
11. van Petersen AS, Vriens BH, Huisman AB, Kolkman JJ, Geelkerken RH. Retroperitoneal endoscopic release in the management of celiac artery compression syndrome. J Vasc Surg. 2009 Jul;50(1):140-7.