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## Case Report

# Absence of the celiac trunk: The left gastric, the common hepatic, and the splenic arteries arising independently from the abdominal aorta: A case report <sup>☆</sup>

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## ABSTRACT

The celiac trunk is the first branch of the abdominal aorta which arises from the anterior surface of the abdominal aorta and usually extends 1-2 cm before it branches into 3 branch arteries: the left gastric artery, the common hepatic artery, and the splenic artery. It is essential to comprehend the intricate arterial branch anatomy of the abdominal aorta to carry out abdominal surgeries as well as interventional radiology procedures safely. A 63-year-old woman who had been experiencing right upper quadrant abdominal pain for 2 months along with weight loss and appetite presented to the surgical unit of Tikur Ambessa Hospital. On exams, her vital signs were stable. Her abdominal exams were unremarkable. She was evaluated with an abdominal ultrasound which detected a mass arising from the gallbladder. With the impression of gallbladder mass contrast-enhanced computed tomography was done and revealed a rare anatomic variant of the celiac artery where the celiac artery was absent and the left gastric, the common hepatic, and the splenic arteries arise independently from the abdominal aorta. Clinicians should be aware of the presence of rare arterial variations because these changes can have a variety of therapeutic implications when performing surgical procedures like liver transplant, celiac artery resection such as the Appleby procedure for pancreatic and stomach cancer, or during interventional radiology procedures like transarterial chemoembolization.

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## Introduction

For safe abdominal surgery, recognizing the abdominal aorta's variant arterial branch anatomy is equally important as studying its typical anatomy [1]. The celiac, the superior mesenteric, and the inferior mesenteric arteries are the major branches that supply the majority of the intra-abdominal organs. The celiac trunk is the first branch of the abdominal aorta which arises from the anterior surface of the abdominal aorta and usually extends 1-2 cm before it branches into 3 branch arteries: the left gastric artery (LGA), the common hepatic artery (CHA), and the splenic artery (SA) [1–3]. According to Morita's classification, the variations of celiac trunks were classified into 3 major classes. The first one is the classic anatomy which is the trifurcation of the celiac trunk into the above-mentioned branches. The second is the incomplete celiac trunk which itself has several forms. The last one is the absence of the celiac trunk which is rare [4–6].

Below we present a 63-year-old female who came to our surgical referral clinic with the complaint of right upper quadrant abdominal pain, loss of appetite, and weight loss. On cross-sectional imaging, there was an absent celiac trunk. By presenting this case report, we hope that clinicians will be more aware of the presence of anatomic variations in the celiac trunk.

## Case presentation

A 63-year-old woman who had been complaining of right upper quadrant abdominal pain which radiates to the shoulder, unquantified but significant weight loss, and decreased appetite for 2 months presented to the surgical unit of Tikur Ambessa Hospital. She had stable vital signs during examinations and an unremarkable abdominal exam. An abdominal ultrasound was used to investigate her, and it revealed a thickening of the gallbladder wall. With the impression that she had a gallbladder mass, contrast-enhanced computed to-

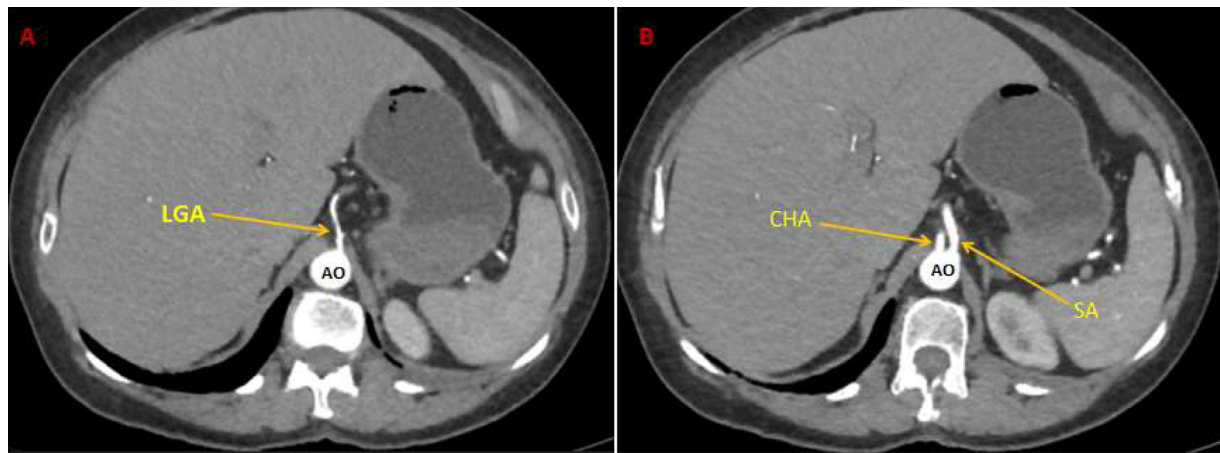


**Fig. 1** – It depicts the arterial phase of the axial abdominal CECT, with arrows indicating gallbladder wall thickening.

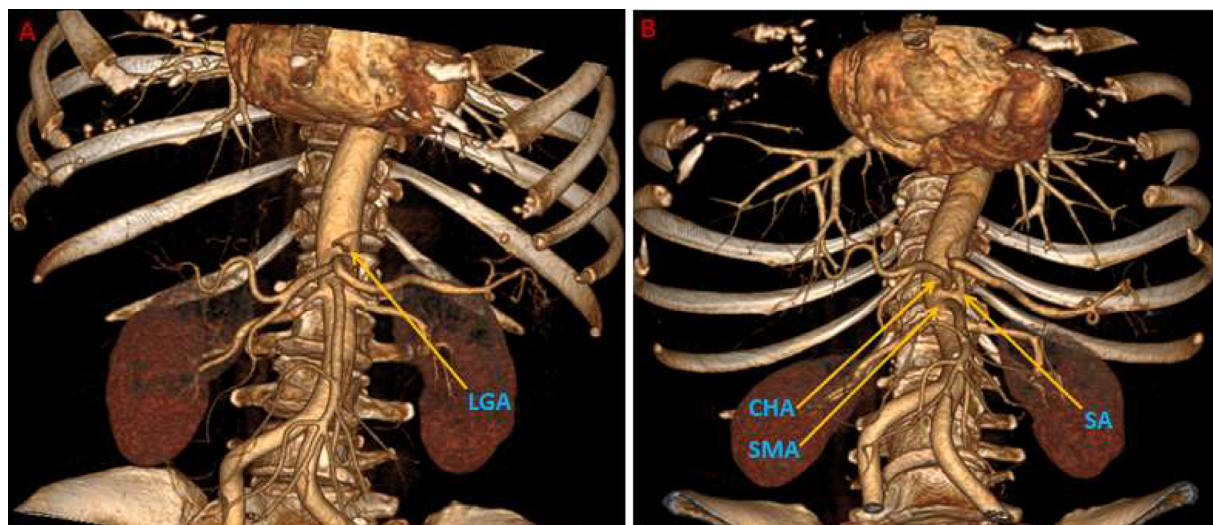
mography (CECT) of the abdomen was done to further characterize the lesion. On CECT heterogeneously enhancing gallbladder wall thickening was noticed (Fig. 1). Upon further evaluation we discovered that she had a rare variant of celiac artery anatomy, in which the celiac artery was absent, and the LGA, CHA, and SA all arise independently from the abdominal aorta (Figs. 2 and 3).

The LGA emerge independently cranial to the origin of the CHA and SA, but the CHA and SA both originate independently at the same level on the left and right anterolateral sides of the aorta, respectively. The other arterial variation we found in this patient is that both the right and left inferior phrenic arteries originate from the LGA, with the right inferior phrenic artery emerging slightly proximal to the left inferior phrenic artery (Fig. 4).

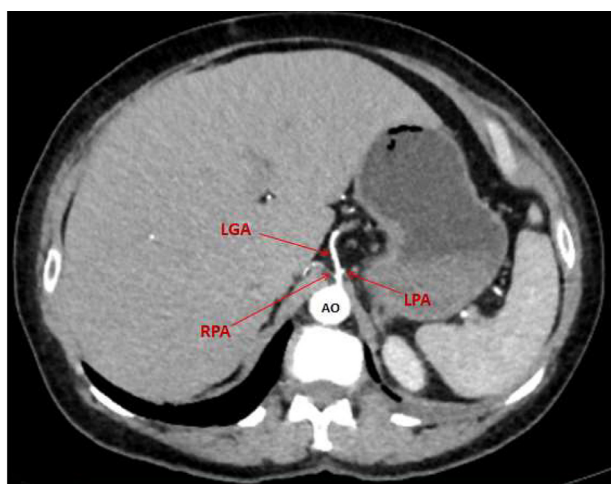
After being sent to our HPB clinic, she was evaluated, and it was determined that she had gallbladder cancer. She was



**Fig. 2** – It illustrates the arterial phase of the abdominal CECT with the LGA emerging independently from the AO (A); and the CHA and SA emerging from the AO at the same level but without a common trunk (B). AO, abdominal aorta; CHA, common hepatic artery; LGA, left gastric artery; SA, splenic artery.



**Fig. 3** – A 3D reconstruction illustrating the origins of the LGA from the abdominal aorta proximal to the origins of the CHA and SA (A); the origins of the CHA and SA from the abdominal aorta, both at the same level and independently (B). CHA, common hepatic artery; LGA, left gastric artery; SA, splenic artery.



**Fig. 4** – It shows the arterial phase of the abdominal CECT with both the LPA and the RPA coming out from the LGA. LGA, left gastric artery; LPA, left phrenic artery; RPA, right phrenic artery.

also assessed for radical cholecystectomy; however, this was deferred due to the patient's poor performance status, and she was subsequently transferred to the oncology and palliative care units.

## Discussion

During development, the celiac trunk is the first major branch from the ventral surface of the abdominal aorta, which predominantly supplies the derivatives of the foregut [7]. The

classic anatomy of the celiac trunk is its trifurcation into 3 named major branches called the LGA, the CHA, and the SA [8]. According to both cadaveric and image series studies, the occurrence of classic trifurcation ranges from 62.5% to 90.5% [9].

Bifurcation of the celiac trunk is another frequent variant vascular anatomy seen in the celiac trunk, and it occurs in approximately 11% of the general population when one branch of the trunk is absent or develops independently from the aorta. Depending on the 2 arteries that emerge from the trunk—this vascular variation can take on different forms—the hepatosplenic, hepatogastric, and gastrosplenic variants [9]. Other variations mentioned in the literature include the celiac trunk being quadrifurcated and having only one terminal branch [10].

The absence of the celiac trunk is a rare variation of the celiac trunk in which all 3 major branches arise independently from the aorta. Most radiologic and cadaveric collections have recorded instances of this variation ranging from 0.1% to 2.6% [3]. Morita's classification was the first to include the absence of a celiac trunk in its classification. Type 1: normal celiac trunk; Type 2: hepatosplenic trunk; Type 3: gastrosplenic trunk; Type 4: hepatogastric trunk; and Type 5: absent celiac trunk. According to this classification, the arterial variation in our patient is type 5, which is a rare variation [4–6].

The right and left inferior phrenic arteries typically emerge as early branches from the abdominal aorta. In addition to the diaphragm, the inferior phrenic arteries supply the adrenal glands via a branch known as the superior suprarenal artery. There are certain anatomic variations of the origin of the inferior phrenic arteries. The left inferior phrenic artery can occasionally arise from the celiac trunk and the right one shows more variation and can arise from the celiac trunk and the renal artery. In our case, both the right and left inferior phrenic arteries arise from the LGA, which is a rare variant [11–13].

## Conclusion

There are currently a variety of radiologic treatments for tumors in the upper abdomen, including transarterial chemoembolization and transarterial radioembolization. Given the recent surge in the use of interventional radiology, it is essential to comprehend the anatomical variations of the upper abdomen. In addition to radiologists, surgeons also need to be familiar with the numerous anatomical variations of the upper abdomen. A thorough evaluation of the upper abdomen's vascular structure is required prior to living donor liver transplants and procedures for advanced gastric and pancreatic cancers like Appleby.

## Patient consent

The patient's written informed consent was taken before the publication of this case report.

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