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Case Report

CT angiographic diagnosis of hepatosplenomesenteric trunk – a rare variation

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Rudresh HIREMATH [1] ✦
Aishwarya KC [1]
Aruna PAILOOR [1]
Ramachandra C BHAT [2]

Departments of Radiodiagnosis [1] and Medicine [2], K.V.G. Medical College, Sullia, Dakshina Kannada, Karnataka, INDIA.

✦ Dr. Rudresh Hiremath
Associate Professor
Department of Radiodiagnosis
KVG Medical Quarters, Quarter no. 32
Kurunjibag, Sullia, Dakshina Kannada
Karnataka, 574-327, INDIA.
☎ +91 8257 602404
✉ drrudresh76@yahoo.co.in

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Abstract

We report an incidental finding of a rare anatomical variation of foregut and midgut arteries, hepatosplenomesenteric trunk on multidetector computed tomography (MDCT) abdominal angiography in a78-year-old male patient. MDCT is a robust and accurate diagnostic modality for the diagnosis and analysis of pathologies and anatomical variations of vessels. Proper understanding of anatomical variations of celiac trunk and superior mesenteric arteries is of prime importance prior to surgical or interventional procedures.

Key words [hepatosplenomesenteric trunk] [multidetector computed tomography] [left gastric artery]

Introduction

The celiac trunk is the first anterior branch of abdominal aorta that arises just below the aortic hiatus at the level of T12/L1 vertebral bodies. It is 1.5–2.0 cm long and divides into left gastric, splenic and common hepatic arteries. The celiac trunk supply the organs of origins of foregut, up to the proximal half of second part of duodenum [1]. Superior mesenteric artery (SMA) is the second ventral branch of abdominal aorta, arises approximately 1–20 mm below the origin of celiac trunk, at the level of T12-L2 vertebral bodies. The width of the main stem of superior mesenteric artery varies from 6 to 13 mm in diameter and forms 45 to 90 degrees angulations to the aorta, depending on the amount of adipose tissue in the abdomen [2]. The superior mesenteric artery supplies the organs of origins of midgut, from the distal duodenum up to the proximal two thirds of transverse colon. The SMA gives rise to inferior pancreaticoduodenal artery, middle colic artery, right colic artery, ileo-colic artery and jejunal and ileal branches.

Various studies conducted on abdominal arterial anatomical variations on cadavers during dissection and in live patients by various imaging modalities showed the classical trifurcation of celiac trunk is in 86-89% [3–5].

Preoperative or interventional preprocedural thorough knowledge of anatomic variations of these arteries is extremely important, as they can cause life-threatening complications on table if neglected. With current contrast enhanced 3 dimensional magnetic resonance angiography and computed tomographic angiography, the detailed assessment of the usual and unusual vascular anatomy in majority of cases can readily be displayed and analyzed [2].

Case Report

A 75-year-old male was referred to the department of Radiodiagnosis, K. V. G. Medical College, Sullia from the Department of Medicine for the evaluation of small retroperitoneal mass lesion, diagnosed incidentally on ultrasound for vague abdominal pain. On ultrasonography cystic retroperitoneal mass of 30x25 mm was noted in the region of head of pancreas, suspicious for pancreatic neoplasm or necrotic lymph node. Patient came prepared for the CT abdominal angiography in the morning hours with 12 hours of fasting. Patient's renal function was within the normal limits and vitals were stable.

CT abdominal angiography was performed with 16-slice multidetector CT Siemens Emotion. Initial plain CT abdomen was performed, and then 120 ml of non-ionic contrast was injected through cephalic vein with the help of power injector. Arterial scans were performed after delay of 18 seconds from the start of injecting contrast. Later portal and delayed images were acquired. During CT angiography, 0.5 mm sections were

obtained through the abdomen which were reconstructed to 0.1 mm. Recovered images were used to display multiplanar and volume rendered images. A well-defined non-enhancing cystic mass was noted in the region of uncinate process of pancreas measuring 32x26 mm (Figure 1). Possibility of pancreatic cystic neoplasm was considered on imaging.

Incidental finding of non-visualization of celiac trunk in its normal position was noted with a single large ventral branch arising from the abdominal aorta adjacent to the L1-L2 intervertebral disc. The trunk measured 34 mm in length with the diameter of 12.6 mm. The trunk divided into two main branches, hepatosplenic trunk and superior mesenteric trunk (Figure 2). The hepatosplenic trunk divided into the common hepatic artery and tortuous splenic artery. The splenic artery was tortuous and ascended craniolaterally to the supply the spleen. The common hepatic artery gave off gastroduodenal artery and became hepatic artery proper which divided into the right and left hepatic arteries. Left gastric artery originated separately from the abdominal aorta as first ventral branch, 1.5 cm above the hepatosplenomesenteric trunk (Figure 2). It took U shaped turn ascending cranially to the stomach.

Discussion

Each primitive dorsal aortae gives off three groups of branches; these are ventral splanchnic arteries, lateral or intermediate splanchnic arteries and somatic intersegmental branches [1]. The ventral splanchnic arteries are originally paired vessels

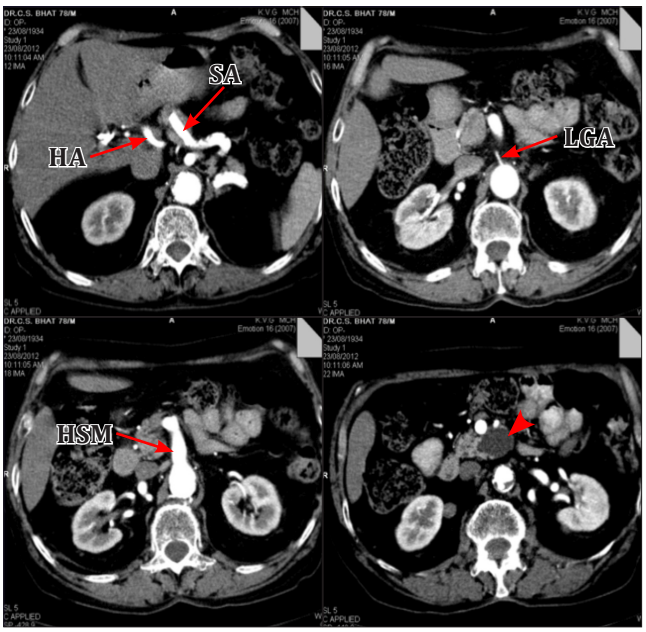

Figure 1. Axial contrast enhanced CT (arterial phase) showing *common hepatosplenomesenteric trunk (**HSM**)* and *left gastric artery (**LGA**)* arising as separate ventral branches of abdominal aorta. A well-defined *cystic non-enhancing mass (**red arrowhead**)* is noted in the region of uncinate process of pancreas. Tortuous *splenic (**SA**)* and *hepatic arteries (**HA**)* are also noted.

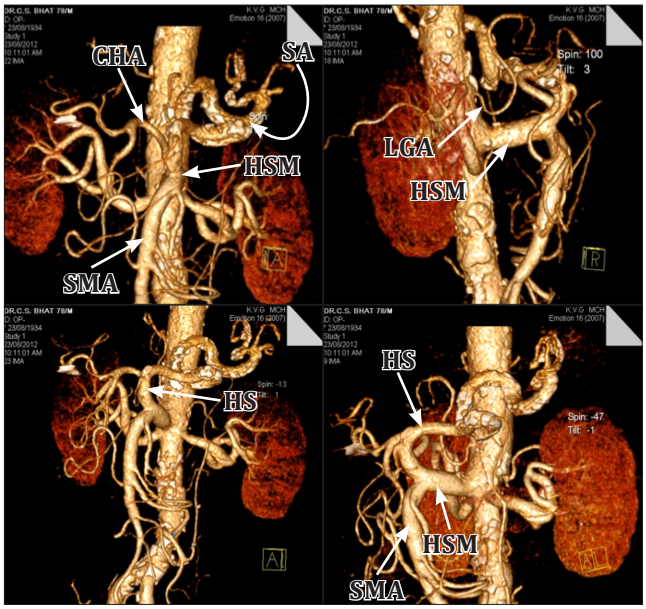

Figure 2. Volume rendered technique images of CT abdominal angiography showing *hepatosplenomesenteric trunk (**HSM**), hepatosplenic trunk (**HS**) left gastric artery (**LGA**), splenic artery (**SA**) and common hepatic artery (**CHA**).*

Table 1. Classification of anatomical variations of celiac trunk according to Uflacker's system [8].

Presentation	Type
Classic celiac trunk	Type I
Hepato-splenic trunk	Type II
Hepato-gastric trunk	Type III
Hepato-spleno-mesenteric	Type IV
Gastrosplenic	Type V
Celiac-mesenteric	Type VI
Celiac-colic trunk	Type VII
No celiac trunk	Type VIII

distributed to the capillary plexus in the wall of yolk sac, which later merge as unpaired trunks. The longitudinal anastomotic channels connect these branches along the dorsal and ventral aspects of the tube. These vessels obviate the need for so many subdiaphragmatic ventral splanchnic arteries, and these are reduced to three, the celiac trunk, the superior mesenteric artery and the inferior mesenteric artery [1]. Variations in the development of these ventral splanchnic branches results in the variant branching pattern, and hepatosplenomesenteric artery is one among them [1].

According to a study conducted in 974 cadavers by Chen et al., classical trifurcation of celiac trunk was observed in 89.8% of cases. In this study hepatosplenomesenteric trunk was encountered in 0.7% [5]. Another study was conducted by Song et al. in Seoul, Republic of Korea in 5002 patients, who underwent abdominal spiral CT and digital subtraction angiography. In this study 4457 (89.1%) of 5002 patients had usual celiac axis anatomy, which appeared as hepato-gastro-splenic trunk and superior mesenteric artery originating separately from the aorta [6]. The most common celiac axis variation was hepato-splenic trunk with separately originating left gastric and superior mesenteric arteries, found in 4.42% of cases (221 patients) [6]. Hepatosplenomesenteric trunk with separate left gastric artery was found in 34 patients (0.68%) [6].

Retrospective study of abdominal CT angiography conducted in Ankara, Turkey by Ugurel et al. in 100 patients showed that usual celiac trunk trifurcation was observed in 89% of patients [7]. Gastro-splenic trunk was most prevalent variation (4%), followed by hepato-splenic trunk (3%). Hepatosplenomesenteric trunk is noted in only one patient out of 100[7]. According to Bergman et al. in a study on 756 cases, the incidence of hepatosplenomesenteric trunk was 0.5%, and left gastric artery arose directly in 6.7% [4].

Anatomical variations of celiac trunk were described according to Uflacker's system into eight categories (Table 1) [8].

By referring to various studies conducted by anatomists on cadavers or by radiologists in patients by conventional or CT angiography shows that the incidence of hepatosplenomesenteric trunk is rare accounting for less than 1%, hence it becomes significant to report such rare anatomic variation.

In the era of Appleby procedure, laparoscopic surgeries and interventional radiological procedures for the treatment of benign and malignant diseases of organs originating from foregut and midgut, extreme knowledge of celiac trunk and superior mesenteric artery variations is of prime clinical importance [9]. These anatomical variations are also of prime importance in the field of transplants and vascular surgeries of aorta itself [10, 11]. The frequency of iatrogenic vascular injury rises with aberrant anatomy and variations.

Digital subtraction angiography is regarded as gold standard in the evaluation of vascular structures; however, its invasive nature limits its role [2]. Introduction of multidetector CT has enabled to visualize the vascular structures of smaller diameter to a greater extent and permits an accurate and detailed analysis of abdominal arterial system [2].

Conclusion

Most of the vascular anatomical variants are asymptomatic and are incidental findings on imaging techniques. Multidetector CT is best semi-invasive technique for recognizing and analyzing these anatomical variations prior to the diagnostic or therapeutic, surgical or radiological procedures. The current case report of rare vascular variant provides useful information in clinical practice.

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