A Case Report of Hepato Spleno Mesenteric Trunk – A Rare Vascular Variation

Jisha Sree Hasheem[1], Rohini Avantsa[2]

[1, 2] Department of Radiodiagnosis, K.S. Hegde Medical Academy, Deralakkatte, Mangalore, Karnataka, India.

INTRODUCTION

Major sources of the vascular supply of the gastrointestinal tract are the celiac trunk (CT) and superior mesenteric artery (SMA) which are the main proximal branches of the abdominal aorta. The CT gives rise to three branches normally as follows: left gastric artery (LGA), common hepatic artery (CHA) and splenic artery (SA). The branching pattern of the CT is considered as the most literature explained anatomical pattern.[1] After the CT, the abdominal aorta gives the second named branch as superior mesenteric artery. Vascular variations of the celiac trunk and superior mesenteric artery are common and had been described earlier.[2] These variations are caused due to the aberrant embryological development of splanchnic arteries. The incidence of hepato-spleno-mesenteric trunk has been reported by various authors as 0.68 %,[3] 0.7 %,[4] 0.3 %,[5] 0.4 %,[6] or 1 %.[7]

The importance of knowledge of these variations lies in preplanning of invasive surgical techniques, organ transplantation, diagnosis, prevention, and management of some metastatic tumours and to overcome the catastrophic consequences like bowel ischemia due to common trunk.[8] Hence a better understanding of these anatomical variations is considered vital for surgeons or radiologists for appropriate planning and conduction of surgical procedures or interventions.[9]

Most of the anatomical variations in abdominal aorta branches are asymptomatic and incidental findings while imaging for other aetiologies. But the identification of such vascular variations is of utmost importance in clinical practice. The Hepato-spleno-mesenteric trunk [HSMT] is one of those variations and was less frequently reported. The authors describe a case report of the hepato-spleno-mesenteric trunk which was incidentally detected in the multi detector computed tomography study of the abdomen of a 54-year-old male patient who had been diagnosed to have chronic liver disease and hepatic encephalopathy.

The origin of the HSMT [with a diameter of 11mm] occurs from the abdominal aorta at the level of the L2 vertebral body and is divided into the hepatosplenic trunk [diameter of 7 mm] and superior mesenteric artery [diameter of 7.5 mm] after coursing for a length of 28 mm. The hepatosplenic trunk ascends superiorly for a length of 20 mm and divided into two terminal branches: common hepatic (6 mm) and splenic artery (6 mm).

Corresponding Author:
Dr. Jisha S. H.,
Junior Resident,
Department of Radiodiagnosis,
K. S. Hegde Medical Academy,
Deralakkatte, Mangalore,
Karnataka, India.
E-mail: jishahasheem@gmail.com

DOI: 10.14260/jemds/2021/453

How to Cite This Article:
Hasheem JS, Avantsa R. A case report of hepato spleno mesenteric trunk - a rare vascular variation. J Evolution Med Dent Sci 2021;10(29):2217-2220, DOI: 10.14260/jemds/2021/453

Submission 13-03-2021,
Peer Review 20-05-2021,
Acceptance 26-05-2021,
Published 19-07-2021.

PRESENTATION OF CASE

A 58-year-old male patient came with complaints of abdominal distension and altered sensorium. He was a known case of chronic liver disease and advised for ultrasonography of the abdomen and pelvis. A suspicious hypoechoic lesion was noted in the segment V of the liver and was advised for contrast study of CT abdomen and pelvis. Renal function tests of the patient were within normal limits and vitals were stable.

The patient was prepared for CECT abdomen with 6 hours of fasting. Scanning was performed with 16 slices MDCT scanner (General Electrical Systems Bright speed Milwaukee, Wisconsin, USA). Plain CT scan was done initially with negative oral contrast followed by IV contrast of 100 ml of non-ionic contrast with a power injector. The arterial phase was taken with a delay of 20 seconds after the contrast injection. Later portal and delayed phases were taken. Multiplanar reconstructions and volume - rendered images were obtained. During the evaluation of the abdominal images, an abnormal branching pattern of the upper abdominal aorta was noticed. A common arterial trunk was noted arising from the anterior aspect of the aorta dividing into SMA and a single trunk of CHA and SA as described in the literature, which was named as Hepato-spleno-mesenteric trunk (HSMT). A detailed evaluation of this variation revealed that the HSMT was arising from the abdominal aorta at the level of the L2 vertebral body and had a diameter of 11mm. The length of the HSMT was found to be 28 mm and dividing into two branches as the hepatosplenic artery [HST] and SMA at the same vertebral level. The HST with its diameter of 7mm ascended superiorly for a length of 20 mm and divided into two terminal branches of CHA and SA. The diameters of these branches were 6 mm each. The gastroduodenal artery (GDA) and hepatic artery proper (HAP) were arised from the CHA after a length of 30 mm. The GDA originated from the CHA and coursed inferiorly to the first part of the duodenum.

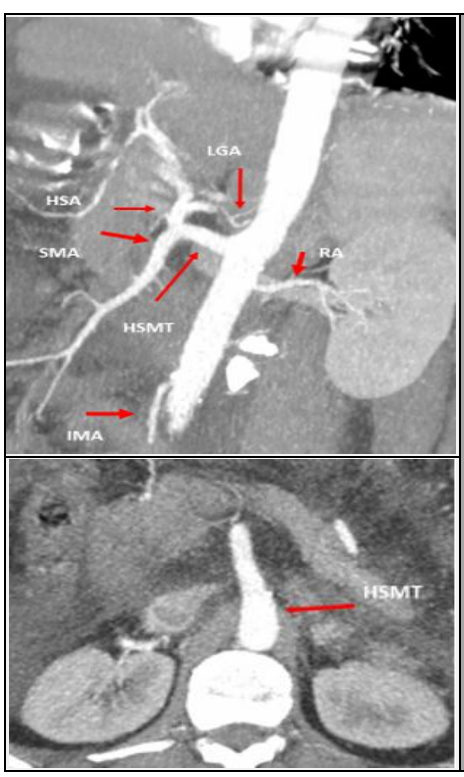

Figure 1. Oblique Coronal and Axial MIP Images of CECT in Arterial Phase Shows HSMT and LG Arteries. LGA – Left Gastric Artery, HST – Hepatosplenic Artery, SMA – Superior Mesenteric Artery, IMA – Inferior Mesenteric Artery, RA – Renal Artery, HSMT – Hepato Spleno Mesenteric Artery

The GDA appeared larger than HAP. The HAP was further divided into its right and left branches. The right hepatic artery gave branches to both the right hepatic lobe and gall bladder. SA appeared closely related to the pancreas and gave a branches to the spleen. Along the course, the SA gave multiple branches to the pancreas. Another small-calibre vessel was seen arising from the HST which was descending to the posterior aspect of the body of the pancreas and was seen supplying the pancreatic parenchyma which could be the additional pancreatic branch. The SMA with its diameter of 7.5 mm descended inferiorly for a length of 44 mm from the CMT to supply the midgut. A small twig of LGA with a diameter of 3 mm was noted arising from the abdominal aorta about 12 mm before the HSMT. The LGA further gave rise to the left inferior phrenic artery.

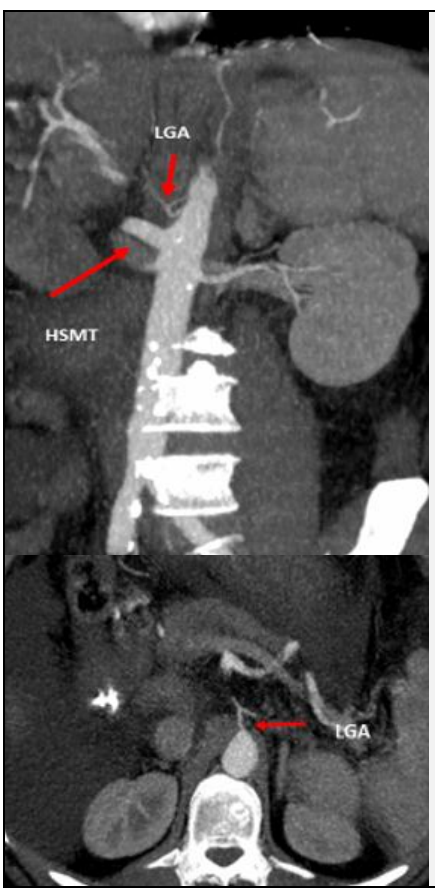

Figure 2. CECT Axial and Oblique Coronal Maximum Intensity Projection Images Shows Origin of Left Gastric Artery Proximal to the HSMT

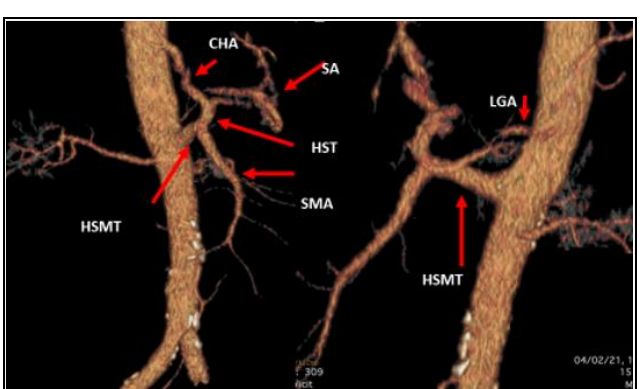

Figure 3. Three – Dimension Volume – Rendered CT Image Showing the Hepatosplenomesenteric Trunk (HSMT). HSMT Divides into the Hepatosplenic Trunk (HST) and Superior Mesenteric Artery (SMA). Common Hepatic Artery (CHA) and Splenic Artery (SA) are Seen Arising from the Hepatosplenic Trunk

DISCUSSION

Normally the abdominal aorta has CT as the first anteriorly arising branch at the level of T12 / L1 vertebrae. The approximate length of the CT is 2 cm which branches into the LGA, SA and CHA. The majority of the organs developing from the foregut are supplied by the CT. At the level of T12 / L2 vertebra, the SMA arises from the abdominal aorta as the second branch below the CT. It supplies the midgut organs and branches into inferior pancreaticoduodenal, middle colic, right colic and ileocolic arteries.[10] Most of the vascular variations of the abdominal aortic branches were known and reported earlier.

HSMT is one of those variations and is the less frequently reported variation of the branching pattern of the abdominal aorta. The reason for this variation has been explained by the development of splanchnic arteries. According to Tandler,[11] the primitive dorsal aorta supplies visceral arteries via four splanchnic roots.

Later the four splanchnic roots fuse anteriorly together via longitudinal anastomosis which is occurring along the direction of the aorta. Any mal-development in the formation of the anastomosis can lead to vascular anomalies. The failure of fusion of 2nd and 3rd splanchnic roots can lead to the abnormal connection of 1st and 4th roots. The superior mesenteric, left gastric, common hepatic and splenic arteries originate from the fused splanchnic roots. If there is abnormal longitudinal fusion occuring above the SMA, it can result in the development of SMA separately from the celiac branches without any continuity.

Interruption of the anastomosis developing between the LGA and SA can lead to the formation of an HSMT with the origin of the LGA directly from the aorta.[1] Another example of this type of variation is the development of the hepatosplenic trunk by the anastomosis of the hepatic and splenic arteries.

Buntero Adachi in his book Das Arterien system der Japaner (1928) classified CT into six types and 28 groups. HSMT was included in the type three group where the left gastric branch was arising from the abdominal aorta. According to a study conducted by Song et al.[3] HSMT had an incidence of 0.68 %. In another study by Chen et al.[4] in 2009 among 5002 patients who underwent multi detector contrast-enhanced computed tomography and digital subtraction angiography, HSMT was reported in 0.7 %. According to Wang[12] et al. in 2014, ten theoretical anatomical classifications of celiac and SMA were identified. HSMT was classified as a subclass under CMT. Ugruel et al.[7] conducted a study with 100 patients, HSMT was reported in only 1 patient.

Hence by various studies, the incidence of HSMT was found out to be rare which was less than 1% and hence becomes important to report such cases. Maldjaan et al.[11] concluded in their study that the origin of LGA differentiated Celiacomesenteric trunk (CMT) from HSMT and easily misinterpreted in routine clinical reporting.

As the Appleby procedures, laparoscopic surgeries and interventional radiological procedures are increasingly being done for different diseases of the foregut and midgut organs, thorough knowledge of these anatomical variations are of utmost importance. There is an increase in vascular injury due to anomalous vascular variations.

In recent years, there is a tremendous increase in the usage of multidetector computed tomography, for identifying the major bowel pathologies and abdominal vascular abnormalities as well as surgical planning. Therefore, the number of studies to determine the anatomical variation of abdominal vessels has been increased. Whitely et al.[13] in their study done in 2020, studied variations in the celiac trunk using MDCT and reported that 0.26 % of the total celiac variations were HSMT.

Accurate identification of vascular anatomy of major vessels of the abdomen is inevitable for surgical management as well as interventional procedures of the gastrointestinal and hepatobiliary system. So multi-detector computed tomography angiography with volume rendering should be performed before any surgery on the upper and lower gastrointestinal studies.[6,12,13]

CONCLUSIONS

The majority of the vascular variations are incidental findings. Unidentified major vascular anatomic variants can lead to complications in abdominal surgeries and radiological intervention procedures. So thorough knowledge of celiac and SMA variations is important in surgical, oncological, interventional radiology etc. as they can significantly reduce morbidity and mortality of patients. MDCT along with 3D reconstruction plays an important role in identifying such variants. Reporting of such rare variations is important in current clinical practice.

Financial or other competing interests: None.
Disclosure forms provided by the authors are available with the full text of this article at jemds.com.

REFERENCES

[1] Yi SQ, Terayama H, Naito M, et al.. A common celiacomesenteric trunk and a brief review of the literature. Ann Anat 2007;189(5):482-8.
[2] Lipshutz B. A composite study of the cœliac axis artery. Ann Surg 1917;65(2):159-69.
[3] Song SY, Chung JW, Yin YH, et al.. Celiac axis and common hepatic artery variations in 5002 patients: systematic analysis with spiral CT and DSA. Radiology 2010;255(1):278-88.
[4] Chen H, Yano R, Emura S, et al.. Anatomic variation of the celiac trunk with special reference to hepatic artery patterns. Ann Anat 2009;191(4):399-407.
[5] Aslaner R, Pekcevik Y, Sahin H, et al.. Variations in the origin of inferior phrenic arteries and their relationship to celiac axis variations on CT angiography. Korean J Radiol 2017;18(2):336-44.
[6] Iezzi R, Cotroneo AR, Giancristofaro D, et al.. Multidetector-row CT angiographic imaging of the celiac trunk: anatomy and normal variants. Surg Radiol Anat 2008;30(4):303-10.
[7] Ugurel MS, Battal B, Bozlar U, et al.. Anatomical variations of hepatic arterial system, coeliac trunk and renal

arteries: an analysis with multidetector CT angiography. Br J Radiol 2010;83(992):661-7.
[8] Bhatnagar S, Rajesh S, Jain VK, et al.. Celiacomesenteric trunk: a short report. Surg Radiol Anat 2013;35(10):979-81.
[9] Sangster G, Ramirez S, Previgliano C, et al.. Celiacomesenteric trunk: a rare anatomical variation with potential clinical and surgical implications. J La State Med Soc 2014;166(2):53-5.
[10] Hiremath R, Kc A, Pailoor A, et al.. CT angiographic diagnosis of hepatosplenomesenteric trunk-a rare variation. Int J Anat Variations 2014;7(1).37-9.
[11] Wang Y, Cheng C, Wang L, et al.. Anatomical variations in the origins of the celiac axis and the superior mesenteric artery: MDCT angiographic findings and their probable embryological mechanisms. Eur Radiol 2014;24(8):1777-84.
[12] Maldjian PD, Chorney MA. Celiomesenteric and hepatosplenomesenteric trunks: characterization of two rare vascular anomalies with CT. Abdom Imaging 2015;40(6):1800-7.
[13] Whitley A, Oliverius M, Kocián P, et al.. Variations of the celiac trunk investigated by multidetector computed tomography: systematic review and meta-analysis with clinical correlations. Clin Anat 2020;33(8):1249-62.