

Anatomical Variation Of Coeliac Trunk

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Abstract: Anatomical variations of the coeliac trunk are very common. A variation of coeliac trunk occurs due to the developmental abnormalities in the ventral splanchnic arteries. Main Purpose of this study was to identify and evaluate the spectrum and prevalence of coeliac axis (CA) variations and its branches. During routine dissection on adult cadavers in Anatomy department, we found some variations in the branching pattern of the coeliac trunk. The left gastric artery arises as first branch of coeliac trunk and then the trunk bifurcates into splenic and hepatic arteries. Right gastric artery is seen originating from the hepatic artery proper. Knowledge of this rare variation is clinically very important for surgeons, especially while performing liver transplantation, gall bladder surgeries, trans arterial catheterization for hepatic tumors.

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I. Introduction:

The celiac trunk is the first anterior branch of abdominal aorta and is the most important artery of the foregut. It arises from abdominal aorta at the level of T12–L1 vertebrae [1]. After a short horizontal trajectory forwards it divides into left gastric artery, common hepatic artery and splenic artery. The coeliac trunk also known as hepatolienogastric trunk or “Tripus Halleri” described by Haller in 1756 (2). This “Tripus Halleri” was and is still being considered to be the normal appearance of the coeliac trunk [2]. Anatomical variation of the coeliac trunk is due to the persistence or abnormal development of the ventral splanchnic arteries. According to the branching pattern of coeliac trunk many variations have been reported. Many variations have been reported in the branching pattern of the coeliac trunk like quadrifurcation of coeliac trunk[3], anomalous origins of different arteries from coeliac trunk other than usual three main branches[4], penta-furcation of the trunk[5] and even absence of coeliac trunk[6]. These anatomical variations are common and usually asymptomatic. Awareness of the coeliac trunk anatomic variations becomes specifically important in patients undergoing interventional radiology procedures or prior to an operative procedure.

II. Materials And Methods

This study was conducted on 25 cadavers (11 females and 14 males) which were used during the routine dissection for the medical undergraduates in the Department of Anatomy, Andhra medical college, Visakhapatnam, A.P., India. Abdomen was dissected as per Cunningham’s manual to observe the coeliac trunk and its branches. All the branches of coeliac trunk were carefully dissected and photographed using digital camera.

III. Observation

During a routine dissection of the cadavers for undergraduate MBBS batches, the following variations of the coeliac trunk were found. Out of 25 specimens in 18 specimens we found trifurcation of celiac trunk, in 5 specimens the left gastric artery was found to be arising as a first branch of coeliac trunk, then the next part of trunk (hepatosplenic trunk) bifurcates into splenic and hepatic arteries (fig-1). Right gastric artery usually arises from the common hepatic artery. We observed in one cadaver that right gastric artery was arising from the hepatic artery proper (fig-2), dorsal pancreatic artery arose from the coeliac trunk. Inferior phrenic arteries are considered as the first branches of the abdominal aorta. Generally additional branches of Coeliac trunk other than the normal branches are referred to as collaterals. Collaterals observed included dorsal pancreatic, gastroduodenal, inferior phrenic and ileal arteries. In our study left inferior phrenic artery was seen arising from the coeliac trunk. The left gastric artery is the smallest branch of coeliac trunk, but it is the principal artery of stomach.

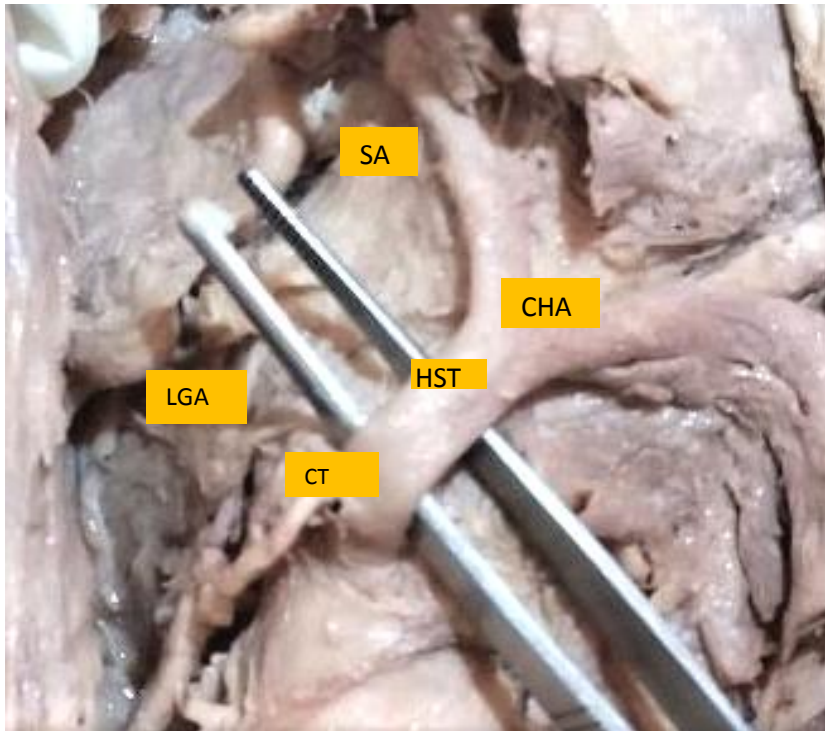


FIG -1 showing origin of left gastric artery as a first branch of coeliac trunk

CT- COELIAC TRUNK
LGA- LEFT GASTRIC ARTERY
HST- HEPATO SPLENIC TRUNK
SA- SPLENIC ARTERY , CHA – COMMON HEPATIC ARTERY

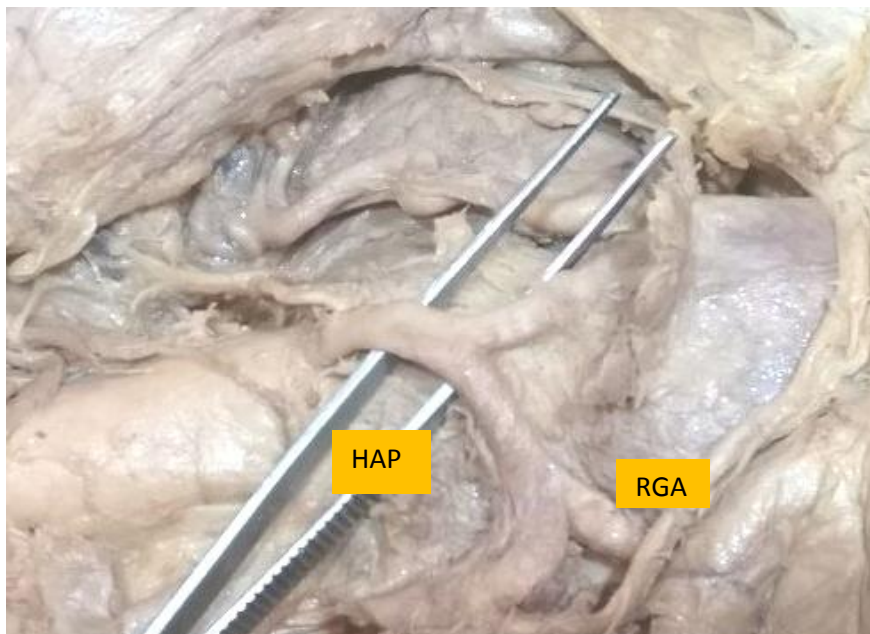


Fig -2 showing origin of right gastric artery from the hepatic artery proper

HAP- HEPATIC ARTERY PROPER
RGA- RIGHT GASTRIC ARTERY

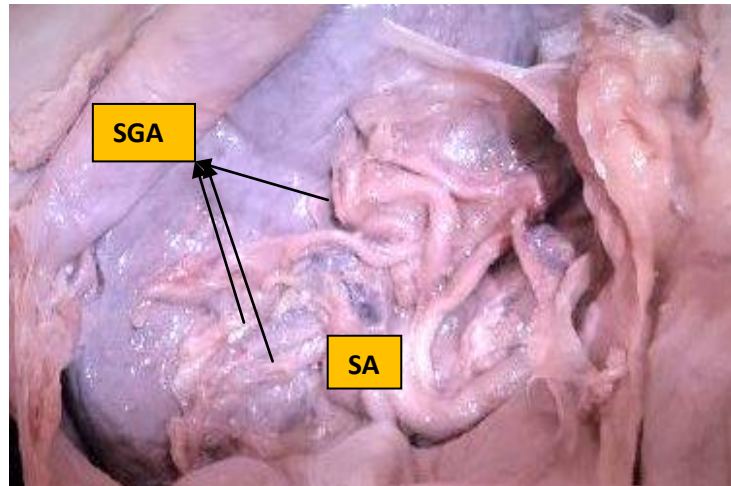


Fig-3 showing segmental branches of splenic artery before entering into spleen

SGA- SEGMENTAL ARTERIES

SA -SPLENIC ARTERY

IV. Discussion

Anomaly during embryological development of the vitelline arteries (fusion or malfusion) may be responsible for the variations of the coeliac trunk. Variations in the branches of the coeliac trunk are the most commonly reported ones and many authors have reported different variation patterns. Vascular variations are usually asymptomatic. They may become important in patients undergoing coeliacography for gastrointestinal bleeding, coeliac axis compression syndrome, prior to an operative procedure or transcatheter therapy; chemoembolization of pancreatic and liver tumors(8). The types of coeliac trunk according to Michels(11) classification are as follows: Type 1: Normal branching –Trifurcation. Type 2: Hepatosplenic trunk and left gastric artery from aorta. Type 3: Hepato splenomesenteric trunk and left gastric from aorta. Type 4: Hepatogastric trunk and splenic artery from superior mesenteric artery. Type 5: Splenogastric type; splenic and left gastric from the coeliactrunk and common hepatic artery from superior mesenteric artery. Type 6: Coeliacomesenteric trunk; splenic, left gastric, common hepatic and superior mesenteric arteries arise Later Adachi in 1928 [9] added two more variants in this classification: The Coeliacomesenteric and hepatomesenteric trunk classifying in this way the coeliac trunk in six types . Uflacker in 1997 [10] added two more variants to the previously reported classification types by Michels and Adachi [9] [11]. He added the coeliacocolic trunk and the absence of the coeliac trunk classifying it in eight different types

In our study we have analyzed 25 Cadavers. Female were 44% and male 56%. According to Michels's classification in our study type 1 was found in 72% of patients; type 2 was found in 20% of patients; type 3 was found in 1% .we didn't find any of type 4 to 6 types of variation. Nayak SB et al[12] reported that the right gastric artery took its origin from the left hepatic artery within the porta hepatis and descended down in the lesser omentum. Lipshutz(13) observed the same. The current variation of the origin of the right gastric artery from the common hepatic artery might be of additional advantage to pass a catheter into left hepatic artery through it to embolize the left hepatic artery [13] . Though the variations of the common hepatic artery are rare, the right and left hepatic arteries show many variations in their course, branching and distribution. Song et al. [14] did an extensive study on the common hepatic artery and found variations in only 2% of cases. In our study right gastric artery arising from hepatic artery proper. We also found an another variation of splenic artery which is giving segmental branches before entering the spleen(Fig-3).

Knowledge of the anatomical variations of the coeliac trunk is of extreme clinical importance during surgery/interventional radiology procedures. Recognition in detail of arterial dimension and branch anomaly of coeliac trunk are mandatory before liver surgery including liver transplantation, tumor resection or chemoembolisation of liver malignancy. During abdominal surgery such open or laparoscopic gastrectomy (where gastric vessels are ligated and divided) or splenectomy (where splenic and short gastric artery should be ligated-previous knowledge of these arterial variation are indispensable to avoid catastrophic complications due to ligation or division of the wrong vessel which may lead to ischemia or bleeding of the respective organ, so detailed informations for coeliac trunk anomaly become important. Also, information about right hepatic artery is of great value in pancreatic surgery for malignancies of head/uncinate process and preservation of this artery is important to prevent liver necrosis.

V. conclusion

Our findings were similar to a certain range to previous studies published [12]. Recognition in detail of variations of coeliac trunk anatomy and its morphometry is important in the accurate interpretation of disease, in diagnostic imaging, while it is indispensable to avoid complications during surgery/interventional radiology procedures.

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