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RESEARCH ARTICLE

A STUYD ON VARIATION OF COELIAC TRUNK BRANCHES IN SOUTH INDIAN POPULATION

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ABSTRACT

A variant course and branching pattern of the coeliac trunk was recorded in a 55-year-old male cadaver during the practical sessions of Basaveshwara medical college, Chitradurga, Karnataka, India. We report on a unique anatomically and surgically significant study of multiple coeliac trunk variations. Coeliac trunk arises from abdominal aorta normally and gave rise to common phrenic artery which divided into right inferior phrenic and left inferior phrenic arteries. After 0.5 cm course Coeliac trunk gave rise to left gastric artery then coursing downwards as hepatospleenic trunk, divided into common hepatic and spleenic arteries. Common hepatic gave rise to proper hepatic, gasrtoduodenal and a branch to right kidney. Proper hepatic artery communicates with right inferior phrenic, supplies right dome of diaphragm and liver. In our study right gastric artery was absent. Preoperative selective angiography or other coeliac trunk imaging studies are helpful for arterial variation demonstration and important for surgical, interventional and radiological purpose.

KEY WARDS: Coeliac trunk, common phrenic artery, hepatospleenic trunk.

INTRODUCTION:

The Coeliac trunk is the first ventral branch of the abdominal aorta, at the level of the intervertebral disc, between the T12 and the L1 vertebrae. It is 1.5cm-2cm long and divides into the left gastric, the common hepatic and the spleenic arteries [1]. This normal branching pattern is referred to as a classical trifurcation and it was observed by Haller as Tripus Halleri. Common hepatic artery gives right gastric, gasrtoduodenal arteries and occasionally posterior superior pancratico-duodenal artery, and then continues as hepatic artery proper. Inferior phrenic arteries are first lateral branches of abdominal aorta. The branching pattern may vary from a classical trifurcation to an abnormal trifurcation, a bifurcation, a quadrifurcation, a pentafurcation of trunk [2]. The prevalence of this trifurcation has been reported by Malnar et al., (72%) [3], Song et al., (89.1%) [4], Ugurel et al., (89%) [5] and Bergman et al., (86%) [6].

It is an accepted fact that variations of the coeliac trunk do frequently exist and thus its presence may not be undermined, Additional branches other than the normal branches are referred to as collaterals [7]. The aim of the present study was to highlight the additional branches arising from the coeliac trunk and discuss their topography, which may be important for surgeons operating in the upper abdominal region. Presence of additional arteries may provide collateral circulation which may be important during transplant surgeries. Knowledge of anomalous branches of the coeliac trunk may also be important for interventional radiologists in day-to-day clinical practice.

The anatomical variations of the coeliac trunk are due to developmental changes in the ventral segmental (splanchnic) arteries. These ventral segmental arteries supply the yolk sac, allantois and chorion. Three ventral segmental arteries remain as coeliac trunk, superior mesenteric artery and inferior mesenteric artery. During embryological period, there are longitudinal anastomoses between roots of four upper ventral segmental arteries of abdominal region. The two central roots disappear and the longitudinal anastomoses join the first and fourth root. The hepatic, spleenic and the left gastric arteries originate at this longitudinal anastomoses. These branches usually become separated from the fourth root (the future superior mesenteric artery) below their last end. If this separation takes place at the higher level, one of the branches is displaced to the superior mesenteric artery. If the first or fourth root disappears, a coeliacomesenteric trunk will be formed. [8, 9] In our case, the variations of the coeliac trunks are due to developmental changes in the longitudinal anastomosis between above mentioned roots.

MATERIALS AND METHODS:

Seventeen cadavers from Department of anatomy, Basaveshwara medical college were fixed in 10% formalin

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solution, their ages ranging from 21 to 56 years, of which 7 were males and 10 females. During Routine Dissections of abdomen for medical graduates and under graduates of same institution in Chitradurga, Karnataka. With the help of Cunningham's practical manual stomach, Peritoneum, liver, duodenum, pancreas and surrounding tissue was removed. In 55 years male embalmed cadaver we found unique variation in the branching pattern of coeliac trunk and absence of right gastric artery. In other cadavers branching pattern of coeliac trunk was normal.

RESULTS:

In our study a total of 17 cadavers of different ages were dissected and observed [Table- 1]. Cadavers are categorised into different age groups of 18 – 30 years, 30 – 40 years, 40 – 50 years and more than 50 years. All the cadavers are dissected and abdomen was opened for medical students and came across the unique variation of coeliac trunk branches [Figure – 1].

Table 1: Distribution of different age group cadavers

Age	Male	Female	Total
21 – 30	1	3	4
30 – 40	2	2	4
40 – 50	1	1	2
>50	3	4	7
			17

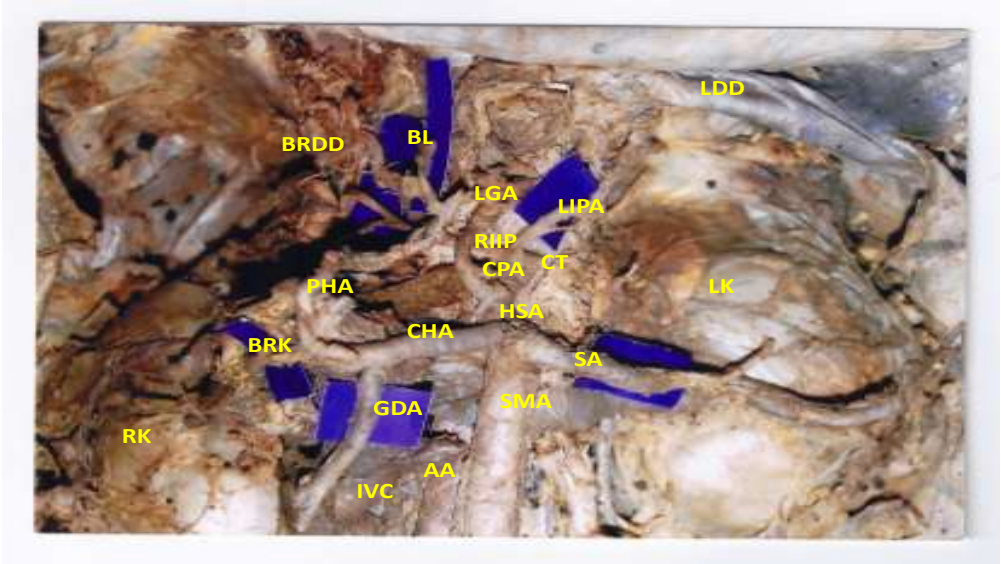

Figure 1: Showing the dissection of branching pattern of coeliac trunk. CT, Coeliac trunk. CPA, Common phrenic artery artery. LIPA, Left Inferior phrenic artery. RIPA, Right inferior phrenic artery. LGA, Left gastric artery.HSA Hepatosplenic trunk. CHA, Common hepatic or hepatic artery.SA, Spleenic Artery. PHA, Proper hepatic artery. GDA, Gastro duodenal artery. BRK, Branch to right kidney. BL, branch to liver. BRDD, branch to right dome (crus) of diaphragm. AA, Abdominal aorta. Left dome (crus) of diaphragm. IVC, inferior venacava.RK, right kidney. LK, left kidney. SMA, superior mesenteric artery.

DISCUSSION:

Piano et al8., stated that inferior phrenic arteries were usually paired (left and right) and their origins were summarized as follows; a) the aorta itself (61.6%), b) ventro-visceral arteries (coeliaco-mesenteric system of aorta) , (28.2%), and left gastric artery (2.9%), c) the latero-visceral arteries (adreno-renal system of the aorta) including the middle adrenal artery (2.9%), and renal artery (4.3%). The right and left inferior phrenic arteries occasionally originated as a common trunk from the aorta, coeliaco-mesenteric system or adreno-renal system [10]. Peterella S et al., 11 studied 89 cadavers, comprising 72 males and 17 females from 5 centres in Brazil. In 31 of the cadavers (26 males and 05 females), the inferior phrenic arteries had their origin in the right contour of the coeliac trunk was observed in 05 of the 89 cases [11]. Our study reports that common inferior phrenic artery arises from left contour of coeliac trunk. Then divided in to right inferior phrenic and left inferior phrenic arteries.

Adachi in his study stated that, two types of bifurcated trunks were observed: gastrosplenic present in 4.9% and hepatosplenic in 13.1%. A similar prevalence has been reported in a Japanese study where the gastrosplenic and hepatosplenic trunks (with an aortic origin of the left gastric) were present in 3% and 8% respectively [12]. Hiatt *et al*. (1994) described a mesenteric origin of the common hepatic in only 1.5% in an American study [13]. Bifurcation of the celiac trunk may follow different patterns such as gastrophrenic and hepatosplenic

Trunks [14]. A short lienogastric trunk with hepatic arteries having variable origins [15]) and hepatogastric trunk with splenic artery having an aortic origin [16, 17]. Knowledge of variation found in the present case is very useful in surgical, oncologic or interventional procedures and should be kept in mind to avoid complications. In 13%, [10, 18], 28.2% Inferior phrenic arteries arises from celiac trunk; and in 2.9% [10] from the left gastric artery. The left inferior phrenic and left gastric arteries arose from the celiac trunk via a common trunk [19].

According to vandemme et al, additional branches of the celiac trunk other than its usual branches are referred to as collaterals. The additional branch may be one of the inferior phrenic, a common trunk for the inferior phrenic or for a inferior phrenic and left gastric, a gasrtoduodenal (or an accessory gasrtoduodenal), a second left gastric or an accessory spleenic artery, a superior mesenteric, a middle or accessory middle colic, a supreme pancreatic, or a dorsal pancreatic. One of the usual branches of the CT may be absent, and may be replaced by a stem common to the inferior phrenic, by the right middle suprarenal and the right gastroepiploic, or more rarely by some other branches. Adachi reported that the inferior phrenic artery originated (8.1%) from the celiac trunk [20].Our literature agreed with above cited literatures, we found inferior phrenic arteries, a Branch to the right kidney as collateral branches. absence of right gastric artery not same as above said above literature.

CONCLUSION:

In the current study coeliac trunk gave rise to common inferior phrenic artery, which divided in to right and left inferior phrenic arteries, hepatosplenic trunk gave rise to spleenic and common hepatic arteries and absence of right gastric artery was not documented in earlier literature. A thorough knowledge on the vascular pattern of the coeliac trunk and its relations is important for the surgeons who conduct laparoscopy and it also helps the radiologists in performing intra-operative angiograms and gasrtoscopy.

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