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VARIATION IN BRANCHING PATTERN OF COELIAC TRUNK- A CASE REPORT

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ABSTRACT

Coeliac trunk is a short wide vessel (1.25cm long) arising from the front of abdominal aorta at the level of vertebra T12. The main branches of coeliac trunk are common hepatic artery, splenic artery & left gastric artery. During routine dissection for medical undergraduates, we observed a variation in coeliac trunk in a middle aged male cadaver. The Coeliac trunk was 2cm in its length & dividing into five branches. Initially it gave rise to left inferior phrenic artery, then three regular branches i.e., Left gastric, common hepatic & splenic artery & finally Middle colic artery. The knowledge of these variations is important for surgeons while doing liver transplants, laproscopic surgery, radiological abdominal interventions & penetrating injuries to the abdomen.

Keywords: Abdominal Vessels, Coeliac Trunk, Inferior Phrenic Artery, Splenic Artery, Hepatic Artery

INTRODUCTION

The coeliac trunk (CT) is the first ventral branch of abdominal aorta arising at the level of T12 thoracic vertebra (Starding, 2008). The CT is a ventral branch of the abdominal aorta arising just below the aortic hiatus superior to the pancreas. The CT is about 1.25cms in about 75–90% of individuals, but may vary between 8 & 40 mm (Cavdar *et al.*, 1997, 1998).

The branches of CT are splenic artery, left gastric artery & common hepatic artery. The common hepatic artery divides into gastroduodenal artery & hepatic artery proper. The gastroduodenal artery terminates by dividing into superior pancreaticoduodenal & right gastroepiploic arteries. The hepatic artery proper terminates by dividing into a right & a left hepatic artery, which supply the right & left lobes of the liver, respectively. The right hepatic artery gives a cystic branch which supplies the gall bladder. The right gastric artery may arise from the common hepatic or proper hepatic arteries. The left gastric artery, apart from supplying the stomach, gives one or two oesophageal branches, which supply the terminal part of oesophagus. The splenic artery gives pancreatic, left gastroepiploic & short gastric arteries in addition to the branches that supply the spleen (Starding, 2008).

There are diverse branching pattern that are observed with respect to the origin & course of vessels of abdomen especially the CT. The normal pattern of trifurcation of CT was observed in 87.6%, bifurcation & incomplete division in 12.2% (Ucerler *et al.*, 2006). The prevalence of normal branching pattern of the CT into common hepatic, splenic & left gastric arteries has been reported by Malnar *et al.*, (2010) 72%, Song *et al.*, (2010) 89.1%, Ugurel *et al.*, (2006) 89% & Bergman *et al.*, (1988) 86%. It is also observed that the CT unites with the SMA at their origins to form a common trunk, the celiacomesenteric trunk (Cavdar *et al.*, 1997). A common celiacomesenteric phrenic trunk was reported by Nayak (2006).

The chances of iatrogenic injuries during various surgical procedures of upper abdomen is more if the operating surgeon is not aware of the variations in the branching pattern of CT (Gielecki *et al.*, 2005). The knowledge of the variations will be of great help in planning & executing radiological interventions such as chemoembolization of hepatic tumors (Aigner, 2005).

CASES

During routine dissection of a middle aged cadaver for medical undergraduates, we have observed a variation in CT. The CT originated from ventral aspect of abdominal aorta at the level of T12 vertebrae & was 2cm in its length. Initially it gave rise to left inferior phrenic artery, then three regular branches i.e., Left gastric, common hepatic & splenic artery & finally Middle colic artery. The Left phrenic artery

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supplied few branches to stomach & gave rise to superior supra renal artery. The course of left gastric, common hepatic & splenic artery was normal. The anomalous middle colic artery ran directly downward from its origin & passed in front of the aorta & supplied transverse colon, splenic flexure & proximal descending colon. The middle colic branch of the superior mesenteric artery was absent.

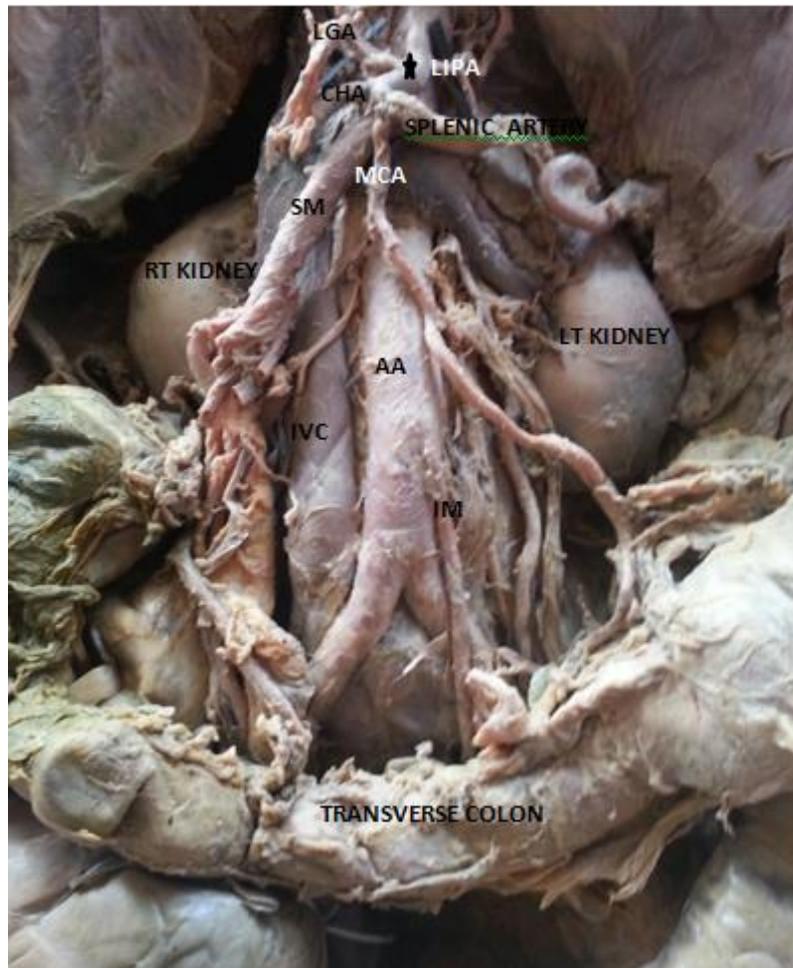


Figure 1: Showing the Celiac Trunk Originating from Ventral Surface of Abdominal Aorta (AA); The Left Inferior Phrenic Artery (LIPA) Originating from the Coeliac Trunk*, Supplying the Diaphragm; The Splenic Artery (SA), the Common Hepatic Artery (CHA) & Left Gastric Artery (LGA) are the Terminal Branches Emerging from the Coeliac Trunk*, Further Middle Colic Artery (MCA) Runs Downwards and Supplies the Transverse Colon; The Superior Mesenteric (SM) & Inferior Mesenteric Artery (IM) had a Normal Course

DISCUSSION

The CT arises from the ventral portion of abdominal aorta opposite vertebra T12. It supplies the derivatives of foregut. At the end of the 4th week of intrauterine life, the yolk sac is supplied by a number of paired vessels in the form of vitelline arteries. These arteries gradually fuse & form arteries in the dorsal mesentery of the gut, which are represented in adult life as coeliac, superior mesenteric & inferior mesenteric arteries (Sadler, 2004). The incomplete fusion or malfusion of the vitelline arteries during the developmental stage may be responsible for the variations that are observed in CT (Mburu, 2010).

The inferior phrenic artery is the branch of abdominal aorta given just above the CT (Starding, 2008). The inferior phrenic arteries originated with almost equal frequency from the CT as well as directly from the

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abdominal aorta. The left inferior phrenic artery originated from abdominal aorta in the present study. The exact localization of inferior phrenic artery is important in transarterial embolization in patients with severe hemoptysis (Gwon *et al.*, 2007).

The middle colic artery is a branch of superior mesenteric artery it supplies the transverse colon & inferior phrenic artery arises directly from abdominal aorta & supplies the diaphragm (Starding, 2008). In our observation, the middle colic artery also originated from the CT along with its usual three branches i.e., left gastric, hepatic & splenic artery.

Mburu *et al.*, (2010) in their study stated that CT trifurcated in 61.7 % of the cases & bifurcated in 17.9 % of the cases & gave collateral branches in 20.3% of the cases. Collateral branches were dorsal pancreatic artery (DPA), inferior phrenic artery, gastroduodenal artery & ileal artery. Deepthinath *et al.*, (2006) observed a variation where the CT apart from three usual branches gave an accessory renal artery, two testicular arteries, middle suprarenal & left inferior phrenic arteries. The present case also, the CT apart from three usual branches gave left inferior phrenic artery & Middle colic artery. Mehmet *et al.*, (2004) also observed that CT in addition to its normal branches, had a middle colic artery with a diameter of 0.6 cm & stretched towards the transverse colon & supplied the entire transverse colon & proximal descending colon originated from the CT.

Conclusion

Even though many variations of CT have been reported in the past, The CT diving into five branches is very rare. Presence of arterial variations may result in misinterpretation of angiograms & helps in preventing injury to important vessels during upper abdominal surgeries. Thus, knowledge of such variations is important for proper pre-operative diagnosis & planning of surgical & radiological procedures & for interventional radiologists performing angiography.

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