

## Multiple Variations of the Ventral Splanchnic Branches of the Aorta

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### Abstract

During routine dissection for the undergraduates on the posterior abdominal wall of a 65 year old indian male cadaver in AIIMS Raipur, we found a common trunk giving rise to celiac artery and superior mesenteric artery. There was an intermesenteric arcade connecting the superior and inferior mesenteric arteries. The subjects with celiaco-mesenteric artery are asymptomatic but can present with: abdominal angina, aneurysms, median arcuate ligament syndrome, thrombosis. The incidence of celiacomesenteric trunk varies from 0.9 to 4%.

**Keywords:** Celiacomesenteric Trunk; Metamers; Aneurysms; Thrombosis.

### Introduction

Abdominal aorta forms the sole source of blood supply to the abdomen. The branches of the abdominal aorta are classified as ventral, lateral, dorsal and terminal branches. The ventral branches are unpaired and three in number. They are the celiac trunk, superior mesenteric artery and inferior mesenteric artery.

The celiac trunk is present at the level of T12-L1 level below the aortic opening of the diaphragm. It is short stump measuring 1.25cm and then trifurcates into left gastric artery, common hepatic artery and splenic artery. This is called as Haller's tripod named after Haller who found out this trifurcation[1]. The celiac trunk is the artery of the foregut supplying the stomach, spleen, liver upto a part of the second part of duodenum.

The superior mesenteric artery is present at the level of L1. It supplies the structures derived from the midgut. The branches of the superior mesenteric artery are inferior pancreaticoduodenal, middle colic artery, right colic artery and ileocolic artery. Variations in the origin of the arteries due to the embryological development have been reported.

Sometimes the superior mesenteric artery is connected to the celiac trunk by arcade of Buhler and the superior mesenteric artery is connected to the inferior mesenteric artery by intermesenteric arcade.

The celiac trunk and superior mesenteric artery arising from a common trunk is a rare anomaly. The incidence of the celiaco-mesenteric trunk (CMT) varies from 0.9 to 1.5%[2]. Here we report a case of celiaco-mesenteric trunk. Awareness of this variation has anatomical, surgical and embryological relevance.

### Case Presentation

During routine dissection for the undergraduates on the posterior abdominal wall of a 65 year old indian male cadaver in AIIMS Raipur, we found a common trunk giving rise to celiac artery and superior mesenteric artery. The common trunk took origin from the aorta at the level of L1. The common trunk divided into small upper and larger lower divisions. The upper division divided into splenic artery, left gastric artery and common hepatic artery. The lower division formed the superior mesenteric artery (Figure 1). There was no anastomosis between the celiac trunk and superior mesenteric artery. The inferior phrenic arteries arose from a common stump from the aorta. There were variations of the branching pattern of the superior mesenteric artery. There was an intermesenteric arcade connecting the superior and inferior mesenteric arteries. The middle colic and the right colic arteries had a common origin. The

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inferior mesenteric artery branches also had variations. The 1<sup>st</sup> branch of the inferior mesenteric artery, the left colic artery divided into an ascending and a descending branch at its origin. Length of the common trunk, Celiac trunk and superior mesenteric

artery was 8.73mm, 14.75 and 13.2 respectively. Diameters of left gastric splenic, common hepatic and superior mesenteric artery was 1.91, 7.46, 4.01 and 13.53mm respectively.

**Fig. 1:** Figure shows the celiaco-mesenteric trunk and its branches. CMT- Celiaco-mesenteric trunk, CHA- Common Hepatic artery, LGA- Left gastric artery, SMA- Superior mesenteric artery, SA- Splenic artery.



## Discussion

In 1904, Tandler gave the reason for the variations in the celiac artery. According to Tandler, there is a metameric disposition of the vessels of the trunk. The metameres are supplied by 3 paired arteries from the aorta. They are namely dorsal arteries supplying the body wall, lateral splanchnic arteries supplying the urogenital organs and vitelline arteries which supply the gut tube. These ventral branches are connected by a ventral longitudinal anastomosis. As the embryo evolves, the central two roots disappear. When the 1<sup>st</sup> root or 4<sup>th</sup> root disappear, it leads to the formation of celiac-mesenteric trunk. The other factors responsible for the variation are: (1) rotation of midgut, (2) physiological herniation, (3) leftward migration of the spleen, (4) hemodynamic changes in the gut tube [3].

The presence of celiaco-mesenteric artery is often missed or found during autopsy. The subjects with celiaco-mesenteric artery are asymptomatic but can

present with: abdominal angina, aneurysms, median arcuate ligament syndrome, thrombosis.

Median arcuate ligament syndrome leads to total avascularisation of supracolic organs as CMT is the only source of blood supply to the supracolic organs. Thrombosis of CMT results in ischemia of the stomach upto right two-thirds of transverse colon, splenic infarction and ischemia of liver.

Knowledge regarding CMT is important in upper abdominal surgeries and interventional radiological procedures.

Anatomical classification:

Lipshutz was the first who classified the branching pattern of celiac trunk into 4 types in 1917 which did not include the celiacomesenteric trunk [4]. In 1951 Adachi and Michel classified variations in the celiac trunk into 6 types. The celiac-mesenteric trunk belongs to the sixth type[5]. Uflacker in 1997 mentioned celiacomesenteric trunk as type 6 [6]. Dilli babu et al in 2013 proposed a new classification of

the celiac trunk variations into 16 types. Of which, celiacomesenteric trunk was classified as type IV (a) [1].

#### *Incidence*

The incidence of celiacomesenteric trunk was 1.5% as observed by Adachi 1928 [5]. It was 0.7% proposed by Chen et al in 2009 [7]. In 2010 Song et al gave the incidence of celiacomesenteric trunk as 1.1% [8]. Imakeshi et al 1949 and Malnar et al 2010 confirmed the presence of celiacomesenteric trunk in 0.9% and 4% of the cases [9,10].

Recent studies in 2013 show that the incidence is more in asian population [1]. The intermesenteric arcade is due to the persistence of the ventral longitudinal anastomoses between the 13<sup>th</sup> and 21<sup>st</sup> root of the aorta. Knowledge about these variations help the clinicians in planning surgeries in the upper abdomen, laparoscopic surgeries and radiological procedures and to avoid complications.

#### **Conclusion**

We have reported a case with multiple variations in the ventral branches of aorta. It will be helpful for the clinicians in planning abdominal surgeries and in avoiding complications.

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