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Variations In Branching Pattern Of Coeliac Trunk

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Abstract: *The coeliac trunk is one of the mostwell-documented arterial trunks, with many researchers pondering on the topic, as well as providing detailed studies and an impressive number of specimens. The CT arises just below the aortic hiatus at the level of thoracic 12–lumbar 1 (T12–L1), and is the first anterior branch of abdominal aorta. It divides into the left gastric, common hepatic and splenic arteries. The trifurcation of the celiac trunk was first described by Haller 1756 as Tripus Halleri. This "tripus Halleri" was and is still considered to be the normal appearance of the CT. This research work has been carried out during the past 6 years in cadavers in the Department Of Anatomy.AMC, Visakhapatnam.*

Aims*: To study the anatomy of coeliac trunk and variations in branching pattern.*

Methods*: This study was conducted on 50 embalmed cadavers from the dissection laboratory; out of them 44 were male and 6 were female. Dissection method was employed for this study.*

Result and Observation*: Classic coeliac trunk with the left gastric, splenic and hepatic arteries was found in 39 (78 %) cadavers and in 8 cadavers variations were found. Vascular anomalies are usually asymptomatic; they may become important in patients undergoing diagnostic angiography for gastrointestinal bleeding, coeliac axis compression syndrome, or prior to an operative procedure.*

Key words: Coeliac trunk, hepatic artery,left gastric artery, Splenic artery.

I. Introduction

The Coeliac trunk is the first ventral branch of the abdominal aorta and it arises first below the aortic hiatus at level of T12-L1 vertebra. It passes horizontally forwards and divides into left gastric, common hepatic and splenic arteries. The coeliac trunk is an integral part of the circulatory system as it delivers blood from the heart to major organs within the abdominal cavity. The blood that it delivers is oxygenated and carries essential nutrients and immune system particles that can aid in life sustaining processes and can also prevent the development of diseases and complications from illnesses. Variation in branching pattern of blood vessels are always interesting from a scientific point of view since they often shed light on obscure problems of phylogeny and ontogeny. The unusual embryological development of the ventral splanchnic arteries can lead to considerable variations in the branching pattern of Coeliactrunk. hepatic and splenic arteries. This trifurcation was first described by Halleri in 1756. Developmentally, each dorsal aorta even before the stage of its fusion gives ventral splanchnic branches, which supply the gut and its derivatives. With the fusion of the dorsal aorte, the ventral branches fuse and form a series of unpaired segmental vessels, which run in the dorsal mesentery of gut and divide into ascending and descending branches. These vessels eventually form dorsal and ventral longitudinal anastomotic channels, with the formation of longitudinal anastomotic channels, numerous ventral splanchnic branches are withdrawn and only three trunks persist as coeliac artery for foregut, superior mesenteric artery to midgut, and inferior mesenteric artery to hindgut.

The abdominal vessels, especially Coeliac Trunk and Superior mesenteric artery, frequently show diverse anomalies in their origin and course. The CT is a wide ventral visceral branch of the aorta arising just below the aortic hiatus superior to the pancreas.In 75–90% of individuals, it runs horizontally forward for approximately 1.25 cm. Although the CT, in general, divides into three arteries, namely Left Gastric, Splenic and Common Hepatic Artery, one of the components of the CT sometimes arises directly from the abdominal aorta. In rare cases, all three components arise independently from the aorta. In addition, it has been reported that the CT unites with the SMA at their origins to form a common trunk, the celiacomesenteric trunk (CMT). Variations in the branching pattern of the coeliac trunk are therefore having immense surgical importance.

II. Material And Methods

Material: The adult bodies which are allotted for routine dissection in the Department of Anatomy, Andhra Medical College, Visakhapatnam and in Department of Anatomy. 50 embalmed cadavers which were dissected during the period of past 6 years were considered for the study.

Method:

The left gastroepiploic artery is followed which is running parallel to the greater curvature of stomach.Anterior layer of peritoneum was removed from lesser curvature of stomach and left right gastric artery was identified. Right gastric artery is traced upto proper hepatic artery. Omental bursa was exposed and left gastroepiploic artery is identified lying left of the pylorus. At the superior border of pancreas, coeliac trunk is identified.

III. Observations And Results

In the present study of 50 cadavers CT arises from abdominal aorta as a wide short ventral branch opposite the lower border of T-12 vertebrae in 35 cadavers giving percentage of 70%, 12 of them arising from upper boarder of L1 vertebrae with 24%, 3 of them arising at upper border of T 12 giving 6%.

Branching pattern of celiac trunk- Majority of cases of the celiac trunk have 3 branches (78%) followed by 4 branches (16%), only 2 branches in 6% of cases. In 16 % of cases dorsal pancreatic artery is arising from the celiac trunk. And in 6% of cases the hepatic artery is arising from the superior mesenteric artery.

In the present study out of 50 cadavers 39 has normal branching pattern i.e., left gastric artery, splenic artery, and common hepatic artery. 8 of them showed 4 branches namely left gastric artery and splenic artery, common hepatic artery and a new branch after giving few pancreatic branches terminated into left branch i.e., transverse pancreatic branch and a right branch which units with superior pancreaticoduodenal artery and is called dorsal pancreatic artery/ arteria pancreatica suprema. 3 of them show 2 branches they are splenic artery and left gastric artery. Hepatic artery is arising from superior mesenteric artery instead of celiac trunk. During these years found the observations.

During 2010- 2011

S.NO	SEX	NO.OF BRANCHES	ANAMOLY
1	M	3	NIL
2	M	3	NIL
3	M	3	NIL
4	F	3	NIL
5	M	4	DORSAL PANCREATIC ARTERY
6	M	3	NIL
7	M	3	NIL
8	M	3	NIL
9	M	3	NIL
10	M	3	NIL

During 2011-2012

S.NO	SEX	NO.OF BRANCHES	ANAMOLY
1	M	3	NIL
2	M	3	NIL
3	F	3	NIL
4	M	2	A) SPLENOGASTIRC B) COMMON HEPATIC
5	M	3	NIL
6	M	3	NIL
7	M	3	NIL
8	F	3	NIL
9	M	4	DORSAL PANCREATIC ARTERY
10	M	3	NIL

During 2012-2013

S.NO	SEX	NO.OF BRANCHES	ANAMOLY
1	M	3	NIL
2	M	3	NIL
3	M	3	NIL
4	M	3	NIL
5	M	3	NIL
6	M	3	NIL
7	F	3	NIL
8	M	3	NIL
9	M	3	NIL
10	M	3	NIL

During 2013-2014

S.NO	SEX	NO.OF BRANCHES	ANAMOLY
1	M	3	NIL
2	M	3	NIL
3	M	3	NIL
4	M	3	NIL
5	M	3	NIL
6	F	3	NIL
7	M	2	COMMON HEPATIC ARISING FROM SUPERIOR MESENTRIC
8	M	3	NIL
9	M	3	NIL
10	M	3	NIL

During 2014-2015

S.NO	SEX	NO.OF BRANCHES	ANAMOLY
1	M	3	NIL
2	M	3	NIL
3	M	3	NIL
4	M	3	NIL
5	F	3	NIL
6	M	3	NIL
7	M	3	NIL
8	M	4	DORSAL PANCREATIC ARTERY
9	M	3	NIL
10	M	3	NIL

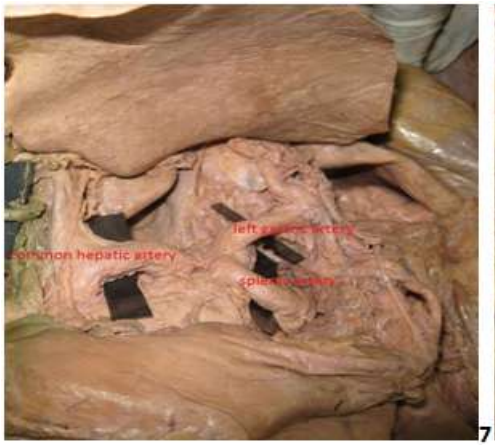

Fig no 3: coeliac trunk and its 3 branches

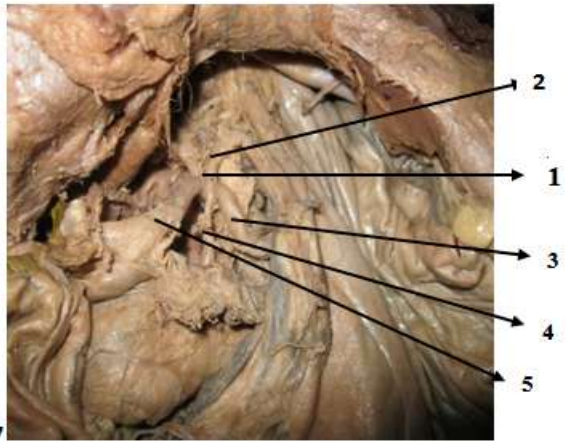

Fig no 4: coeliac trunk showing 4 branches

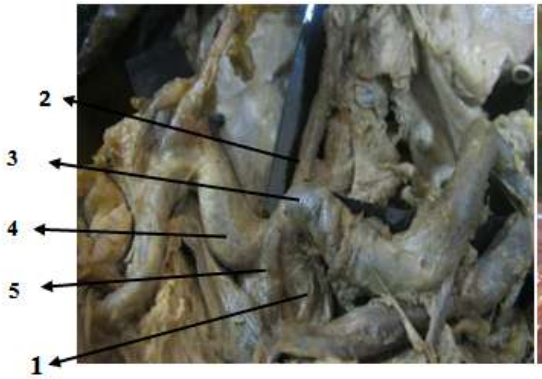

Fig no 5: coeliac trunk showing 4 branches

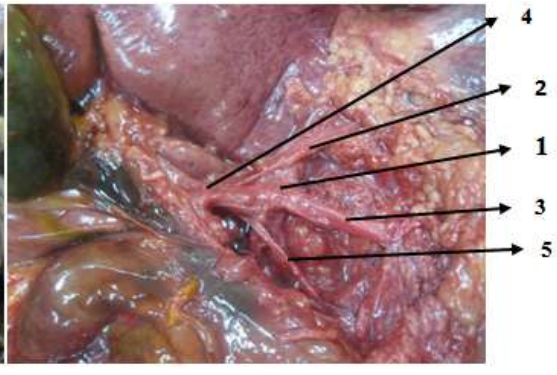

Fig no 6: coeliac trunk showing 4 branches

1.COELIAC TRUNK
2. LEFT GASTRIC ARTERY
3. SPLENIC ARTERY
4. COMMON HEPATIC ARTERY
5. DORSAL PANCREATIC ARTERY

Fig no 7: coeliac trunk showing 2 branches (spleno gastric trunk)

Fig no 8: coeliac trunk (splenogastric trunk) (hepatic artery arising from superior mesenteric artery)

1.COELIAC TRUNK
2. LEFT GASTRIC ARTERY
3. SPLENIC ARTERY
4. COMMON HEPATIC
5.SUPERIOR MESENTERIC

IV. Discussion

Coeliac trunk normally arises at the level of lower border of T_{12} vertebra from abdominal aorta. In the present study celiac trunk is arising at the level of lower border of T_{12} in 35 cadavers (70%) in 12 cadavers (24%) arising at the lower border of L_1 and in 3 (6%) it is arising at the level of upper border of T_{12}. The origin at the L_1 level is of great important for clinicians because SMA and renal arteries also arise from aorta at L_1.

Level of origin of C.T:

Level of origin of CT	NO OF Dissections	Percentage
Lower border of T_{12}	35	70
Upper border of L_1	12	24
Upper border of T_{12}	3	6

% of branches

Number of branches	No of dissections	Percentage
3	39	78
4	8	16
2	3	6

Superior mesenteric artery is developmentally considered as a part of the coeliac complex and it follows that variations in the superior mesenteric artery are related to the coeliac trunk. The anatomical variations of these vessels are due to developmental changes in the ventral splanchnic arteries.
Complete celiac trunk was seen in 39 cases (78%) which was close to Pic-guard study (82%) incomplete coeliac trunk was observed in 3 cases (6%).

Type of Celiac trunk compared with other study

Name	No. of specimens	CT complete	Incomplete CT	Celiacomesenteric trunk	NO CT
Rossi	102	84%	11%	2.5%	2.5%
Leriche	55	84%	9%	1%	0%
Descomps	50	88%	12%	0%	0%
Branco	50	89%	8%	2%	0%
PicK guard (9)	50	82%	14%	2%	2%
Lipchutz(7)	838	72%	25%	3%	0%
Eaton(8)	206	90%	9%	1%	0%
Poynter	106	89%	9%	2%	0%
Present study	50	78%	6%	0%	0%

The coeliac and superior mesenteric arteries having a common origin from the aorta accounts for less than 1% of all abdominal vascular anomalies.

V. Conclusion

Knowledge about variations of CT and superior mesenteric artery are of extreme clinical importance in the areas of laproscopic surgery and radiological procedures in the upper abdomen and should be kept in mind by clinicians to avoid complications. Celiac artery compression syndrome is due to large median arcuate ligament of diaphragm. Patient with cirrhosis liver are at risk for developing splenic artery aneurysm. Hepatic artery diameter is important for hepatic artery infusion chemotherapy for treatment of hepatic metastasis. Treatment is surgical intervention for majority of patients. Hepatic artery thrombosis is one of the principle causes of morbidity. In conclusion, the present study gives details about coeliac trunk. The observation of present study correlates with previous studies. The present variation of Coeliac trunk will be very useful for the surgeons dealing with stomach and pancreas.

Awareness of variations in arteries supplying the duodenum and pancreas can also help in minimizing the blood loss during various surgical procedures in this area. 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. Careful identification and dissection of celiac trunk branches is therefore important to avoid iatrogenic injury.

VI. References

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