ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Study of variational Anatomy of Coeliac Trunk and its Branches – A Cadaveric Study.

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ABSTRACT

The coeliac trunk is a major artery that supplies the foregut of the gastrointestinal tract. It is the first ventral branch of the abdominal aorta and it arises just below the aortic hiatus, at the level of the T12-L1 vertebra. The present study was conducted on total of thirty adult embalmed cadavers allotted to M.B.B.S. students in the department of Anatomy, Malabar Medical College Hospital and Research Center, Modakkallur, Kerala. In the present study we could find some variations in the branching pattern of celiac trunk and the observations are in agreement with previous studies as mentioned in the discussion. This study can be helpful in various diagnostic and surgical procedures. The present study can be applied in various radiological procedures like computed tomography angiography, intra-arterial digital subtraction angiography, etc. where the radiologists should have knowledge of various branching patterns and calibres of blood vessels. The results of this study can also be highly useful to the surgeons who can plan their line of treatments in cases like liver transplantation, hepatobiliary tumours, splenic aneurysm, pancreatic carcinoma, coeliac axis compression syndrome, gastric carcinoma, mesenteric ischemia etc.
Keywords: Coeliac Trunk, anatomical variations , surgical outcome

https://doi.org/10.33887/rjpbcs/2022.13.6.13

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ISSN: 0975-8585

INTRODUCTION

The coeliac trunk is a major artery that supplies the foregut of the gastrointestinal tract. It is the first ventral branch of the abdominal aorta and it arises just below the aortic hiatus, at the level of the T12-L1 vertebra. It is 1.5 to 2 cm long and it passes almost horizontally forwards and divides into the left gastric (LGA), the common hepatic (CHA) and the splenic arteries (SA) [1]. The coeliac trunk typically arises a short distance above the superior mesenteric artery but these two vessels sometimes have a common stems known as coeliacomesenteric trunk [2].

Variations in the branching pattern of blood vessels are of considerable significance from a clinical or a surgical standpoint and are also interesting from a purely scientific point of view, especially since they so often shed light on obscure problems of phylogeny and ontogeny [3].

Anatomic variations involving the visceral arteries are common. While vascular anomalies are usually asymptomatic, they may become important in patients undergoing diagnostic angiography for gastrointestinal bleeding or prior to an operative procedure or transcatheter therapy [4].

Reported variations in the branching pattern of the celiac trunk include absence of the trunk, presence of collateral vessels, and anomalous branches, and even bifurcation of the trunk [5, 6]. Such variations in the pattern of branching of the celiac trunk may predispose to iatrogenic injuries during surgical procedures such as total pancreatomy and resection of tumors of head of pancreas. So, the knowledge of this variable anatomy may be useful in planning and executing radiological interventions such as celiacography and chemoembolisation of hepatic tumors [7]. Since there is no anastomosis between the hepatic arteries, an injury to the hepatic artery during operation would result in hepatic damage with serious morbidity. Therefore, preoperative information on the anatomical features of the hepatic arteries is very important in hepatobiliary surgery [8]. Keeping in mind all these factors, this study was undertaken to give a composite account of the celiac trunk with regard to its origin, vertebral level, branches and its variations encountered.

Aims and Objectives

- To note the origin of celiac trunk.
- To observe the branching pattern of celiac trunk.
- To find out varioations if any in the origin and branching pattern of celiac trunk.

MATERIAL AND METHODS

The present study was conducted on total of thirty adult embalmed cadavers allotted to M.B.B.S. students in the department of Anatomy, Malabar Medical College Hospital and Research Center, Modakkallur, Kerala. The cadavers which showed signs of any trauma or surgical scars on the abdomen were excluded. Each cadaver was numbered and was dissected in supine position. Dissection was carried out according to guidelines of "Cunningham's Manual Of Practical Anatomy" [9]. A midline skin incision from the xiphisternal junction to the pubic symphysis, encircling the umbilicus, was made. Then a transverse incision from the xiphoid process to a point on the midaxillary line was made. Skin incision was extended from pubic symphysis to anterior iliac spine followed by extension upto to a point on midaxillary line. The skin was reflected from medial to lateral aspect towards the midaxillary line. Anterior abdominal wall was dissected layer wise. Muscles of anterior abdominal wall were incised and reflected laterally. Peritoneal cavity was opened and branches of coeliac trunk were identified. As dissection proceeded these branches were traced to their origins and coeliac region was dissected and cleared of nervous and connective tissue network and thus coeliac trunk was completely exposed on abdominal aorta. The sites of origins of coeliac trunk and its all branches were noted and the branches were traced and variations were recorded.

RESULTS

In the present study, the coeliac trunk was found to be arising from the aorta at the level of intervertebral disc between T12 and L1 in 23 cases (76.66%) and upper 1/3rd of L1 vertebra in7 cases (23.33%). We observed in the present study that the celiac trunk was given off as the first branch of the abdominal aorta just below the aortic opening of the diaphragm. In all cases, it was surrounded by the

crura of the diaphragm and these were used as landmarks. It was observed in the present study that the coeliac artery after arising from the abdominal aorta trifurcated in 29(96.66%) cadavers bifurcated in 1(03.33%) cadaver. Two patterns of trifurcation were observed; classical and non classical. In case of classical trifurcation the common hepatic, splenic and left gastric arteries had a common point of origin from the celiac trunk after having a course of about a centimeter from its origin.[fig1] Out of 29, in 24(82.75%) cadavers classical trifurcation was found. In nonclassical trifurcation coelic trunk, after giving left gastric artery had further course and gave two terminal branches; splenic artery and common hepatic artery.[fig2] Out of 29, in 5(17.25%) cadavers nonclassical trifurcation was found. In one cadaver bifurcation of celiac trunk was observed. In the present study, celiac trunk bifurcated into left gastric and splenic artery while common hepatic artery found to be arising from superior mesenteric artery.[fig3]

DISCUSSION

Variations in the branches of the CT are reported by various authors in the past. Some of them were related to its branches such as in our case and other variations were related to its diameter, length or location. Generally, additional branches of the CT other than its normal branches are referred to as collaterals [4]. The patterns of branching of the CT were observed to vary from classical trifurcation to nonclassical trifurcation, bifurcation and quadrifurcation of the trunk [10].

In the present study, the coeliac trunk was found to be arising from the aorta at the level of intervertebral disc between T12 and L1 in 23 cases (76.66%) and upper 1/3rd of L1 vertebra in7 cases (23.33%). The findings of the presnt study are in accordance with study done by wadhwa et al in which the coeliac trunk was found to be arising from the aorta at the level of intervertebral disc between T12 and L1 in 22 cases (73.33%) and upper 1/3rd of L1 vertebra in 8 cases (26.66%). These findings were also comparable to the study of Moncada et al [11] and Hofman and Watson [12] who concluded that the vertebral level ranged from upper third of T11 to L2 vertebra with a mean level opposite upper third of L1 vertebra. Slight variability in the vertebral level suggests that treatment planning for carcinoma stomach, pancreas and hepatobiliary tree should be individualised as the nodes at risk lie adjacent to this vessel.

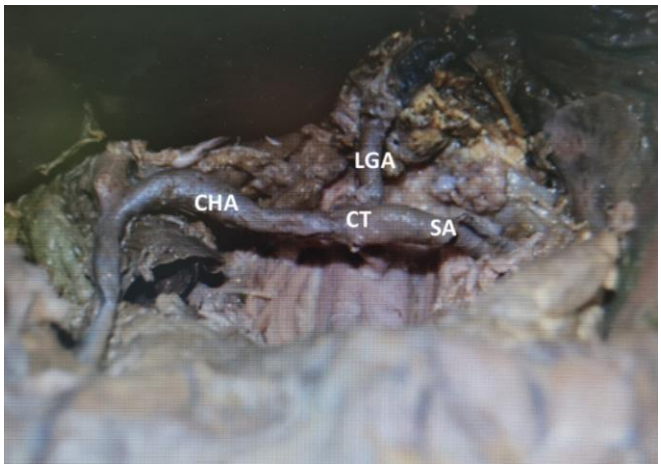
In most of the cases CT divides into the left gastric (LGA), the common hepatic (CHA) and the splenic arteries. In the present study CT after arising from the abdominal aorta trifurcated in 29(96.66%) cadavers bifurcated in 1(03.33%) cadaver. It was observed in the present study that out of 29, in 24(82.75%) cadavers classical trifurcation was found and in 5(17.25%) cadavers nonclassical trifurcation was found. According to Mburu et al [7], the CT was found to be trifurcated in 76 (61.7%), bifurcated in 22 (17.9%) and to give collaterals in 25 (20.3%) cadavers. They found classical trifurcation pattern in 40 (32.5%) of the cases while Nonclassical trifurcation was observed in 36 (29.3%). Thus our findings do not match with their findings but are in accordance with findings of Antony et al [3,10,12,13].

CONCLUSION

In the present study we could find some variations in the branching pattern of celiac trunk and the observations are in agreement with previous studies as mentioned in the discussion. This study can be helpful in various diagnostic and surgical procedures. The present study can be applied in various radiological procedures like computed tomography angiography, intra-arterial digital subtraction angiography, etc. where the radiologists should have knowledge of various branching patterns and calibres of blood vessels. The results of this study can also be highly useful to the surgeons who can plan their line of treatments in cases like liver transplantation, hepatobiliary tumours, splenic aneurysm, pancreatic carcinoma, coeliac axis compression syndrome, gastric carcinoma, mesenteric ischemia etc.

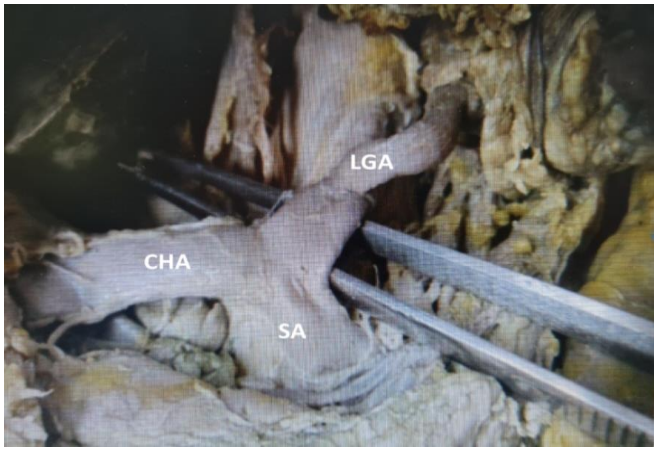
ISSN: 0975-8585

Figure 1- Classical Trifurcation



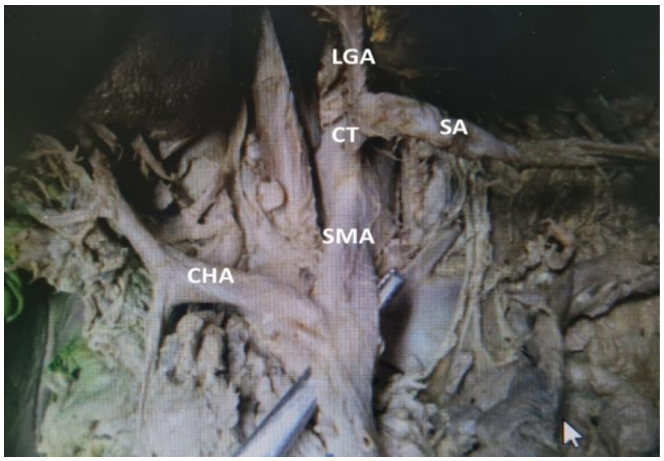
Coeliac trunk – CT, Left gastric - LGA, Common hepatic artery – CHA, Splenic artery – SA

Figure 2: Non-classical Trifurcation



Left gastric - LGA, Common hepatic artery – CHA, Splenic artery – SA

Figure 3: Bifurcation



Coeliac trunk – CT, Left gastric - LGA, Common hepatic artery – CHA, Splenic artery – SA
Superior mesenteric Artery - SMA

ISSN: 0975-8585

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