

Surgical Significance of Variations in Celiac Trunk Branching Pattern- A Research Study



Anatomy

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Naveena Swargam

Associate Professor, Department of Anatomy, ESIC Medical College, Sanathnagar, Hyderabad, Telangana State, India, PIN- 500038.

ABSTRACT

Knowledge of anatomical variations in branching pattern of great vessels of abdomen, including the coeliac trunk, is important for clinicians in planning surgical interventions and radiological imaging. The present study aimed to record the prevalence of variations in the vascular pattern of coeliac trunk branches in cadavers. During routine dissection on cadavers in Anatomy department, the present author found some variations in the branching pattern of the coeliac trunk. The splenic artery and cystic artery were seen originating from superior mesenteric artery in different cadavers instead of their usual origins from coeliac trunk and right hepatic artery respectively. Anatomical variations in the origin of coeliac trunk branches can significantly alter the surgical management of the upper abdomen. Hence, the clinicians and radiologists should be aware of such aberrant vascular anatomy so as to reduce the incidence of surgical complications.

Introduction:

The coeliac trunk is a surgically significant artery originating as a ventral branch from the abdominal aorta and supplying the supracolic organs. It is about 1.25 cm long passes almost horizontally forwards and slightly right above the pancreas and splenic vein, trifurcates to give left gastric, splenic and common hepatic arteries. Common hepatic artery before dividing into right and left hepatic arteries gives gastroduodenal, right gastric arteries and continues as proper hepatic artery. Right hepatic artery, before it enters into the porta hepatis of liver, gives cystic artery. Branches of this arterial trunk supply the primary organs of the abdomen and divert a significant volume of blood from the abdominal aorta. About 15% of the population displays significant variations in its typical branching pattern. The anatomical variations of the coeliac trunk branching pattern is due to developmental changes in the ventral splanchnic arteries.

Material and Methods:

A total of 20 properly embalmed and formalin-fixed cadavers of both sexes with age ranging from 30 – 70 years of Indian population were selected for the present study. Dissection included surgical incision, followed by mobilisation of the anatomical viscera, to observe and record the branching pattern of the coeliac trunk. The study was done for 4 years that is between 2013 – 2017. All the cadavers were studied by careful gross and fine dissection to observe the origin of coeliac trunk branches and their relation to the adjacent structures.

Results:

During a routine dissection of cadavers for the undergraduate MBBS students, the following variations of coeliac trunk branching pattern were found. In one cadaver (Figure 1) coeliac trunk bifurcated to give left gastric artery and common hepatic artery whereas the splenic artery arose from the superior mesenteric artery. In another cadaver (Figure 2) the cystic artery which usually arise from right hepatic artery found to be arising as a first branch of superior mesenteric artery. The coeliac trunk had its usual branching pattern in 18 cadavers but in 2 cadavers variations in the branching pattern of coeliac trunk were observed in the present study.

Figure 1: Bifurcated coeliac trunk, splenic artery arising from superior mesenteric artery. SMA- Superior mesenteric artery

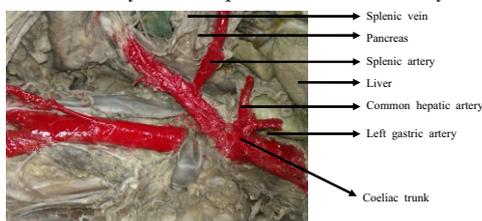
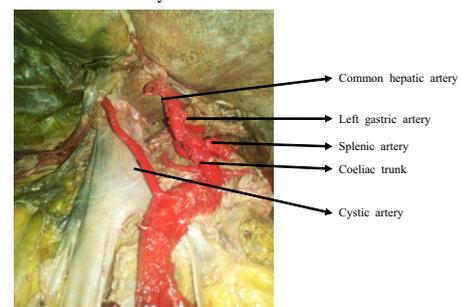


Figure 2: Cystic artery arising from superior mesenteric artery. SMA- Superior mesenteric artery



Discussion:

Anatomical variations in coeliac trunk are common and usually asymptomatic. They may become important in patients undergoing coeliacography for gastrointestinal interventions. The coeliac trunk has been classified by many authors according to its branching patterns. Lipchutz was the first one, in 1917, who classified the coeliac trunk in four types: 1-Normal trifurcation, 2-Hepatosplenic trunk, 3-Hepato gastric trunk, 4-Gastrosplenic trunk [1]. In 1951 Michel's classified the coeliac trunk in six different types: 1-Normal trifurcation, 2-Hepatosplenic trunk, 3-Hepatosplenomesentric trunk, 4-Hepato gastric trunk, 5-Splenogastric trunk, 6-Celiacomesentric trunk [2]. Uflacker in 1997 added two more variants to the previously reported classification types by Michels [3]. He added the celiacocolic trunk and the absence of the coeliac trunk classifying it in eight different types.

In the present study 20 cadavers were dissected, out of which 18 cadavers shown normal trifurcation of coeliac trunk and 2 cadavers shown variations in the branching pattern of coeliac trunk. The result of present study was correlated with the observations of previous studies shown in Table 1 below.

Table 1: Variations in the branching pattern of coeliac trunk

Sl. No.	Author	Number of cadavers studied	Percentage of normal coeliac trunks	Percentage of variations
1.	Lipshutz B. 1917	88	49.4	50.6
2.	Adachi 1928 [4]	252	86	14
3.	Wadhwa and Soni 2011 [5]	30	93.3	6.7
4.	Prakash et al 2012 [6]	50	86	14
5.	Present author	20	90	10

Conclusion:

Anatomical variations in the branching pattern of coeliac trunk

are of considerable importance in laparoscopic surgery, radiological abdominal interventions and penetrating injuries to the abdomen. Presence of additional arteries may provide collateral circulation which may be important during vessel ligation and anastomosis in transplant surgeries like liver transplantation. The background knowledge of different vascular patterns related to coeliac trunk is very useful in surgical, oncological or interventional procedures and should be kept in mind to avoid complications. A good understanding of the arterial architecture of this region prevents surgical and angiographic mistakes that can occasionally become catastrophic. The findings of the present study could help to minimise complications related to abdominal surgery, including bleeding and necrosis, and also facilitate better and more accurate radiological interpretations.

References:

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