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A cadaveric study of variation in branching pattern of splenic artery

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ABSTRACT

Background: The splenic artery is a significant blood vessel that arises from the celiac trunk, a branch of the abdominal aorta. The present study was conducted to assess variation in branching pattern of splenic artery.

Materials & Methods: The present cadaveric study was conducted on 68 cadavers embalmed with 10% formalin in the department of Anatomy. The celiac trunk, splenic artery and its branches were noted and photographed. All the branches and course of the splenic artery were recorded.

Results: Out of 68 cadavers, 38 were of males and 30 were of females. Origin of splenic artery was from celiac trunk in 55, superior mesenteric artery in 8 and abdominal aorta in 5 cases. The difference was significant (P< 0.05).

Conclusion: Surgeons need to be well-versed in the splenic artery's branching structure. Splenic artery origins varied, including those from the abdominal aorta, superior mesenteric artery, and celiac trunk.

Key words: Celiac trunk, Splenic artery, gastric arteries

Introduction

The splenic artery is a significant blood vessel that arises from the celiac trunk, a branch of the abdominal aorta. It plays a crucial role in supplying oxygenated blood to the spleen, which is the largest lymphoid organ in the human body. The spleen is located in the left upper quadrant of the abdomen, just beneath the diaphragm and behind the stomach.[1]The celiac trunk branches into three main arteries: the left gastric artery, the common hepatic artery, and the splenic artery. The splenic artery follows a tortuous course and travels towards the spleen, giving off several branches along the way. These branches include the short gastric arteries (supplying the fundus and upper part of the greater curvature of the stomach) and the left gastroepiploic artery (supplying the greater curvature of the stomach along its lower part).[2]

Upon reaching the spleen, the splenicthe splenic artery enters through the hilum, which is a concave area on the spleen's medial side. Within the spleen, the artery divides into smaller vessels, forming a network of capillaries known as the splenic sinusoids.[3] These sinusoids are part of the spleen's filtration system, where old or damaged red blood cells are removed from circulation and recycled.The splenic artery is vital for maintaining the spleen's function, which includes filtering blood, removing damaged or old blood cells, and serving as a reservoir for blood storage. Additionally, the spleen plays an essential role in immune function, as it houses various immune cells that help combat infections and pathogens.[4]

This variation in the branching pattern of the splenic artery can be correlated with its embryological development. The coeliac, superior mesenteric and inferior mesenteric arteries are derived from

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fusion of the vitelline arteries supplying the yolk sac, and are located in the dorsal mesentery of the gut.[5]The present study was conducted to assess variation in branching pattern of splenic artery.

Material & Methods

The present cadaveric study was conducted on 68 cadavers embalmed with 10% formalinin the department of Anatomy.

Peritoneal cavity was opened and explored. Stomach was turned superiorly. As the pancreas was uncovered the celiac trunk was identified and the dense autonomic plexus around it was cleared. Then the splenic artery was traced proximally up to its origin and also distally noting its course in relation to pancreas. The celiac trunk, splenic artery and its branches were noted and photographed. All the branches and course of the splenic artery were recorded.Results were statistically analysed. P value less than 0.05 was considered significant.

Results

Table I: Gender wise distribution

Total- 68		
Gender	**Male**	**Female**
Number	38	30

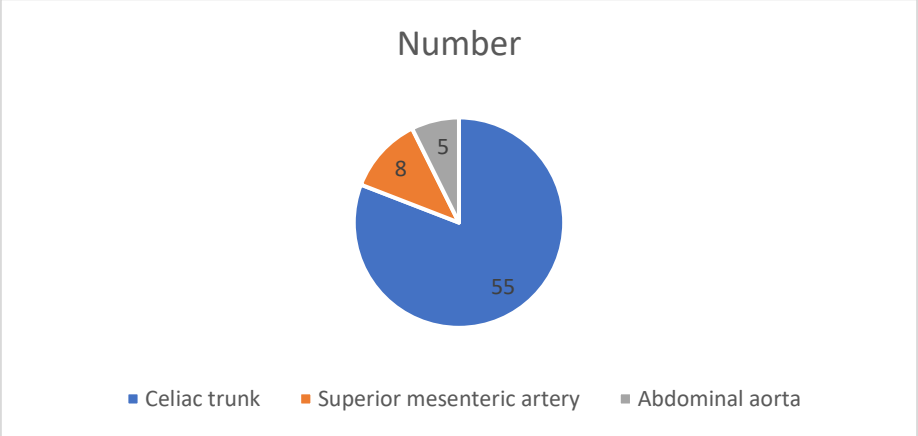
Table I shows that out of 68 cadavers, 38 were of males and 30 were of females.

Table II: Assessment of variation in site of origin of splenic artery

Origin	Number	P value
Celiac trunk	55	0.001
Superior mesenteric artery	8	
Abdominal aorta	5	

Table II, graph I shows that origin of splenic artery was from celiac trunk in 55, superior mesenteric artery in 8 and abdominal aorta in 5 cases. The difference was significant (P< 0.05).

Graph I: Assessment of variation in site of origin of splenic artery



Discussion

A good understanding of the vascular architecture of this area is necessary for surgery on the supracolic region of the abdomen's organs. The abnormal embryological development is what causes the vascular abnormalities. According to embryology, the splenic artery, also known as the celiac

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trunk, is one of the branches of the artery of the foregut. The biggest branch of the celiac trunk, the splenic artery is notable for its tortuosity. It follows the upper border of the pancreas as it moves horizontally to the left, behind the stomach. It enters the lienorenal ligament at the pancreas' tail, where it divides into five or more terminal branches that enter the spleen's hilum.[6]The present study was conducted to assess variation in branching pattern of splenic artery.

We found thatout of 68 cadavers, 38 were of males and 30 were of females. In 184 Japanese cadavers, Shoumara et al[7] examined the celiac trunk's manner of branching. Four examples of trunks that split into the left gastric artery and splenic artery were recorded. They also saw a patient with a gastrohepatic and lienomesenteric trunk. In this instance, the lienomesenterictrunk gave rise to the splenic artery, with the superior mesenteric artery serving as its other branch.

We observed that origin of splenic artery was from celiac trunk in 55, superior mesenteric artery in 8 and abdominal aorta in 5 cases.Pandey et al[8]in their study the variations in origin, course, and terminal branching pattern of the splenic artery were studied in 320 cadavers. The artery originated from the coeliac trunk in the majority of cadavers (90.6%), followed by abdominal aorta (8.1%), and other sights (1.3%). A suprapancreatic course of the artery was commonly observed (74.1%) followed by enteropancreatic (18.5%), intrapancreatic (4.6%), and retropancreatic (2.8%) courses. In two cases (0.63%) the proximal part of the splenic artery made a loop that was embedded in the substance of the pancreas, which is an interesting and rare finding. In five cases (1.5%) the proximal part of the artery divided into two or more branches that had suprapancreatic and enteropancreatic courses. The splenic artery divided into terminal branches in 311 (97%) cadavers. In nine (2.8%) cadavers it passed through the hilum of spleen without dividing. Two terminal branches were the most common (63.1%) followed by four (18.8%), six (9.7%), and more than six (5.6%) branches.

Bokan et al[9] studied the variation in the site of origin of splenic artery in 50 cadavers. It was observed that the splenic artery originated from the celiac trunk in 48 cadavers (96%), in 1 cadaver (2%) it originated from the abdominal aorta and in 1 cadaver (02%) from superior mesenteric artery. Oh E et al[10] found that incident independent origin of the hepatic and splenic arteries was observedin two of 159 examinations (1.3%).This is similar to the report of the angiographic and surgical literature (1%)

Jyothi et al[11]compared the prevalence of variations in the branching pattern of splenic artery. In some instance the left gastro epiploic artery, the posterior gastric artery and the accessory left gastric artery took origin from the interior of spleenso care should be taken during splenectomy. Covantsev et al[12] found that the analysis of the splenic artery trajectory led to identification of four types: straight (43.03%), sinusoidal (27.58%), serpentine (20.91%) and alternating (8.48%).Sinuous or serpentine trajectory was associated with the presence of long splenic artery branches (dorsal pancreatic artery or the great pancreatic artery), $X2$ (2, $N = 330$) = 12.85, $p = 0.001$. The artery was located suprapancreatic in 70.3% of cases, anteropancreatic in 4.55%, the vessel had an intrapancreatic course in 14.85% and in 10% of cases the artery was located retropancreatic. The presence of inferior polar arteries was associated with a longer pancreas. In a multiple regression analysis, inferior polar arteries predicted the length of the pancreas. There were 30 (9.09%) cases of accessory spleens.

Conclusion

Authors found that surgeons need to be well-versed in the splenic artery's branching structure. Splenic artery origins varied, including those from the abdominal aorta, superior mesenteric artery, and celiac trunk.

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