

# Variations in Branching Pattern of Superior Mesenteric Artery

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## Case Report

**Abstract:** Anatomical variations of branching of superior mesenteric artery are common. In this study a rare case of origin of splenic artery from superior mesenteric artery is reported during routine dissection of abdominal region in 60 yr old male cadaver, where splenic artery arises from anterior aspect of superior mesenteric artery.

Other variation observed were

1. Common trunk arises from posterior aspect of superior mesenteric artery, which divides into inferior pancreatico-duodenal and first jejunal artery.
2. Appendicular artery arises from right colic artery.

Knowledge of these variations is important in planning and conducting surgical and radiological procedures. The origin of splenic artery from superior mesenteric artery is the rarest variation which makes the case most unique.

**Key words:** superior mesenteric, splenic, pancreatico duodenal, appendicular, artery.

## Introduction

Superior mesenteric artery arises from the front of the abdominal aorta 1 cm below the origin of coeliac trunk, at the level of intervertebral disk between the 1<sup>st</sup> and 2<sup>nd</sup> lumbar vertebrae. It supplies the midgut extending from the duodenum at the opening of common bile duct to the junction between right 2/3 and left 1/3 of transverse colon. Superior mesenteric artery gives off several branches which include inferior pancreatico-duodenal artery from posterior aspect, jejunal and ileal branches from the left side and ileocolic, right colic and middle colic branches from right side [1]. Normally splenic artery is the largest branch of coeliac trunk. It lies posterior to omental bursa extends along the superior margin of the pancreas to the splenic hilum. Inferior pancreatico-duodenal artery arises as a 1<sup>st</sup> branch of superior mesenteric artery from its posterior aspect. Appendicular artery arises from the inferior branch of ileocolic artery. Numerous variations of the superior mesenteric artery regarding origin, course and branching pattern have been reported in the literature. Ceren Gunenc and C-Cem Denk reported unusual anatomical variation of the superior mesenteric artery and renal artery[2], Oran, Yesildag, Memis et al reported a common splenomesenteric trunk branching into the splenic and superior mesenteric artery by angiographic study [3]. The most common variation of superior mesenteric artery is associated with the origin of a right hepatic artery which arises from the superior mesenteric artery [4], [5]. We report very rare case of origin of splenic artery from the superior mesenteric artery which was not previously reported.



Figure 1: Showing Splenic Artery arising from Superior Mesenteric Artery.

SA-Splenic Artery, SMA-Superior Mesenteric Artery, CT-Celiac Trunk, SV-Splenic Vein.

## Case report

During the routine dissection of 60 yr old male cadaver in the Department of Anatomy, Government Medical College, Latur. We found that splenic artery was arising from the anterior aspect of superior mesenteric artery about 2 cm distal to its origin. Then splenic artery ran towards the left along the superior border of body of pancreas. In its course it gives rise to pancreatic branches and left gastroepiploic artery and enters into the hilum of spleen and divides into two segmental branches (fig-1). Also a common trunk was arising from the posterior aspect of superior mesenteric artery which divides into inferior pancreatico-duodenal artery and 1<sup>st</sup> jejunal artery. Inferior pancreatico-duodenal artery divides into anterior and posterior branches (fig-2). Appendicular artery was arising from the descending branch of right colic artery (fig-3). Other branches of superior mesenteric artery were having normal course.



Figure 2: Showing origin of Inferior Pancreatico-duodenal Artery.

SA-Splenic Artery, SMA-Superior Mesenteric Artery, IPDA-Inferior Pancreatico-duodenal Artery, 1<sup>st</sup> JB-First Jejunal Branch, RCA-Right Colic Artery.

## Discussion

Anatomical variations of the visceral arteries, particularly those concerning the coeliac trunk and the superior mesenteric artery are well known in medical literature [3]. The most frequent variations encountered in clinical practice involve a right hepatic artery from superior pancreaticoduodenal artery and left hepatic artery from left gastric artery. However there are some more exceptional anatomical variations that may puzzle the surgeon or vascular radiologist, dealing with intra-abdominal diseases [3]. Trifurcation of coeliac trunk into hepatic, splenic and left gastric arteries has been accepted as the normal anatomy and can be found in 84-86% of human [6]. If one of the main branch is absent a gastrosplenic trunk (with absence of hepatic artery) (5-6%) and hepatogastric trunk (with absence of splenic artery) (1%) are found. If two main branches are absent then the three main branches originate independently. There is no real coeliac trunk (1-2%)[3]. A special form of absence of the coeliac trunk is the celiaco-mesenteric trunk where all three main branches of coeliac trunk and superior mesenteric artery arise from the common trunk (2%)[7]. The most common variant of superior mesenteric artery is origin of common hepatic artery from the superior mesenteric artery (hepato mesenteric trunk) [5] A common spleno- mesenteric trunk, which gives off the splenic and superior mesenteric artery has been reported with an incidence of less than 1% [3], [5]. In the present case, splenic artery is the branch of superior mesenteric artery, instead of common spleno-mesenteric trunk, which arises from the anterior aspect of superior mesenteric artery 2 cm distal to its origin from the aorta. Such type of variation was not reported previously, so it makes the case unique. In the same case inferior pancreaticoduodenal artery was arising from the common trunk which divides into inferior pancreaticoduodenal artery and 1st jejunal artery, also appendicular artery was the branch of right colic artery instead of ileocolic artery. Anatomical variations of these vessels are due to developmental changes in the ventral splanchnic arteries. During development three groups of collateral arteries arise from the abdominal aorta as somatic intersegmental, lateral splanchnic and ventral splanchnic branches. The ventral splanchnic branches develop initially as a paired vessel, which then coalesce in the median line to form the four roots for the gut, the four roots being connected by the ventral longitudinal anastomoses. In the majority of cases the first three roots coalesce to form the coeliac trunk and separate from the fourth root. The future superior mesenteric artery developed from the fourth root, which migrates caudally with the ventral migration of the gut. If the separation takes place at higher level, one of the coeliac branches arises from the superior mesenteric artery [3]. The splenic artery arises from the superior mesenteric artery, as in the present case is an example of this exceptional condition.



**Figure 3:** Showing Appendicular Artery arising from right colic artery. SA-Splenic Artery, SMA-Superior Mesenteric Artery, MCA-Middle Colic Artery, RCA-Right Colic Artery, AA-Appendicular Artery, JB-Jejunal Branches, IB-Ileal Branches, ICA-Ileocolic Artery, TER.SMA-Termination of Superior Mesenteric Artery.

## Conclusion

Different anatomical variations involving the coeliac trunk and superior mesenteric artery should be born in mind during both surgical and radiological evaluations. Knowledge of such variations would result in accurate interpretation of disease in diagnostic imaging, as well as the optimum elective procedure in surgical or interventional radiological management [3]. Prior knowledge about the anomalous branching pattern of coeliac trunk and superior mesenteric artery is essential to successfully accomplish surgical, oncologic or interventional procedures including lymphadenectomy around a hepato-spleno-mesenteric trunk, aortic replacement with reimplantation of trunk, chemoembolization of liver malignancies all of which can potentially create significant morbidity because of the large visceral territory supplied by a single vessel [7].

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