



Unusual duplication and vulnerable intrapancreatic course of the left gastroepiploic artery: a rare anatomical variation

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Abstract

The left gastroepiploic artery (LGEA) is the least described artery in the medical literature. Unusual variations of this artery might lead to vascular injuries, causing intraoperative bleeding after surgery. We observed rare vascular variations in an adult male cadaver. The left gastroepiploic artery after its origin from splenic artery pierced the pancreatic parenchyma at its posterior surface. After a short intrapancreatic course, the LGEA emerged out from the superior border of the body of the pancreas. LGEA then trifurcated into an omental branch, duplicated LGEA and another branch that continued as the main trunk of LGEA. Main LGEA and duplicated LGEA coursed towards the greater curvature of the stomach. The main LGEA ended by anastomosing with the right gastroepiploic artery, while the duplicated LGEA ended at the greater curvature of the stomach by ramifying into minute branches on the walls of the stomach and gave few gastric branches to supply the stomach and also supplied the greater omentum. This variation was associated with the presence of an accessory splenic artery. Anatomists, surgeons, and radiologists should be aware of such anomalous vascular variations as it could help to minimize complications related to pancreatectomy, omentoplasty, and resection of pancreatic tumors.

Keywords Left gastroepiploic artery · Duplication · Greater omentum · Pancreatectomy · Accessory splenic artery

Introduction

Anatomic variations of the abdominal arteries are significant. Unrecognized and unusual variations of these arteries may lead to vascular injuries, causing intraoperative bleeding after surgery. The left gastroepiploic artery (LGEA) or left gastro-omental artery is the least described digestive artery in the medical literature. LGEA is the largest branch of the splenic artery. After its origin, it runs towards the greater curvature of the stomach, between the layers of the greater omentum, and anastomoses with the right gastroepiploic artery (a branch of the right gastro-duodenal artery). LGEA gives few fundic branches, gastric branches that supply both surfaces of the stomach, omental branches that descend to supply the greater omentum [9].

There is minimum available literature reporting the variations of the LGEA. Its relationship to the tail of the pancreas

varies in accordance with its site, mode of origin from the splenic artery and with the volumetric proportions of the pancreas. The artery frequently runs in the pancreaticocolic ligament between the tail of the pancreas and the spleen. We present a rare anatomic variation of intrapancreatic course and duplication of LGEA considering the surgical interest of LGEA during pancreatic surgeries.

Although the mortality following pancreaticoduodenectomy has significantly reduced over the last few years, the morbidity following this procedure remains very high, with the most dreaded complications being postpancreatectomy hemorrhage and anastomotic leakage due to the presence of aberrant vessels [2]. In the case of spleen-preserving distal pancreatectomy with resection of the splenic vessels, the LGEA is the crucial spleen-supplying collateral and hence merits conservation [1]. Given that the LGEA is not readily identifiable either intraoperatively or on section [6], precise anatomical knowledge regarding any variations of the LGEA is of utmost importance to surgeons performing pancreatectomy, gastrectomy, and omentoplasty.

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Case report

During regular dissection classes, we observed rare vascular variations in an adult male cadaver aged approx. 55 years. The left gastroepiploic artery (LGEA) arose as a branch of the splenic artery behind the middle part of the body of the pancreas. After its origin, the LGEA pierced the pancreatic parenchyma at its posterior surface, and after a short intrapancreatic course, the LGEA emerged out from the superior border of the body of the pancreas. LGEA then trifurcated into an omental branch, duplicated LGEA and another branch that continued as the main trunk of LGEA (Fig. 1). Both the arteries (main LGEA and duplicated LGEA) were thick with prominent lumen. Both the arteries then coursed towards the greater curvature of the stomach, between the layers of the greater omentum. The main LGEA ended by anastomosing with the right gastroepiploic artery. While the duplicated LGEA ended at the greater curvature of the stomach by ramifying into minute branches on the walls of the stomach and gave few gastric branches to supply the stomach and supplied the greater omentum. Schematic diagram showing the variant course and branching pattern of LGEA is depicted in Fig. 2. This variation was associated with the presence of an accessory splenic artery that arose from the main splenic artery and entered the spleen through the upper part of its hilus.

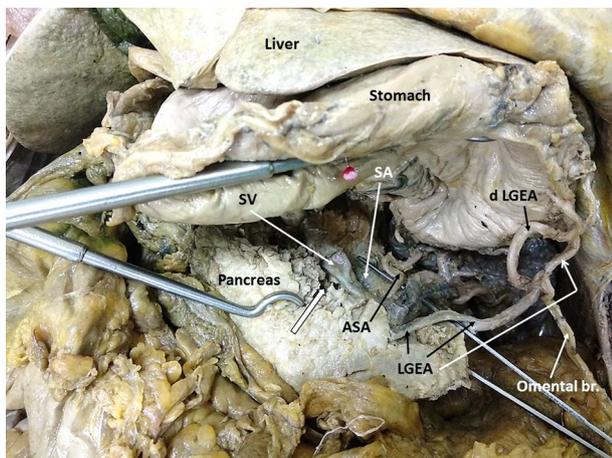


Fig. 1 Dissection of the abdomen showing the multiple vascular variations. Left gastro epiploic artery (LGEA) after its origin from splenic artery (large white arrow) coursed through the pancreas and trifurcated into main left gastro epiploic artery (LGEA), duplicated left gastro epiploic artery (d LGEA), omental branch. Splenic artery (SA) gave rise to accessory splenic artery (ASA). SV splenic vein

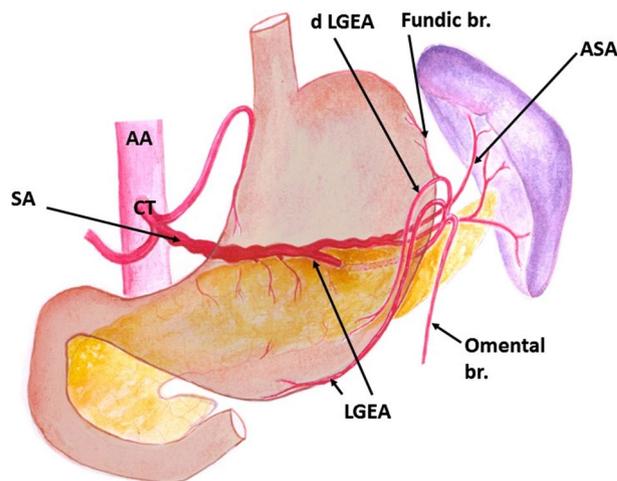


Fig. 2 Schematic diagram showing the intrapancreatic course and trifurcation of left gastro epiploic artery (LGEA) and origin of accessory splenic artery (ASA) from splenic artery (SA). *d LGEA* duplicated left gastro epiploic artery, *CT* coeliac trunk, *AA* abdominal aorta

Discussion

The anatomy of LGEA is quite constant, and hence, variations of this artery are very rare and not reported in the literature. Furthermore, there are no gross anatomical studies investigating variations in the anastomotic form of the gastroepiploic arteries. For surgeons, knowledge on the existence of arterial variations, and the ability to identify it macroscopically is of utmost importance. We report in here unusual intrapancreatic course and duplication of LGEA.

Embryologically, the primitive dorsal aortae give rise to a series of ventral splanchnic arteries for the primitive gut and its derivatives [3]. Most of these branches usually disappear, but the persistence of normally disappearing branches or abnormal fusion among these primitive arteries might explain the abnormal presence of the duplicated LGEA. The variation in the course of the LGEA in relation to the pancreas, i.e., its intrapancreatic course might be due to the abnormal fusion of the ventral and dorsal pancreatic buds [8].

During our literature review, we found very few reported variations of LGEA. These include anomalous origin of LGEA from splenic trunk (72%), inferior polar artery (22%) and superior polar artery (6%) [5]. Zeon et al. [11] reported the absence of LGEA in 64% of cases studied by them. In only one study, they have reported the presence of two LGEA in 2% of cases, of which one LGEA originated from the segmental artery of the spleen and other LGEA originated from the inferior terminal artery

[7]. However, our variation differed from the above case wherein, a single LGEA taking its origin from splenic artery duplicated into two left gastro epiploic arteries. Both these branches reached the greater curvature of the stomach and supplied the greater omentum and walls of the stomach. It is essential to identify such aberrant vascular anatomy on preoperative imaging so that the surgeon can take preemptive precautions to safeguard these vessels from inadvertent injury.

Knowledge regarding this unusual intrapancreatic course of LGEA is of extreme clinical importance while performing total pancreatectomy in case of carcinoma of the pancreas or during pancreatic transplantation wherein resection and reconstruction may be required. The intrapancreatic course of LGEA is a rare anomaly and is best managed by pre-operative identification on radiology and meticulous intra-operative dissection and preservation. Associated with this we also observed the presence of accessory splenic artery supplying the spleen. Both these vascular variations have a 'hidden' posterior location and may be overlooked intraoperatively which increases the chances of inadvertent bleeding if damaged.

Greater omentum is used in the reconstruction procedure to cover the defect of surrounding organs following abdominal surgeries like appendicitis, surgeries of the large intestine and rectum fistulae. The free-flap transfer is a recently introduced technique, wherein it can be used to cover any defect in nearly a whole human body [4]. The arterial supply of the greater omentum is through a rich network of vessels mainly involving omental branches of right and left gastro epiploic arteries. Unusual presence of such duplicated LGEA might lead to unnecessary complications in flap transfer and procedure failure. Hence, selective angiography can be recommended before the planned surgical procedure involving the greater omentum.

The greater curvature of stomach shows the lymph nodes on the borders of the anastomosis of the left and right gastroepiploic arteries and surgeons, therefore, rely on this arterial boundary to distinguish lymph nodes [10]. Presence of such duplications might lead to misinterpretations and misdiagnosis.

Anatomists, surgeons, and radiologists must be aware of such variations of LGEA. Although it is the least described artery, its variations might lead to unwanted vascular injuries. The findings of our study could help to minimize complications related to abdominal surgeries and resection of pancreatic tumors.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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