Anomalous Course of Accessory Splenic Arteries in Gastrosplenic Ligament: Case Report and Clinico-Embryological Basis

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ABSTRACT

Accessory splenic arteries in the gastrosplenic ligament constitute one of the extremely sub-component of abdominal vasculature variations and it is imperative to recognize this anomaly while planning for complex surgeries in the supra-colic compartment. We report the case of accessory splenic arteries in an approximately 50-year-old male cadaver encountered during routine educational dissection. One of them arising from left gastroepiploic artery supplies the spleen in addition to splenic artery. Another variant vessel bifurcated to enter greater omentum and anterior pole of spleen, as discrete branches. The anatomical vascular variation, if recognized during the imaging work-ups for elective surgical procedures could avoid potential iatrogenic blood loss.

KEYWORDS

abdominal vasculature; splenectomy; accessory splenic artery; left gastroepiploic artery

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INTRODUCTION

The splenic artery being one of the largest branches of the celiac trunk, supplies the structures of the foregut predominantly in the dorsal mesogastrium. It passes through the lieno-renal ligament and before reaching the hilum of spleen, usually gets divided into superior and inferior polar branches. The polar branches divides further into four or five segmental branches close to the hilum and supply splenic segments (1). In addition to the spleen, it also supplies pancreas via pancreatic branches, stomach via short gastric arteries and greater omentum via left gastroepiploic artery. Any additional or concurrent vessels supplying spleen, apart from the principal splenic artery can be termed as accessory splenic artery. An unexpected variant in splenic vasculature could lead to inadvertent blood loss during abdominal surgeries especially those involving splenic hilum.

CASE REPORT

During routine dissection of an approximately 50 years old formalin embalmed male cadaver in our institution, we encountered a variation in the vasculature of spleen (Fig. 1). While dissecting out the gastrosplenic ligament, we could find the left gastroepiploic artery arising from the splenic artery. Upon extending the dissection into greater omentum, we observed variation in the vasculature. One variant vessel, which sprouted as a direct branch from left gastroepiploic artery, entered the anterior pole of spleen in addition to the principal splenic artery located at the hilum of spleen (Fig. 2). Another vessel, from the left gastroepiploic artery, continued as a common trunk and got divided into two branches. One of the branch entered the greater omentum and supplied the greater curvature of stomach. Other branch terminated near the anterior pole of spleen (Fig. 2). Thus, we confirmed that there were two accessory splenic arteries arising from left gastroepiploic artery with one being a direct branch and other sprouting from a common trunk. Schematic representation of the origin and course of these variant vessels in this case is depicted in Fig. 3. The arteries were paralleled by their respective venous counterparts, which drained into left gastroepiploic vein. The spleen was of normal size and superior border presented eight notches of variable depth. We could not observe any other abnormalities or accessory spleens in the abdominal cavity. We couldn't observe significant abnormalities in other abdominal organs and their vasculature.

DISCUSSION

Even though accessory splenic artery is rarely reported, with an incidence of < 1.3%, recognition of this anomaly is crucial while planning complex surgeries in the supra-colic compartment (2). Based on the origin, Lipshutz (3) classified the splenic artery into four types: a) type 1: 75% of cases had splenic artery originating as a separate branch from celiac trunk b) type 2: in 15% cases, splenic artery was a branch of hepato-splenic trunk c) type 3: in 6% cases, abdominal aorta directly gave branch to splenic artery and d) type 4: in 4% cases, splenic artery was a branch of spleno-gastric trunk. Following another classification proposed by Michels (4), celiac trunk could be classified into 6 types with type 6 (coeliaco-mesentric type) having left gastric, splenic, common hepatic and superior mesenteric artery arising from a common trunk. The variation documented in the present study gains uniqueness because it doesn't fit into the purview of any classification.

Pandey SK et al. (2) documented that in 97% of cases, splenic artery divided into terminal branches before entering the splenic hilum i.e. in the lienorenal ligament itself. The branching pattern was further elaborated by Ashok K R et al. (5) who had studied the branching pattern in 42 cases

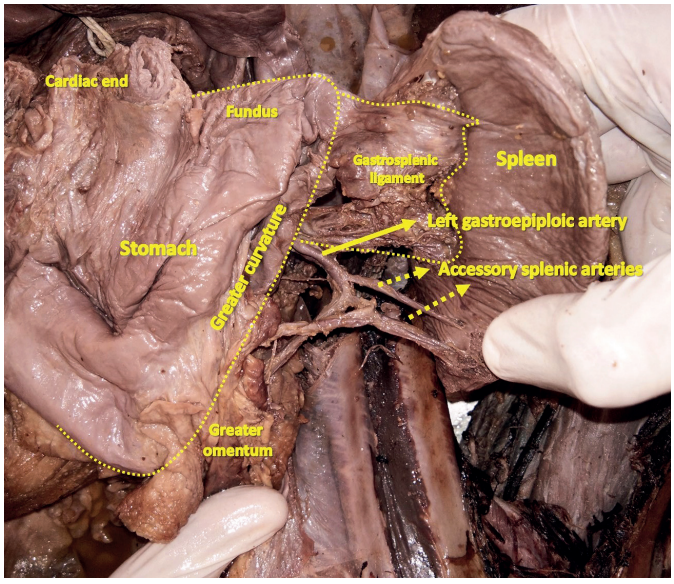

Fig. 1 Showing two accessory splenic arteries (dotted arrow) arising from left gastroepiploic artery (bold arrow).

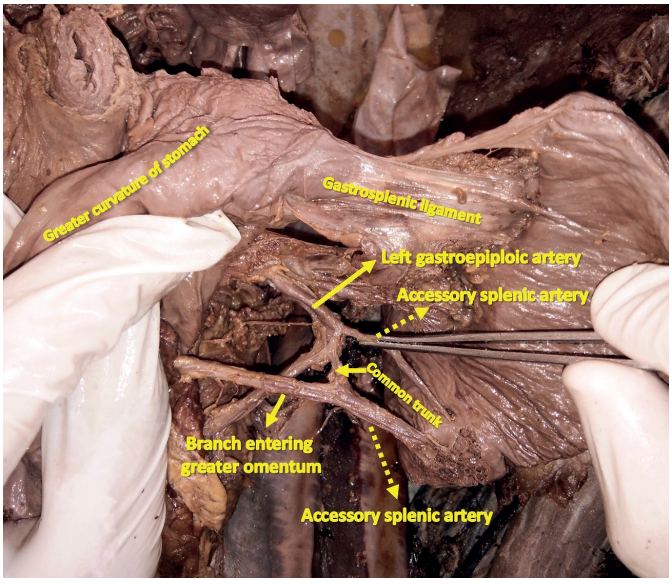

Fig. 2 Showing two accessory splenic arteries arising from left gastroepiploic artery; one as a direct branch and another from a common trunk with a branch to greater omentum.

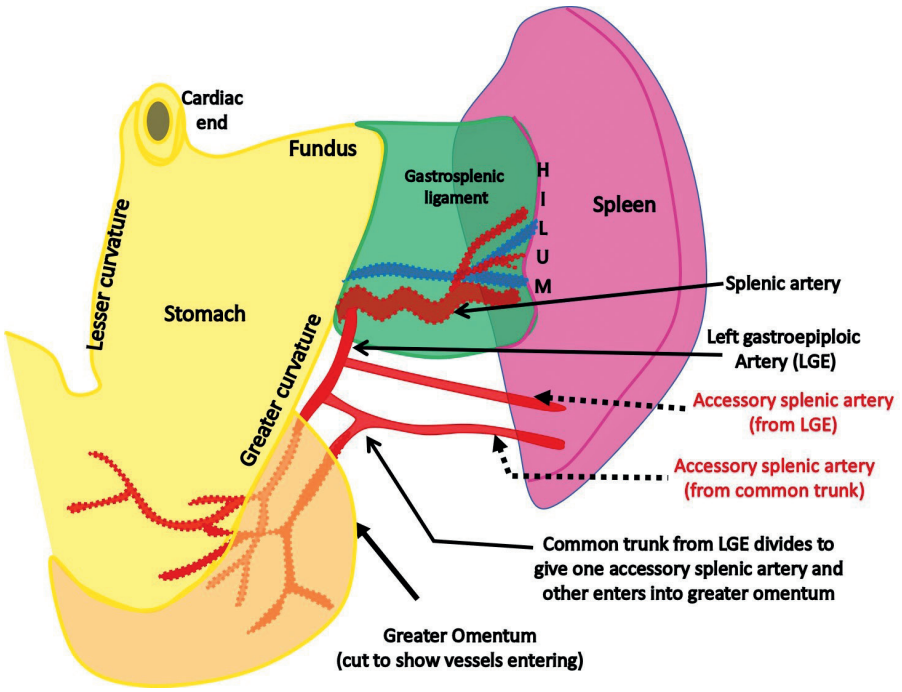

Fig. 3 Schematic representation of the origin & course of accessory splenic arteries.

and found three types of splenic artery termination: a) entering the hilum without branching (10.5%); b) distributed type – dividing away from hilum (55.3%) and c) bundled/marginal type – dividing at the hilum (34.2%).

Kumar N et al. (6) had documented a case report whereby splenic artery divides into two polar arteries 2–4 cm proximal to splenic hilum and accessory splenic artery sprouts from left gastroepiploic artery. Padmalatha et al. (7) and Kervancioglu et al. (8) had previously reported an accessory splenic artery emanating from left gastroepiploic artery and left gastric artery respectively. In the latter case, the accessory artery gave inferior phrenic arteries of both sides and left hepatic arteries. Geeta Anasuya et al. (9) observed a case accessory splenic artery from left gastroepiploic artery which terminated into smaller terminal branches at the lateral end of spleen. Patel SR et al. (10) documented accessory splenic artery in a patient with recurrent upper gastrointestinal bleeding. Upon visualizing using CT angiography, it was found that aberrant vessel originated from left gastric artery and supplied the stomach in addition to the upper pole of spleen.

The plausible embryological hypothesis for aberrant splenic artery could be the failure of regression or faulty fusion of third and fourth splanchnic arteries which forms the gut axial vasculature (11). Gut vasculature develops from the longitudinal anastomoses of branches of these vessels around primitive gut and mesogastrium. Holibkova et al. (12) suggested that the segmental branches of the spleen are involved in three types of anastomosis namely: extra-parenchymatous, intra-parenchymatous and sub-capsular. Juxtaposing the above said hypothesis, we could posit that the accessory splenic artery could be due to the retained anastomoses between inferior polar branches of splenic artery and left gastroepiploic artery. Investigation (13) of splenic artery in chinchilla showed the presence of common trunk, known as gastrosplenic artery, which supplied the dorsal spleen and greater curvature of stomach. In addition, the principal splenic artery supplied central and ventral spleens in the dorsal mesogastrium. This pattern is analogous to splenic and short gastric arteries in humans. In the present case report, the vascular pattern in dorsal mesogastrium is comparable to that of chinchilla.

The anatomical variation described over here is of profound clinical significance because due to its specific pattern of blood supply, spleen can be contextualized to be made of two distinct lobes and 3–5 segments (14). The inferior splenic pole is relatively more vascular and integrates significantly with related abdominal organs in the supra-colic compartment. Owing to this, autologous splenic implants involving inferior pole are being increasingly considered in grounds of traumatic injuries.

CONCLUSION

Even though, accessory splenic artery might be clinically asymptomatic under normal conditions, the knowledge about this would be of great help in salvaging the patient from being vulnerable to iatrogenic injuries particularly while mobilizing pancreatic tail and approaching splenic hilum. The present case report adds to the pool of available literature regarding the variations in the abdominal vasculature which is more relevant from an utilitarian perspective in the era of laparoscopy.

REFERENCES

1. Standring S. Gray's Anatomy: Anatomical Basis of Clinical Practice. 41st edition. New York: Elsevier Churchill Livingstone 2016, p. 1190.
2. Pandey SK, Bhattacharya S, Mishra RN, Shukla VK, Anatomical variations of the splenic artery and its clinical implications Clin Anat 2004; 17(6): 497–502.
3. Lipshutz B. A composite study of the coeliac axis artery. Ann Surg 1917; 65(2): 159–69.
4. Michels NA. Blood supply and anatomy of the upper abdominal organs, with a descriptive atlas. Philadelphia, PA: Lippincott 1955; 139–43.

5. Ashok KR, Kiran TV. Study of branching pattern of splenic artery. Int J Anat Res 2016; 4(1): 2073–5.
6. Kumar N, Patil J, Swamy RS, Guru A, Nayak SB. Atypical arterial supply to the spleen by polar branches of splenic artery and accessory splenic artery – a case report. J Clin Diagn Res 2014; 8(8): AD03–4.
7. Padmalatha K, Ramesh BR, Prakash BS, Balachandra N, Mamatha Y. Accessory splenic artery from left gastric artery. IJAV 2010; 3: 106–7.
8. Kervancioglu S, Yilmaz FG, Gulsen M, Kervancioglu P, Kervancioglu R. Massive upper gastrointestinal bleeding from an accessory splenic artery mimicking isolated gastric varices. Folia Morphol (Warsz) 2013; 72(4): 366–70.
9. Geeta Anasuya D, Jones Eben Raj, Sheela Grace Jeevamani. Unusual anatomical variation in the branching pattern of splenic artery. Int J Anat Res 2016; 4(3): 2809–12.
10. Patel SR, Lowe S. Accessory Splenic Artery: A Rare Cause of Upper Gastrointestinal Bleeding. Cardiovasc Intervent Radiol 2017; 40(7): 1115–7.
11. Zhou W, Qiu J, Yuan Q, Zhou W, Xiong J, Zeng Q. Successful treatment of aberrant splenic artery aneurysm with a combination of coils embolization and covered stents. BMC Surg 2014; 14: 62.
12. Holibkova A, Machalek L, Houserkova D, Ruzicka V. A contribution to the types of branching and anastomoses of the splenic artery in human spleen. Acta Univ Palacki Olomuc Fac Med 1998; 141: 49–52.
13. Özdemir V, Demirkan AC, Akosman MS. Subgross and macroscopic investigation of the coeliac artery in the chinchilla (Chinchilla lanigera). Folia Morphol (Warsz) 2013; 72: 258–62.
14. Liu DL, Xia S, Xu W, Ye Q, Gao Y, Qian J. Anatomy of vasculature of 850 spleen specimens and its application in partial splenectomy. Surgery 1996; 119: 27–33.