

Anatomical Variation of Hepatic Vascularization: Case Report

Cristiane Regina Ruiz¹ Sergio Ricardo Rios Nascimento¹ Alex Kors Vidsiunas¹
Cristiano Cirqueira de Souza² Lilian Andrades³

¹ Macroscopical and Imaging Anatomy Postgraduate Course, Centro Universitário São Camilo, São Paulo, SP, Brazil

² Human Anatomy Laboratory, Centro Universitário São Camilo, São Paulo, SP, Brazil

³ Faculty of Medicine, Hospital das Clínicas da Universidade de São Paulo, São Paulo, SP, Brazil

Address for correspondence Sergio R.R. Nascimento, Master, Avenida Nazaré 1501, Ipiranga., CEP: 04263-200. São Paulo – SP, Brasil (e-mail: srrnascimento@gmail.com).

J Morphol Sci 2019;36:126–128.

Abstract

Anatomical variations in the hepatic arteries and in the celiac trunk are important in liver transplants, laparoscopic surgeries, abdominal radiological interventions, and perforating injuries in the abdomen. The goal of the present report is to describe an abdominal vascular variation observed during a routine dissection in the Anatomy Laboratory of the Centro Universitário São Camilo, São Paulo, state of São Paulo, Brazil, in a male individual. The superior mesenteric artery had its origin in the celiac trunk and originated a right accessory hepatic artery that followed its path all the way to the liver. Several authors described variations in the origin and in the path of the hepatic artery and even created specific classifications. The advance of imaging methods that increase the number of studied individuals, without the need of dissection, aids exponentially the quantifying studies that seek to determine a pattern in the variations present in certain populations. The variations of the hepatic artery, as well as of the celiac trunk, have been extensively described in the literature; however, there is no pattern in the number of variations found both in the celiac trunk and in the regular hepatic artery, what leads to a need of description in each case found.

Keywords

- ▶ anatomical variation
- ▶ clinical anatomy
- ▶ macroscopic human anatomy
- ▶ morphology applied to other sciences

Introduction

Anatomical variations in the hepatic arteries and in the celiac trunk are of significant importance in liver transplants, laparoscopic surgeries, abdominal radiological interventions, and perforating injuries in the abdomen.^{1–4} It is known that the arterial supplying pattern for the liver is variable, even with the occurrence of modifications in the standard organization through which the liver receives its total blood flow, through branches of the celiac trunk, in 25 to 75% of the cases.²

The celiac trunk, from which the left gastric arteries, the standard and splenic hepatic, normally originate, can also, in

some cases, originate the inferior phrenic arteries and the superior mesenteric artery.⁵

In the literature, we have found numerous quotations about accessory hepatic arteries, when they bring blood to a lobe that is already irrigated by its regular artery, and about the substitute hepatic artery, which is a vase that has an unorthodox origin and irrigates a lobe by itself.

When present, the hepatic accessory artery or the right accessory branch of the hepatic artery originate in the superior mesenteric artery.⁵

The present paper reports a case in which, besides the superior mesenteric artery having an origin in the celiac

received
September 25, 2018
accepted
February 15, 2019

DOI <https://doi.org/10.1055/s-0039-1685225>.
ISSN 2177-0298.

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trunk, there is a right accessory hepatic artery supplying the liver and originating in the superior mesenteric artery.

Case Report

In a routine dissection in the Anatomy Laboratory of the Centro Universitário São Camilo, São Paulo, state of São Paulo, Brazil, with the intent of removing a few internal organs in a male cadaver, a variation in the number of hepatic arteries, as well as in their origin, was observed. The medical history of the cadaver was not available.

The common hepatic artery originated in the celiac trunk and had a length of 39.01 mm from its origin all the way to its entry on the porta hepatis. From the origin of the common hepatic artery in the celiac trunk all the way to the origin of its gastroduodenal branch, the distance was of 16.41 mm. The superior mesenteric artery also had an anatomic variation, originating from the celiac trunk, and the distance between its origin and the appearance of a right accessory hepatic artery was of 21.77 mm. The right hepatic artery, from its origin in the superior mesenteric artery all the way to its entry on the door of the liver, had 71.99 mm of length (**Fig. 1**).

Discussion

Several authors have described variations in the origin and in the path of the hepatic artery, and even created specific classifications.^{2,6} With the advance in imaging methods, we were able to increase the number of studied individuals without the need of dissection, a fact that aided exponentially the quantitative studies that established a variation pattern in certain populations. Regarding the celiac trunk, Chen et al⁷ found its standard formation in 974 cadavers (89.8%), and Ugurel et al,⁴ in 50 out of 100 patients (50%). Concerning the origin of the common hepatic artery from the celiac trunk, the study of Hiatt et al² found this pattern in 75.7% of the cases, Michels et al⁶ in 27.5% of the cases, and Song et al,⁸ in 96.44% of the cases.

With regard to a right accessory hepatic artery, the data from the literature show that the incidence is much lower: Michels et al⁶ reported an incidence of 9%, Hiatt et al² of 10.6%, Araujo Neto et al¹ of 5.1%, and López-Andújar et al³ of 0.6%.

If we analyze these data based on the authors studied by Hiatt et al² and by Chen et al,⁷ we can assess that among 15 authors and their results, the rate of the presence of a right accessory hepatic artery is of 12.09%.

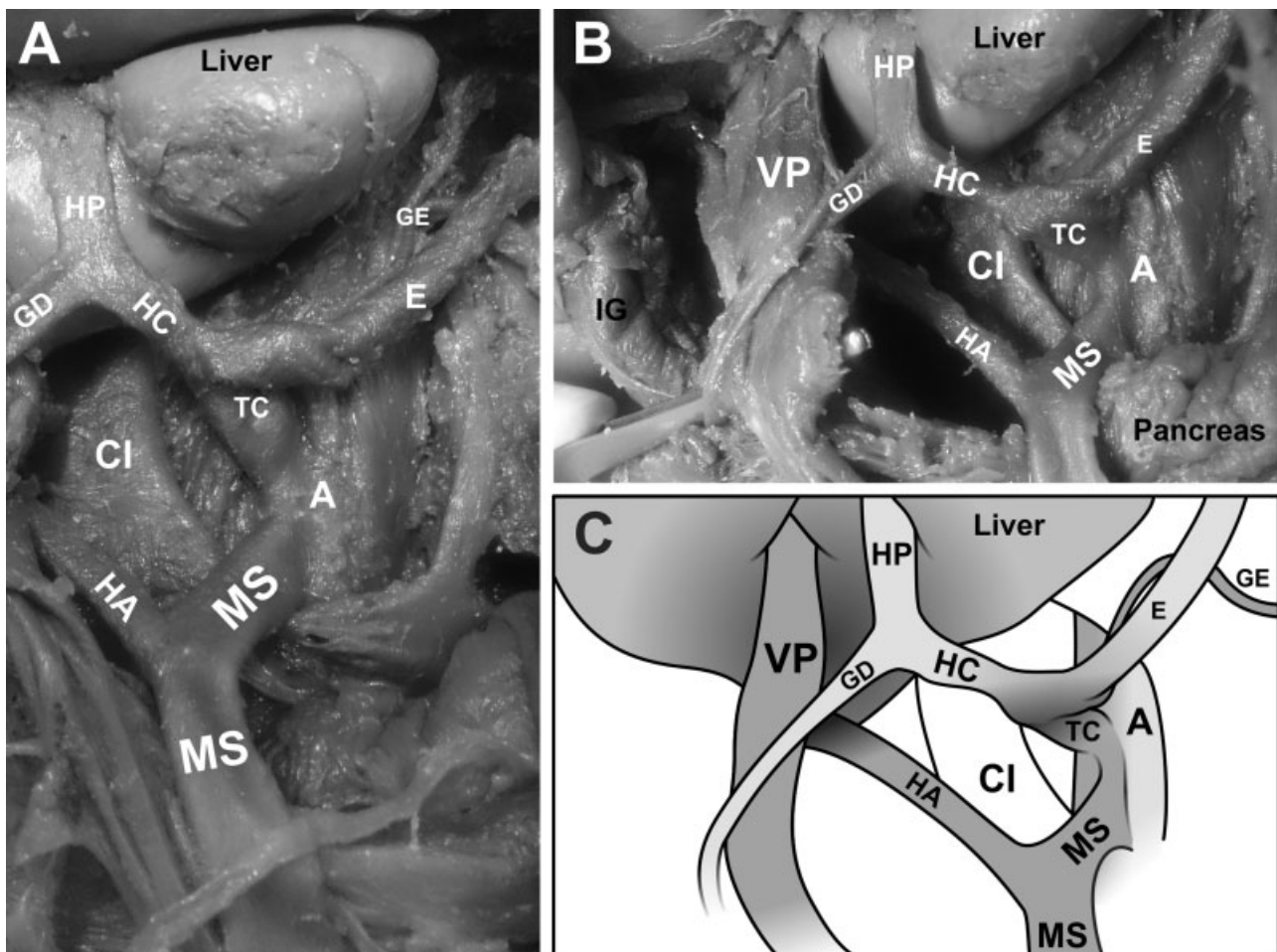


Fig. 1 (A, B) Photograph of the abdomen, area below the liver. (C) Schematic illustration based on the photographs. HP: proper hepatic artery; GD: gastroduodenal artery; E: splenic artery; GE: left gastric artery; TC: celiac trunk; A: aorta artery; MS: superior mesenteric artery; HA: accessory hepatic artery; CI: inferior vena cava. VP: portal vein; IG: large intestine.

According to Standring,⁵ in general, the right accessory hepatic artery, when present, goes behind the portal vein and the bile duct in the area of the lesser omentum, and can be identified during a surgery through the presence of a pulse behind the portal vein. This artery can be harmed during the resection of the head of the pancreas, since it is very near to the portal vein. This description is identical to the finding of the present article.

Conclusion

The variations of the hepatic artery, as well as of the celiac trunk, have been extensively described in the literature; however there is no pattern to the number of variations found along with the celiac trunk and the common hepatic artery, what leads us to the need of description in each case in which they are found.

Conflicts of Interests

The authors have no conflicts of interests to declare.

References

- 1 Araujo Neto SA, Franca HA, de Mello Júnior CF, et al. Anatomical variations of the celiac trunk and hepatic arterial system: an analysis using multidetector computed tomography angiography. *Radiol Bras* 2015;48(06):358–362
- 2 Hiatt JR, Gabbay J, Busuttil RW. Surgical anatomy of the hepatic arteries in 1000 cases. *Ann Surg* 1994;220(01):50–52
- 3 López-Andújar R, Moya A, Montalvá E, et al. Lessons learned from anatomic variants of the hepatic artery in 1,081 transplanted livers. *Liver Transpl* 2007;13(10):1401–1404
- 4 Ugurel MS, Battal B, Bozlar U, et al. Anatomical variations of hepatic arterial system, coeliac trunk and renal arteries: an analysis with multidetector CT angiography. *Br J Radiol* 2010;83(992):661–667
- 5 Standring S. *Gray's Anatomy. The Anatomical Basis of Clinical Practice*. 41st ed. New York: Elsevier; 2015
- 6 Michels NA. Newer anatomy of the liver and its variant blood supply and collateral circulation. *Am J Surg* 1966;112(03):337–347
- 7 Chen H, Yano R, Emura S, Shoumura S. Anatomic variation of the celiac trunk with special reference to hepatic artery patterns. *Ann Anat* 2009;191(04):399–407
- 8 Song SY, Chung JW, Yin YH, et al. Celiac axis and common hepatic artery variations in 5002 patients: systematic analysis with spiral CT and DSA. *Radiology* 2010;255(01):278–288