

Accessory Hepatic Veins and Their Surgical Implication

Lucas A. S. Pires¹, Carlos A. A. Chagas¹, Túlio F. O. Leite², Marcio A. Babinski¹

¹Morphology Department, Biomedical Institute, Fluminense Federal University, Niterói, Rio de Janeiro, Brazil.

²Interventional Radiology Unit, University of São Paulo - Medical School, São Paulo, Brazil.

Date of Submission: 19-01-2018

Date of Acceptance: 13-03-2018

Date of Publishing: 21-05-2018

ABSTRACT

Vascular variations regarding the hepatic veins are well explored in the literature. Many of these variations possess clinical and surgical relevance due to the fact that liver transplants, hepatectomies, and tumors resection of the liver are still a challenge to medical professionals. Furthermore, a great number of diseases affect the vascular dynamic of such organ. During regular dissection of a male cadaver fixed with a 10% formalin solution, we found a rare anatomical variation where three veins emerged from the parenchyma of the visceral side of the fifth portal hepatic lobe and drained into the inferior vena cava above the renal vein confluence. We report this rare vascular anomaly and assess its clinical and surgical significance

Keywords: hepatic veins, inferior vena cava, liver, anatomic variation.

INTRODUCTION

Studies regarding the hepatic anatomy have been dated to 2000 years b. C. by the ancient Babylonians.^[1]

The first reported case of a partial hepatectomy was published in 1716 by Berta.^[2] In 1800, hepatic surgery was still considered too much dangerous, otherwise impossible. Over the 1990, hepatic surgery had great advances due to extensive studies of its circulatory aspects.^[3-5]

The portal vein (PV) carries the blood from the intestines and spleen through the superior mesenteric vein and splenic vein to the liver. The PV gives many branches to the hepatic tissue, and those branches finishes as interlobular veins, joining with the sinusoids.^[6,7]

Those sinusoids, on the other hand, exit the liver parenchyma and form the supralobular veins. Through a large number of anastomoses they form the left, right and middle hepatic veins (HV), which carries the blood from the liver to the IVC.^[6,7]

This anatomy, according to the literature, can vary in many different ways.^[4,5,8-10]

Knowledge of the hepatic vessels variations are essential to surgical procedures such as partial

hepatectomies, transplants, lesions repairs, vascular reconstructions and should be taken into consideration in imaging exams.^[11,12]

Furthermore, variations of this regular anatomy can result in morphological and topographical changes regarding anatomical landmarks.^[10] According to Fang et al. (2012),^[13] the impact on the venous network outflow during obstruction is the least understood subject of hepatic surgery.

The aim of this paper is to report an anatomical variation regarding the presence of three AHV and its clinical and surgical implications.

CASE REPORT

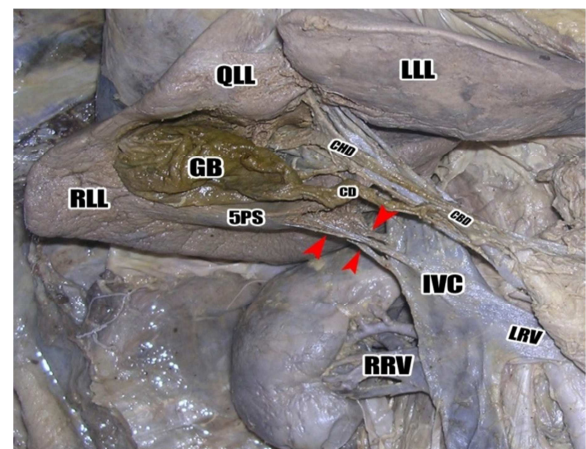


Figure 1: Visceral view of the liver. Dissection of the liver, gallbladder and right kidney.

Name & Address of Corresponding Author

Lucas Alves Sarmento Pires
Fluminense Federal University,
Biomedical Institute, Morphology Department. Rua Professor
Ernani Mello, 101, São Domingos - Niterói ZIP CODE 24210-
150 - Rio de Janeiro - Brazil.
E-mail: lucaspcores@id.uff.br

An uncommon variation of the hepatic veins was found during regular dissection of a male cadaver fixed with a 10% formalin solution. The cadaver pertained to the Anatomy Laboratory of the Morphology Department at the Fluminense Federal University.

There were three AHV emerging from the visceral face of the fifth hepatic segment, laterally to the gallbladder fossae. Those veins drained directly to the inferior vena cava (IVC), close to the superior pole of the right kidney [Figure 1]. Each vein had a 3 mm caliber. No further variations were found herein, a schematic drawing of the liver vasculature can be seen in [Figure 2 and Figure 3].

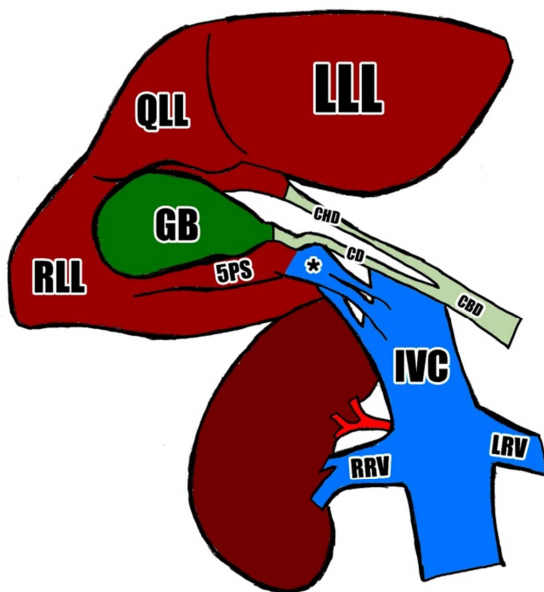


Figure 2: Schematic drawing of the visceral view of the liver.

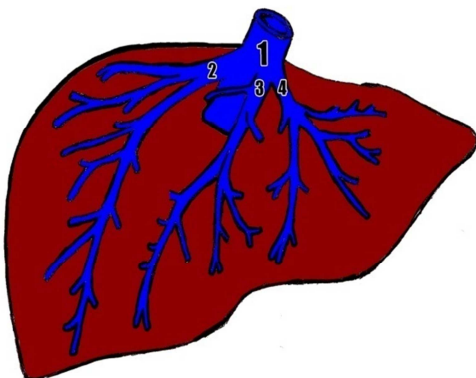


Figure 3: Schematic drawing of the liver veins. There are no other variations beside the one reported herein.

DISCUSSION

The primitive venous system is composed of three pairs of veins: the cardinal, the vitelline and the umbilical veins. The vitelline venous system gives origin to the hepatic sinusoids and veins, and the portal vein system around the 5th week of development.^[14]

One should also point out that the vitelline system gives origin to the venous duct, which works as a communication between the umbilical veins and the IVC. Furthermore, the cranial portion of the right vitelline veins becomes the terminal portion of the IVC. The regular anatomy is only completed after birth, in which the venous duct regresses and forms the venous ligament.^[14]

Due to this embryology, we believe that AHV are remnants of anastomosis that happen during early development.

Orguc et al.^[9] (2004) demonstrated the presence of accessory vessels in 47% of cases, while in 13% of cases there was more than one AHV, and in 22% of cases, those vessels had a caliber greater than 5 mm, which would require surgical anastomoses. The author also calls the attention of those accessory vessels, which should be dissected separately during surgery, as also stated by Sahani et al. (2004).^[15] Larger AHV have been described in the literature.^[16]

It is important to state that those accessory vessels described in the literature joined either the right hepatic vein or the IVC after running superiorly. Our case is unique due to the fact that there are three AHV joining the IVC in a lower position, through an oblique and inferior trajectory.

This type of variation has not been described in the literature, and according to our research, Sahani et al.^[16] (2004) merely states that “At times, three accessory hepatic veins are identified, which significantly increases the time required for surgery.”, although he does not refer, like other authors, if those veins have the same trajectories as ours nor shows images of such variation.

Variations such as: the right hepatic vein joining the IVC after passing through the vena cava foramina; a hepatic vein draining directly into the right ventricle; AHV rising from many lobes; the presence of a common hepatic vein draining to the right atrium has been described in the literature.^[7,8] (Testut and Latarjet, 1958; Bergman et al., 1988). The AHV can form a common trunk with the right adrenal vein.^[17]

The presence of the AHV described here gives origin to portosystemic anastomosis, which, according to Mehran et al. (2000),^[5] could cause variable degrees of encephalopathy and ascites in patients with similar degrees of hepatic cirrhosis.

Moreover, diseases such as Budd-Chiari syndrome, venoocclusive disease and congestive hepatomegaly causes pathological changes on the HV, thus, the study of AHV should be of great importance, due to collateral circulation and the effect of those ailments in these vessels (Mehran et al., 2000; Fang et al., 2011).^[5,13]

Detailed knowledge of the hepatic vessels branching is essential for many surgical procedures, with special attention to partial hepatectomies of the right lobe, transplants, and adrenal vein sampling. Liver transplants require awareness of the surgeon regarding anatomic variations such as this, where three relatively large AHV presented in the visceral aspect of the liver, and could be missed or mistaken during surgery.^[4,5,12,13,18]

Furthermore, knowledge of this anatomy enables the correct preoperative planning of the surgery, in order to estimate more accurately the hepatic tissue percentage that could be maintained, and to avoid massive blood loss.^[19]

CONCLUSION

In conclusion, study of the human anatomy regarding the liver and its vessels should be not restricted during anatomy classes, or to anatomy students and teachers, as many of the variations regarding this organ can lead to a deeper understanding of diseases and increases chances of surgical success.

Acknowledgements

We wish to thank Ms. Nadine de Castro Fernandes for the schematic drawings.

REFERENCES

- Fortner JG, Blumgart LH. A historic perspective of liver surgery for tumors at the end of the millennium. *J Am Coll Surg.* 2001;193:210-22.
- Dagradi A, Brearley R. The surgery of hepatic tumours. *Postgrad Med J.* 1962;38:670-87.
- Couinaud C. *Le Foie: Études Anatomiques et Chirurgicales.* Paris: Masson; 1957.
- Gupta SC, Gupta CD, Gupta SB. Hepatovenous segments in the human liver. *J Anat.* 1981;133:1-6.
- Mehran R, Schneider R, Franchebois P. The minor hepatic veins: anatomy and classification. *Clin Anat.* 2000;13(6):16-21.
- Goss CM, editor. *Henry Gray's Anatomy of the Human Body.* Philadelphia: Lea & Febiger; 1973.
- Testut L, Latarjet A. *Tratado de Anatomía Humana.* Barcelona: Salvat; 1958.
- Bergman RA, Thompson SA, Afifi AK, Saadeh FA. *Compendium of Human Anatomic Variation: Catalog, Atlas and World Literature.* Baltimore: Urban & Schwarzenberg; 1988.
- Orguc S, Tercan M, Bozoklar A, Akyildiz M, Gurgan U, Celebi A, et al. Variations of Hepatic Veins: Helical Computerized Tomography Experience in 100 Consecutive Living Liver Donors With Emphasis on Right Lobe. *Transplant Proc.* 2004;36(9):2727-32.
- van Leeuwen MS, Noordzii J, Fernandez MA, Hennipman A, Feldberg MA, Dillon EH. Portal venous and segmental anatomy of the right hemiliver: observations based on three-dimensional spiral CT renderings. *AJR Am J Roentgenol.* 1994;163(6):1395-404.
- Berumen J, Hemming A. Vascular Reconstruction in Hepatic Malignancy. *Surg Clin North Am.* 2016;96(2):283-98.
- Trerotola SO, Smoger DL, Cohen DL, Fraker DL. The Inferior Accessory Hepatic Vein: An Anatomic Landmark in Adrenal Vein Sampling. *J Vasc Interv Radiol.* 2011;22(9):1306-11.
- Fang C-H, You J-H, Lau WY, Lai ECH, Fan Y-F, Zhong S-Z, et al. Anatomical Variations of Hepatic Veins: Three-Dimensional Computed Tomography Scans of 200 Subjects. *World J Surg.* 2012;36:120-4.
- Schoenwolf G, Bleyl S, Brauer P, Francis-West P. *Larsen's Human Embryology: Churchill Livingstone;* 2014.
- Sahani D, Mehta A, Blake M, Prasad S, Harris G, Saini S. Preoperative hepatic vascular evaluation with CT and MR angiography: implications for surgery. *Radiographics.* 2004;24(5):1367-80.
- Taranikanti V, Dhar P. Large Accessory Hepatic Veins - A Case Report. *J Anat Soc India.* 2003;52(2):174-6.
- Matsuura T, Takase K, Ota H, Yamada T, Sato A, Satoh F, et al. Radiologic anatomy of the right adrenal vein: preliminary experience with MDCT. *AJR Am J Roentgenol.* 2008;191(2):402-8.
- Nakamura S, Tsuzuki T. Surgical anatomy of the hepatic veins and the inferior vena cava. *Surg Gynecol Obstet.* 1981;152(1):43-50.
- Skandalakis JE, Skandalakis LJ, Skandalakis PN, Mirilas P. Hepatic surgical anatomy. *Surg Clin North Am.* 2004;84:413-35.

Copyright: Academia Anatomica International is an Official Publication of "Society for Health Care & Research Development". This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite this article: Pires LAS, Chagas CAA, Leite TFO, Babinski MA. Accessory Hepatic Veins and Their Surgical Implication. *Acad. Anat. Int.* 2018;4(1):04-06.

Source of Support: Nil. **Conflict of Interest:** None declared.