Dutta, Sukhendu; Mukerjee, Bimalendu
Accessory hepatic artery: incidence and distribution
Sociedade Brasileira de Angiologia e de Cirurgia Vascular
São Paulo, Brasil

Available in: http://www.redalyc.org/articulo.oa?id=245016483014
Accessory hepatic artery: incidence and distribution

Artéria hepática acessória: incidência e distribuição

Sukhendu Dutta,1 Bimalendu Mukerjee2

Abstract

Background: Anatomic variations of the hepatic arteries are common. Preoperative identification of these variations is important to prevent inadvertent injury and potentially lethal complications during open and endovascular procedures.

Objective: To evaluate the incidence, extra-hepatic course, and presence of side branches of accessory hepatic arteries, defined as an additional arterial supply to the liver in the presence of normal hepatic artery.

Methods: Eighty-four human male cadavers were dissected using a transperitoneal midline laparotomy. The supra-celiac aorta, celiac axis, and hepatic arteries were dissected, and their trajectories were identified to describe arterial branching patterns.

Results: Normal hepatic arterial anatomy was identified in 95% of the cadavers and six (5%) had accessory hepatic arteries. In five cadavers the accessory hepatic artery followed its course through the fissure for ligamentum venosum, and in one it coursed adjacent to the hepatic artery through the margin of the lesser omentum. One cadaver had a single side branch, which provided arterial blood supply to the left adrenal gland in the absence of any left inferior phrenic artery.

Conclusion: Accessory hepatic artery most often follows the course of the hepatic fissure for ligamentum venosum. Although uncommonly found in 5% of cases, this finding should be identified during open and endovascular procedures to prevent inadvertent injury.

Keywords: Liver-arterial supply, celiac trunk, accessory hepatic artery, suprarenal artery.

Introduction

Proper identification of anatomic variations within the upper abdomen is essential for surgical and radiological interventions. A wide range of variations has been reported by Weiglein in 1996.1 Pre-operative arterial imaging is of paramount importance to plan open and endovascular procedures involving the upper abdominal organs.2,4 Volpe et al.5 reported that injuries to hepatic arterial supply are more likely to be involved in pancreaticoduodenectomy, especially in the region of porta hepatitis. The hepatic artery originates from the celiac axis in 52 to 76% of individuals, and the presence of variations of the normal hepatic artery anatomy is found in 32 to 48% of patients.6-11 These variations may predispose patients to inadvertent injury during open surgical procedures or percutaneous interventions. The aim of this study was to describe the frequency and the anatomic course of variations of the normal hepatic artery circulation.

Material and methods

The present study included 84 male cadavers with height ranging between 158 to 167 cm and without apparent abnormalities. A midline transperitoneal incision was used to expose the supracolic compartment, and the supraceliac

1. Shri Guru Ram Rai Institute of Medical and Health Sciences. Paten Nagar, Dehradun, India.
2. Vinayak Mission, Pondichery, India.

Manuscript received May 21 2009, accepted for publication Nov 16 2009.

Copyright © 2010 by Sociedade Brasileira de Angiologia e de Cirurgia Vascular
aorta, celiac axis, and its branches were dissected. The common and proper hepatic artery was dissected, and the presence of accessory hepatic artery (AHA) was identified. AHA is defined as an additional arterial supply to the liver in the presence of normal hepatic artery. Special attention was directed to the extra-hepatic course of the hepatic and AHAs and its relationship to adjacent anatomic landmarks.

Results

The majority of the subjects studied had normal hepatic artery pattern. Only six subjects (5%) had an AHA distributed in the extrahepatic region (Figure 1).

In five subjects, an AHA followed its course through the fissure for ligamentum venosum (FLV). In one subject, AHA passed along the hepatic artery through the margin of the lesser omentum (LO). AHA was lateral to hepatic artery proper and entered into liver through the porta hepatis. The observations on six subjects showed that one of the subjects showed a solitary branch that was spreading in the subphrenic region. This subject did not show any inferior phrenic artery on its left side. The same artery supplied the apex of the left suprarenal gland (Figure 2).

Discussion

AHA is defined as an additional artery supplying the liver in the presence of a normal hepatic artery. Occurrence of this condition can be explained by its embryological basis, suggested by Kulesza et al., according to which there should be presence of sufficient quantities of signaling molecules and growth factors produced by the developing and migrating mammalian cells for the normal development of any viscera. In the event of an improper signaling and incorrect gradient, there may occur visceral anomalies. When an artery does not originates from an orthodox position, being the only supply to a particular lobe, it is called a replaced artery. Origin, occurrence, and importance of accessory and replaced hepatic arteries are well documented by Michels, Niederhuber et al., Kemény et al., Brems et al., Hiatt et al., and Braun et al.

The observations of the present study showed less variation in contrast with the earlier reports. In the present study, 95% of the arterial supply was normal in its origin and course from the celiac axis. There was presence of AHA in 5% of the cases. No replaced hepatic artery was observed. Similar observations were not found in the literature. It is notable that we have observed distinct origin of left inferior phrenic artery (LIPA) from AHA, and LIPA was supplying the upper part of the left suprarenal gland. Though there are case reports in the literature about the presence of AHA in the FLV, in the present study five cases of AHA were found in the FLV and in one case of AHA coursed along with hepatic artery and entered porta hepatitis (Table 1).
Knowledge of anatomical variations in the arterial supply to the liver is necessary for clinical applications.\textsuperscript{8,23} Based on the anatomical findings of the present study, it may be suggested that surgeons and radiologists need to be aware of the presence of AHA in the FLV to avoid serious or fatal complications.

**References**


**Correspondence:**
Sukhendu Dutta
Department of Anatomy
Shri Guru Ram Rai Institute of Medical & Health Sciences
Patel Nagar, Dehradun, 248001 – India
E-mail: dutta8suk@hotmail.com

**Author contributions**
Conception and design: SD
Analysis and interpretation: SD
Data collection: SD
Writing the article: SD
Critical revision of the article*: SD, BM
Final approval of the article*: SD, BM
Statistical analysis: SD
Overall responsibility: SD
Obtained funding: N/A

* All authors have read and approved the final version of the article submitted to J Vasc Bras.

**Table 1 - Result of occurrence and distribution of accessory hepatic artery (n = 84)**

<table>
<thead>
<tr>
<th>Name of the artery</th>
<th>%</th>
<th>Origin</th>
<th>Course</th>
<th>Extrahepatic branches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal hepatic artery</td>
<td>95</td>
<td>celiac axis</td>
<td>78 cases, normal</td>
<td>Normal branching pattern</td>
</tr>
<tr>
<td>Accessory hepatic artery</td>
<td>5</td>
<td></td>
<td>5 cases were in the FLV and 1 case was in the LO</td>
<td>In 5 cases no branches but in 1 case LIPA and SSA</td>
</tr>
</tbody>
</table>

FLV = fissure for ligamentum venosum; LIPA = left inferior phrenic artery; LO = lesser omentum; SSA = superior suprarenal artery.