



ORIGINAL RESEARCH PAPER

Anatomy

ACCESSORY HEPATIC ARTERY – A CASE REPORT

KEY WORDS: Accessory Hepatic Artery, Hepatic Artery, Abdominal aorta, Cadaver, etc.

Dr. Prasanna S.*

Assistant Professor, Department of Rachana Sharir, Parul Institute of Ayurved, Parul University, Vadodara, Gujarat. *Corresponding Author

Dr. Megha Chandarana

Post Graduate Scholar, Department of Rachana Sharir, Parul Institute of Ayurved, Parul University, Vadodara, Gujarat.

ABSTRACT

The Accessory Hepatic Artery was noted in the 58year old male cadaver during the routine dissection of Under Graduate students. This accessory artery was branch of Left Gastric Artery. Anatomical variations of the hepatic artery are important in the planning and performing of abdominal surgical procedures. Normal hepatic anatomy occurs in approximately 80% of cases, for the remaining 20% multiple variations have been described.

INTRODUCTION:

The Hepatic Artery in the adult is intermediate in size between the left gastric artery and splenic artery; in the fetus and early postnatal life, it is the largest of the three branches of the celiac trunk. The hepatic artery gives off right gastric, gastroduodenal and cystic arteries as well as direct branches to the bile duct from the right hepatic artery. After its origin from the coeliac trunk, the hepatic artery passes anteriorly and laterally below the epiploic foramen (foramen of Winslow) to the upper aspect of the first part of the duodenum¹. It may be subdivided into the common hepatic artery, from the coeliac trunk to the origin of the gastroduodenal artery, and the hepatic artery proper, from that point to its bifurcation. It passes anterior to the portal vein and ascends anterior to the epiploic foramen between the layers of lesser omentum. Within the free border of the lesser omentum the hepatic artery is medial to the common bile duct and anterior to the portal vein. At porta hepatis it divides into right and left branches before these run into the parenchyma of the liver.

A vessel that supplies a lobe in addition to its normal vessel is defined as an accessory artery. A replaced hepatic artery is a vessel that does not originate from an orthodox position and provides the sole supply to that lobe¹.

PROCEDURE:

The abdomen was opened as per Cunningham's dissection manual. Anterior abdominal wall was reflected. Greater and lesser omentum along with intestine, spleen & pancreas were removed to expose the liver properly. Liver was pulled downwards, avoiding injury to the inferior vena cava. Structures of the porta hepatis were exposed and their pattern of entering the liver was noted. Branches of hepatic artery and portal vein were traced.

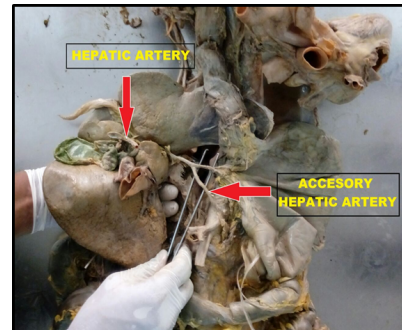
The accessory hepatic artery was encountered and traced. It was noted that this accessory hepatic artery was branch of left gastric artery. Photograph of the same was taken and documented. The specimen was preserved in the departmental museum.

CASE REPORT:

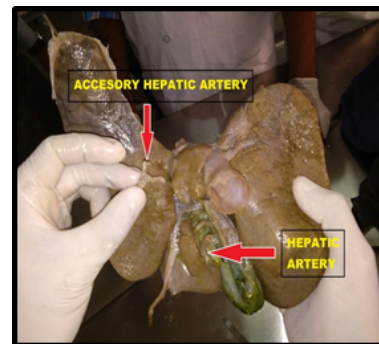
During routine dissection class for the Under Graduate students, we encountered the accessory hepatic artery in the 58year old male cadaver.

The anterior abdominal wall, greater and lesser omentum were removed to expose the liver. Normally, Hepatic artery proper divides into right and left hepatic artery near porta hepatis to supply the liver. But in present case, this accessory hepatic artery was a branch of left gastric artery. By tracing it further, it was noted that a well-defined Coeliac Trunk was absent and it was replaced by two separate arterial trunks. The Left Gastric Artery directly originated from the abdominal aorta and the second arterial trunk got bifurcated into the Common Hepatic Artery & the Splenic Artery. The Left Gastric Artery after taking origin directly from the abdominal aorta, runs upwards towards the left; behind the lesser

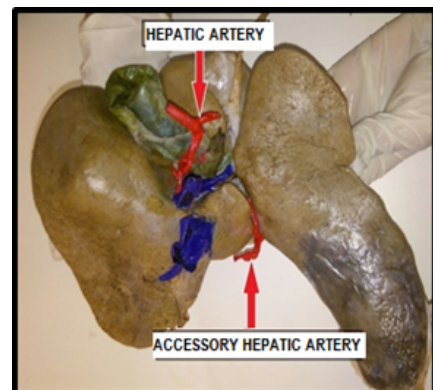
sac, to reach the cardiac end of the stomach. Approximately, a centimeter prior to reaching the cardiac end, it gave a branch to the liver called accessory hepatic artery.



[FIG. 1]



[FIG. 2]



[FIG. 3]

DISCUSSION:

There are two types of aberrant hepatic arteries, the accessory and the replacing ones. The accessory hepatic artery is defined as a vessel that supplies a lobe in addition to its normal one, while the replaced hepatic artery is a vessel that provides the sole supply to that lobe, but originates from other than the orthodox position.⁹

In this case, we found an accessory hepatic artery originating from left gastric artery of 58year old male cadaver. Other blood vessels i.e. left and right hepatic arteries, proper hepatic artery were normal, but there was variation in classical presentation of coliac trunk. The left gastric artery directly originated from the abdominal aorta, forming the first arterial trunk of this variation. Whereas, the second arterial trunk got bifurcated into the common hepatic artery and splenic artery, forming the Hepatosplenic Trunk.

An anomalous branching pattern is often due to an original development during embryonic life. At the beginning, the dorsal aorta branches into the 10th to 13th splanchnic or vitelline arterial roots before its fusion. After the fusion, many of these arteries degenerate and later the celiac trunk and the superior and inferior mesenteric arteries develop and are present in adult. In general, the embryonic left hepatic artery, the middle hepatic artery and the right hepatic artery originate respectively from the left gastric artery, the celiac axis and the superior mesenteric artery. After that, the embryonic left hepatic and right hepatic arteries regress while the middle hepatic artery remains as the proper hepatic artery supplying the whole liver as shown in adult. In the case where failures in the regression of these embryonic arteries occur may lead to abnormal branching pattern of hepatic arteries.¹⁰

[TABLE-1 ANATOMICAL VARIATION OF HEPATIC ARTERY: HIATT'S CLASSIFICATION⁶ AND ITS POSSIBLE SURGICAL IMPLICATIONS⁵]

Type	Variation	Possible surgical implications
I.	Normal anatomy	Most frequent type
II.	Left hepatic artery or accessory left hepatic artery relocation	Gastrectomy should be cautiously performed: left hepatic artery emerges from the left gastric artery (ischemia of the left hepatic lobe after section of the left gastric artery)
III.	Right hepatic artery or accessory right hepatic artery	Procedures involving liver surgery. Confusing course of the right hepatic artery after originating from superior mesenteric artery, the right hepatic artery runs posteriorly to the portal vein
IV.	Left hepatic artery/ accessory left hepatic artery relocation and right hepatic/ accessory right hepatic artery relocation	Same as type I & II
V.	Common hepatic artery originating from superior mesenteric artery	Altering the surgical approach(interference with resection or lymhadenectomy); unexpected bleeding; ischemia; biliary leak; liver dysfunction
VI.	Common hepatic artery originating from the aorta	Same as type V

A classification method was described by Michel et al. in 1957 by doing visceral angiography in 600 patients. Dr. Binit Surekha¹¹ has done multidetector CT abdominal angiography scan of 600 patients (413 men and 187 women). Dr. Craig Hacking⁸ has given the average percentage of variation as per Michel's classification.

[TABLE – 2 HEPATIC ARTERY VARIANTS ACCORDING TO MICHEL'S CLASSIFICATION]

Serial Number	Description	Frequency
1.	Standard anatomy	~60% (Range 55-61)
2.	Replaced Left Hepatic artery	~ 7.5% (Range 3-10%)

3	Replaced Right Hepatic artery	~ 10% (Range 8-11%)
4	Replaced Right and Left Hepatic artery	~1%
5	Accessory Left Hepatic artery from Left Gastric artery	~10% (Range 8-11%)
6	Accessory Right Hepatic artery from Superior Mesenteric artery	~5% (Range 1.5-7%)
7	Accessory Right and Left Hepatic artery	~1%
8	Accessory Right and Left Hepatic artery and Replaced Left or Right Hepatic artery	~2.5%
9	Common Hepatic Artery replaced to Superior Mesenteric artery	~ 3% (Range 2-4.5%)
10	Common Hepatic artery replaced to Left Gastric artery	~0.5%

The increase in the hepatobiliary and pancreatic cancer surgery, the anatomic variations of the coeliac axis and the hepatic arteries is of paramount importance in hepato-pancreatico-biliary surgery. In the literature vascular anomalies in the peripancreatic region are divided into variations of the superior mesenteric area, the celiac trunk and hepatic artery.⁵

CONCLUSION:

Nowadays, there are many improvements and developments in abdomen surgical techniques: upper abdominal video laparoscopic surgeries, liver transplantation and radiological procedures. All of invasive procedures in the abdomen need for professional and wide knowledge of the anatomy of the coeliac trunk, hepatic arterial system and their main variations. The frequency of inadvertent or iatrogenic hepatic vascular injury increases in the event of aberrant anatomy and variations. The knowledge of anatomical liver vascular variants is crucial for decreasing operative and postoperative morbidity and mortality during the performance of hepatic and pancreatic surgeries.

The accessory or replaced left hepatic artery arises from the left gastric artery provides collateral arterial circulation in case of occlusion of the vessels in porta hepatis but may also be injured during mobilization of the stomach as it lies in the upper portion of the lesser omentum.

So, the knowledge of variation in hepatic artery is beneficial for surgeons and anatomists.

ACKNOWLEDGEMENT:

The Accessory hepatic artery was encountered by me, while conducting routine dissection for Under Graduates in Parul Institute of Ayurved, Vadodara, Gujarat during my service. I would like to pay my sincere gratitude to Dr. Hemant Toshikhane, Dean & Principal, Parul Institute of Ayurved, Vadodara for his valuable support.

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