

Case Report

Origin of accessory left hepatic artery from left gastric artery

B.R. Chaitra^{1*}, K.R. Dakshayani¹

¹Department of Anatomy, Mysore Medical College and Research Institute, Mysore- 570001, Karnataka, India

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***Correspondence:**

Dr. B.R. Chaitra,

E-mail: drchaitrabr@gmail.com

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ABSTRACT

Liver is supplied by the branches of celiac trunk. Common hepatic artery which is a branch of celiac trunk continues as proper hepatic artery after giving gastroduodenal artery. Proper hepatic artery enters the liver at Porta hepatis after dividing into right and left hepatic artery. The knowledge of branching patterns of arteries and their variations is important in various surgical and radiological procedures. During routine dissection conducted in the Department of Anatomy, MMC&RI, Mysore, an accessory left hepatic artery was seen arising from left gastric artery in an elderly male cadaver aged around 60 years. An accessory left hepatic artery was arising from left gastric artery and was entering the left lobe of liver. In less than 1% of cases, the accessory left hepatic artery supplies the part of left lobe of liver or whole liver. Knowledge of anomalous origin of left hepatic artery is important for successful liver transplant surgeries, hepatobiliary operations, gastrectomies, hiatal surgery for gastro esophageal reflux, bariatric surgeries and in selective arterial chemotherapy for liver cancers. Ligation or laceration of this artery during surgeries causes fatal ischemic necrosis of left lobe of liver.

Keywords: Accessory left hepatic artery, Liver transplantation, Bariatric surgery

INTRODUCTION

Liver is the largest abdominal viscera and has a dual blood supply. 70-80% is via hepatic portal vein which is nutrient rich and 20-30% is via hepatic artery which is oxygen rich.

Hepatic artery proper is a branch of common hepatic artery which in turn is a branch of coeliac trunk. Coeliac trunk arises from abdominal aorta at the level of T12 thoracic vertebra. Coeliac trunk gives three branches i.e. left gastric artery, splenic artery and common hepatic artery. After its origin from the coeliac trunk hepatic artery passes anteriorly and laterally below epiploic foramen to the upper part of first part of duodenum. Common hepatic artery continues as hepatic artery proper after giving right gastric artery and gastroduodenal artery.

Hepatic artery proper passes anterior to the portal vein and ascends anterior to the epiploic foramen between the layers of lesser omentum. Within the free border of lesser

omentum, hepatic artery is medial to common bile duct and anterior to portal vein. At the porta hepatis it divides into right and left branches run into the parenchyma of liver.

Right hepatic artery crosses posterior to the common bile duct. Its close proximity to the bile duct tells that right hepatic artery is involved in bile duct cancer earlier than left hepatic artery.

Right hepatic artery divides into anterior and posterior divisions. Anterior division supply segments V and VIII. Posterior division supply segments VI and VII. Left hepatic artery supply segments I, II, III and IV.

The segmental arteries are macroscopically end arteries although some collateral circulation occurs between segments via terminal branches. A small number of variants are important to demonstrate angiographically because they may influence surgical and interventional radiological procedures.¹

A vessel that supplies a lobe in addition to its normal vessel is defined as an accessory artery. Accessory hepatic arteries present potential bleeding risks during hepatobiliary surgeries and complicate liver transplantation procedure.²

CASE REPORT

During routine dissection conducted in the Department of Anatomy, Mysore Medical College and Research Institute, Mysore, an accessory left hepatic artery was seen arising from left gastric artery in an elderly male cadaver aged around 60 years.

In the present case coeliac trunk was seen arising at T12 vertebra which is normal and it was giving three branches i.e. left gastric, splenic and common hepatic artery. Common hepatic artery continued as hepatic artery proper which divided into right and left hepatic artery. Right and left hepatic arteries entered the Porta hepatis to supply the right and left lobe of liver respectively. In addition an accessory left hepatic artery was seen arising from left gastric artery which entered the left lobe of liver at the site of ligamentum venosum (Figure 1).

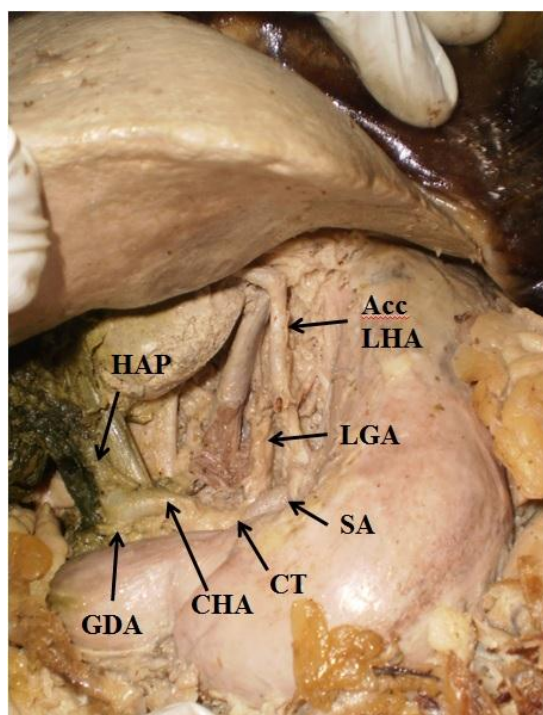


Figure 1: Accessory left hepatic artery from left gastric artery.

CT - Coeliac trunk
LGA - Left gastric artery
SA - Splenic artery
CHA - Common hepatic artery
HAP - Hepatic artery proper
GDA - Gastroduodenal artery
Acc - Accessory
LHA - Left hepatic artery

DISCUSSION

Hepatobiliary variations are important to gastroenterological surgeons and interventional radiologists.

Hiatt JR et al. studied the surgical anatomy of hepatic arteries in 1000 cases and classified the pattern of hepatic artery branching into following types.³

Type I – Normal.

Type II - Origin of left hepatic artery from left gastric artery.

Type III – Origin of accessory right hepatic artery from superior mesenteric artery.

Type IV– Origin of right hepatic artery from superior mesenteric artery and left hepatic artery from left gastric artery.

Type V - Origin of common hepatic artery from superior mesenteric artery.

Type VI – Origin of common hepatic artery from abdominal aorta.

The arterial supply to the liver in early gestational age is from three main sources. They are,

1. The left hepatic artery from left gastric artery
2. Middle or common hepatic artery from coeliac trunk
3. Right hepatic artery from superior mesenteric artery

With further development, the blood supply assumes adult pattern, with atrophy of both right and left hepatic arteries. The common hepatic artery (middle hepatic artery) supplies the whole liver. This adult pattern occurs in around 67% of individuals. Complete or partial persistence of fetal pattern may result in anatomical variations of vascularization of the liver.⁴

Here the accessory left hepatic artery was arising from left gastric artery in the lesser omentum. Hence the surgeons must be careful while dividing the lesser omentum to reach gastro esophageal junction. The accessory left hepatic artery in the present case is at risk of injury during mobilization of stomach causing necrosis of liver parenchyma.

Presence of accessory left hepatic artery further complicates the transarterial chemoembolization procedure for patients with hepatocellular carcinoma. Awareness of anatomical variations is of great importance in hepatobiliary surgical procedures.²

Presence of such anomalies should be ruled out preoperatively during selection of the donor for partial hepatic grafts in living related liver transplantation

procedures. Hepatic arterial anatomy must be defined precisely to ensure optimum donor lobectomy and graft arterialization.⁵

Knowledge of these variations is also important in planning whole and split liver transplantation surgeries. Transplantation of such livers with multivascular pedicles may pose challenge during anastomosis of these accessory hepatic arteries of donor liver to the nearby arteries of the recipient.

However accessory hepatic artery may be advantageous in some instances. Due to proximity of right hepatic artery to the bile duct, bile duct cancer usually spreads to right hepatic artery. Because of the farther distance between accessory hepatic artery and bile duct, accessory left hepatic artery will be spared in cancers of bile duct. Accessory hepatic arteries provide collateral circulation in case of thrombosis of main hepatic artery.⁶

CONCLUSION

The left hepatic artery can provide accessory arteries that may be an important source of blood supply to the left lobe of liver. These variations presents as the potential bleeders during hepatobiliary surgeries and liver transplantation procedures. Preoperative knowledge of anomalous vessels is also helpful in modification of surgical approach.

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