

## Case Report

# A RARE CASE WITH MULTIPLE VARIATIONS OF LIVER AND ASSOCIATED ARTERIES

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## ABSTRACT

Variations of liver, its arterial supply and branching pattern of coeliac trunk are not uncommon as separate entity but this case presents several variations. During routine dissection, a multi-lobular liver, with irregular inferior margin, was observed occupying only right upper quadrant of the abdomen. An extra (accessory) lobe was hanging from its inferior surface. Common hepatic artery was giving eight branches, six on left side and two on right side. Five of the left branches were entering liver but none was passing through porta hepatis. Coeliac trunk showed tetrafurcation; the additional branch was supplying pancreas and transverse colon. Knowledge of these variations or combinations is important in open access surgeries, endoscopic surgeries and diagnostic and interventional radiology of the region.

**KEYWORDS:** Liver, Hepatic Arteries, Branching Pattern, Accessory Lobe, Coeliac Trunk (CT), Tetrafurcation, Common Hepatic Artery (CHA).

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## INTRODUCTION

Liver is present in upper part of right upper quadrant and upper left half of the upper left quadrant of abdominal cavity. It is supplied by left and right hepatic arteries, usually the terminal branches of hepatic artery proper which in turn is continuation of common hepatic artery (CHA). CHA arises from coeliac trunk (CT) which also gives splenic and left gastric arteries. Variations in branching pattern of CT and CHA are common but variation in the position of liver is not a common one. However, this case presents several variations which need to be documented. Knowledge of these variations, individual or in combinations, are important in open access surgeries, endoscopic surgeries and diagnostic and interventional radiology of the region.

## CASE REPORT

During routine dissection of abdomen of a 50-55 year old male cadaver for undergraduate students following variations were noted:

1. Liver was occupying only right upper quadrant of the abdomen, with its apex falling short of 3 cm to the midline. Its dimensions were 190 mm x 155 mm x 151 mm (height x transverse diameter x thickness), measured with the help of a spreading caliper (measuring up to 1 mm) as; height: measured from the bottom of the right hepatic lobe to the upper edge of right lateral surface; transverse diameter: extending from the right edge of the right hepatic lobe to the apex of liver and thickness: from the front of the right hepatic lobe to the back of the same lobe. It weighed 1635 gm.



**Fig 1:** showing AL: Accessory lobe, HB: Hepatic band, LT: Ligamentum teres, GB: Gall bladder, CT: Coeliac trunk, CHA: Common hepatic artery and LL: Left lobe of liver.

2. Its inferior margin was irregular and an extra (accessory) lobe was hanging from its inferior surface (Fig 1). This extra lobe of liver was spheroidal in shape with a length (L) of 40 mm, width (W) 25 mm and thickness (T) of 15 mm. It was attached to liver with the help of liver tissue.
3. A band of hepatic tissue of the size 15 mm x 5 mm x 2 mm (L x W x T) was also found, bridging the groove for ligamentum teres hepatis and converting it into a tunnel (Fig 1).
4. Coeliac trunk, after arising from abdominal aorta at the level of lower border of 12<sup>th</sup> thoracic vertebrae, was tetrafurcating instead of trifurcating. The additional branch was running downwards and towards the right side, ending by bifurcating to supply right side of transverse colon and head of pancreas.
5. CHA was thick with a length of 40 mm and diameter of 25 mm and there was no hepatic artery proper (HAP). After giving eight branches, six on left side and two on right sides, it continued to supply gall bladder (cystic artery) (Fig 1). The first left branch was accidentally torn and could not be traced, while remaining of the left branches were perforating into liver separately, but none was passing through porta hepatis. Each hepatic branch bifurcated before piercing liver. They arose at a distance of 10, 12, 19, 28, 38 and 40 mm, respectively, from the origin of CHA. Right branches were right gastric artery and gastroduodenal artery.
6. Porta hepatis was occupied by divisions of portal vein and right and left bile ducts only. No variation was observed in the course and branching pattern of gastro duodenal artery and right gastric artery. Gall bladder was present on the right side of ligamentum teres hepatis and no other anomaly was observed in the large vessel or other viscera of abdomen and thorax.

## DISCUSSION

Liver is present only on right side of abdominal cavity in the present case; no similar match was found after a thorough search of the literature. Although, Nagato et al in their study has classified nine types of liver with organ type 2 (costal liver with very small left lobe and deep impressions) and type 3 (liver with total atrophy of the left lobe) but the present case falls in none of the organ type as left lobe of the liver was neither small nor absent [1].

Presence of accessory lobe of liver is not uncommon and various reasons of its presence are being given by different authors [2,3,4,5].

Variations in branches pattern of CT is a common entity [6,7,8,9,10,11], various classifications regarding branching pattern of CHA have been reported (12-14), but none has reported a direct branch from CT supplying transverse colon.

Branching pattern of CHA in the present case is also unique and no similar pattern is being observed after a thorough search of literature. However, similar number of hepatic branches of CHA has been reported [12] but contrary to our finding, in that case hepatic branches were

entering liver both through porta hepatis and directly. Moreover, in their case cystic artery was a branch of right hepatic artery. Reason for this, in our case may be due to early rotation of liver downward to the right and backward (explaining unique position of liver in our case), CHA failed to enter liver through porta hepatis. Shortening of CHA, due to absence of HAP, has forced the segmental arteries to take their origin before entering into liver. This is also evident by the fact that arteries bifurcated before piercing liver, doubling their number to ten (number of segmental arteries).

### CONCLUSION

Knowledge of such variation is of utmost importance in planning open access surgeries inclusive of liver transplant/resections, endoscopic surgeries or interventional radiology, to minimize mortality, morbidity and iatrogenic complications.

**Conflicts of Interests: None**

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