Original Research Paper

Volume - 11 | Issue - 11 | November - 2021 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Anatomy

STUDY OF VARIATIONS IN THE MORPHOLOGY OF LIVER IN THE INDIAN CADAVERS.

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ABSTRACT **Backgrounds:** Liver is the largest organ of the body and it is located in the right hypochondrium, epigastrium and left hypochondrium of the abdominal cavity. It is a wedge-shaped organ and narrow end of liver is pointed towards the left. It is convex in the front, to the right, above, and behind, and is somewhat concave inferiorly, where it is moulded to the shapes of the adjacent viscera. Even though the surface is smoothly continuous, liver is customarily apportioned by the anatomists into a larger right and a smaller left lobe by the line of attachment of the falciform ligament anteriorly and the fissure for ligamentum teres and ligamentum. **Materials And Methods:** Theis study was conducted on 50 formalin fixed livers and gall bladders during routine lab of undergraduate students in the dissection hall of Anatomy department of ANM Medical College, Gaya in the period of 1 years starting from July 2020 to July 2021. All specimens were studied for morphological variations. **Results:** In the present study the livers with normal architectures were considered normal. Out of 50 liver specimens, 21 were normal without any gross anomalies with normal architecture. The remaining 29 specimens showed some short of accessory fissures and lobes on the different lobes of the liver. Out of 29 specimens in 2 specimens lingular process was observed arising from the left lobe. Hypoplastic left lobes was also observed in 2 specimens. **Conclusions:** Understansding of morphological variations like atrophy, agenesis, presence of accessory lobes and fissures, presence of intrahepatic gall bladder and absence of normal fissure and lobe can cause diagnostic error in interpretation for the anatomists, radiologists and surgeons venosum on inferior surface.

KEYWORDS : Liver, morphology, cadever

INTRODUCTION

Liver is the largest organ of our body and it is located in the right hypochondrium, epigastrium and left hypochondrium of the abdominal cavity [1]. It is a wedge-shaped organ and narrow end pointed of liver is towards the left. It is convex in the front, to the right, above, and behind, and is somewhat concave inferiorly, where it is moulded to the shapes of the adjacent viscera [2].

even though the surface is smoothly continuous, liver is customarily apportioned by the anatomists into a larger right and a smaller left lobe by the line of attachment of the falciform ligament anteriorly and the fissure for ligamentum teres and ligamentum venosum on inferior surface. In addition to the right and left lobes, there are two additional lobes called as the quadrate lobe and the caudate lobe, separated from each other by the porta hepatis.

Quadrate lobe is visible on the inferior surface appears somewhat rectangular and is bounded in front by the inferior border, on the left by fissure for ligamentum teres, behind by the porta hepatis, and on the right by the fossa for the gall bladder. Tha caudate lobe is visible on the posterior surface, bounded on the left by the fissure for ligamnetum venosum, below by porta hepatis, and on the right by the groove for inferior vena-cava. Above, it continues into the superior surface. Below and left it has a small round papillary process[3].

The liver primordium appears in the middle of the third week as an outgrowth of the endodermal epithelium at the distal end of the foregut. This outgrowth, the hepatic diverticulum, or liver bud, consists of rapidly proliferating cells that penetrate the Septum transversum, that is, the mesodermal plate between the pericardial cavity and the stalk of the yolk sac.

While hepatic cells continue to penetrate the septum, the connection between the hepatic diverticulum and the foregut (duodenum) narrows, forming the bile duct.

A small ventral outgrowth is formed by the bile duct, and this outgrowth gives rise to the gallbladder and the cystic duct. During further development, epithelial liver cords intermingle with the vitelline and umbilical veins, which form hepatic sinusoids. Liver cords differentiate into the parenchyma (liver cells) and form the lining of the biliary ducts. Hematopoietic cells, Kupffer cells, and connective tissue cells are derived from mesoderm of the septum.

MATERIALAND METHODS

After approval of Institutional Ethical committee of ANM Medical College, Gaya , the present study was conducted on 50 formalin fixed livers and gall bladders during routine lab of undergraduate students in the dissection hall of Anatomy department in the period of 1 years starting from July 2020 to July 2021. Each of the specimens was studied for morphological variations.

INCLUSION CRITERIA

Fresh undisected liver specimens.

EXCLUSION CRITERIA

The cirrhotic livers and livers with tumors or other pathologies.

Methods of study of morphological variation

A total of 50 cadaveric liver were **studied for morphological variation**. Direct observation the following five parameters were taken from each cadaveric liver, and their ratios were analyzed. Right Lobes, Left Lobe, Caudate Lobe, Quadrate Lobe, Intrahepatic Gall Bladder

Repeatability of measurements

To assess measurement errors for intra reliability tests, 4 cadaveric liver were randomly selected and all parameters from were measured on 2 consecutive days by the same observer under similar experimental conditions. For inter reliability tests, two investigators undertook three sets of measurements.

STATISTICALANALYSIS

Descriptive statistics were calculated for all measurements. Morphological variation was calculated as a % difference from a fixed normal echotexture of liver.

The association of variables was calculated using analysis of variance (ANOVA). Analysis of variance followed by orthogonal contrasts was used to compare the morphological variation of cadaveric liver. A significance level of $P < 0.05$ was used.

RESULT

In the present study the livers with normal architectures were considered normal. Out of 50 liver specimens, 21were normal without

any gross anomalies with normal architecture.

The remaining 29 specimens showed some short of accessory fissures and lobes on the different lobes of the liver.

Out of 29 specimens in 2 specimens lingular process was observed arising from the left lobe (Image 1&1').

Hypoplastic left lobes was also observed in 2 specimens.

Right Lobes
On the right lobe of 9 liver specimens was accessory fissures were seen in different areas of the right lobe. The fissured varied in size and shape. Two specimens presented a goove on the superior surface formed by the diaphragm called as the diaphragmatic impression, that is, Netter type 7.

Left Lobe
The left lobe of two specimen showed a tongue like projection from the left border called as the lingular process, that is, Netter type 5.

Caudate Lobe
The caudate lobe of 5 specimens showed some type of accessory fissures and accessory lobes between the caudate process and the right lobe.

Quadrate Lobe
The quadrate lobe of two specimens presented with further lobulation and fissure on its surfaces.

Intrahepatic Gall Bladder
Out of the studied liver specimen one specimen showed the gall bladder embedded inside the quadrate lobe, which we simply called as the intrahepatic gall bladder. One specimen showed partial gall bladder embedding in the substance of right lobe of liver. So that the fundus part was not clear.

DISCUSSION

In spite of the complex development of liver, gross abnormalities of liver are rare. The more common gross abnormalities are irregularities in the normal architecture and less common abnormality is the occurrence of one or more accessory livers or lobes.

Bradely has done much to elucidate the development of liver. The single liver in some lower animals like pig and dog has distinct lobules separated by strands of connective tissue and sometimes the human liver shows this variation by reversion [5]. The congenital anomalies of liver can be divided into anomalies due to defective development and anomalies due to excessive development. Defective development of right lobe may remain latent or progress to portal hypertension, whereas defective development of left lobe of liver can lead to gastric volvulus. The excessive development of liver can may lead to formation of accessory lobes that carry the risk oftorsion [6].

The acquired changes in the liver morphology are represented by the appearance of lingual lobes, costal organ with very small left lobe, deep renal impressions and local inflammation of the organ or the gall bladder [7].

Study done by TS Cullen, showed that multiple hepatic fissures andlobes were common on the undersurface of liver [8]. Study done by Vinnakota S and Jayasree N showed that 35.48% of specimens showed sparse incidence of accessory fissures in various lobes of the liver [9].

It was described that the hepatic malformations are common in perinatal age group and liver undergoes reformation postnatal.

Accordingly all fissures and lobes of liver should disappear during postnatal [10]. Hussein Muktyazet, et al. found accessory liver lobes in six cadavers (14.6%), atrophy of left lobe in two cadavers, accessory fissures in various lobes of the liver [9]. It was described that the hepatic malformations are common in perinatal age group and liver undergoes reformation postnatal. Accordingly all fissures and lobes of liver should disappear during postnatal [10]. Hussein Muktyazet, et al. found accessory liver lobes in six cadavers (14.6%), atrophy of left lobe in two cadavers, accessory fissures in five cases (12.1%) and evidence of ectopic liver tissues [11]. Pujari & Deodhare reported presence of a symptomatic accessory lobe may herniated into thorax through diaphragm and cause serious problems. He also reported a case of bifid liver presenting with anomalous quadrate and caudate lobes with transverse gall bladder [12]. In the present study out of 50 specimen's variations was observed in 29 specimens (58%). In one of the specimen there was seen intrahepatic gall bladder along with the Riedel's lobe.

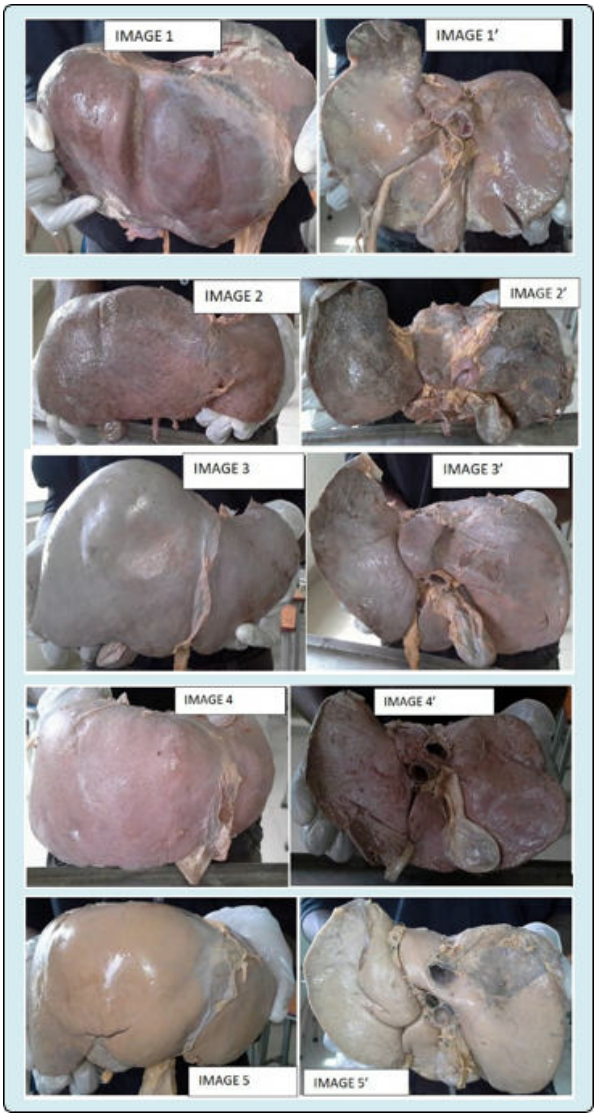

Figure 1: Showing different type of cadaveric liver

CONCLUSION

Understanding of morphological variations like atrophy,agenesis, presence of accessory lobes and fissures, presence of intrahepatic gall bladder and absence of normal fissure and lobe can cause diagnostic error in interpretation for the anatomists, radiologists and surgeons. Awareness helps to avoid fatal complications and assists in planning the better way for surgical approaches during liver resection. This knowledge also is helpful for the morphologists and embryologists to update the frequency of the variations in liver or gall bladder.

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