



STUDY OF VARIATIONS OF MORPHOLOGY OF THE LIVER & ITS CLINICAL IMPORTANCE

Medical Science

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ABSTRACT

Present study has shown variations in the livers specimens studied from routine dissection for first year medical students and from the preserved specimens of museum in the Department of Anatomy, Saraswati Medical College, Unnao UP. The study was conducted on 28 formalin fixed cadaveric livers. Each liver specimen was examined in detail for the variations in the fissures lobes. Out of them, 25 showed normal fissures and without any other variations like absence of fissures, multiple accessory fissures, variations in porta hepatis, while 3 livers showed variations in lobes and fissures. The objective of present study is throwing light on the variations on liver to the field of medicine especially to the physicians and surgeons.

KEYWORDS

Liver –variations -Hepar – porta hepatis-- Accessory lobe – Fissure

INTRODUCTION:

Liver is the largest organ in the Abdominal cavity present in Right hypochondrium quadrant, epigastric and left hypochondriac region. In healthy liver, it has homogenous parenchyma and by peritoneal attachments, it can be divided into 4 anatomical lobes. Variations may be due to size of the body, size, sex. It constitutes 2% of total body weight. Functional Anatomy of liver has been classified into 8 divisions based on classification of Couinaud, [1957] making use of an imaginary plane and hepatic vasculature distribution^[1,2]. Normally liver has four lobes, namely left lobe, right lobe, caudate and quadrate lobes. Caudate lobe of liver is a well marked lobe located between the two grooves namely groove for inferior vena cava (IVC) on the right, fissure for ligamentum venosum on the left and anteriorly porta hepatis [hilum of the liver]. Normally liver is not palpable, if palpable then it will be enlarged known as **Hepatomegaly** well felt below the right costal margin. Whole of the liver is **smooth and shining due to the presence of Glisson's capsule**

MATERIALS AND METHODS:

Twenty eight liver specimens constituted the materials for the present study. They were studied from specimens taken out from the cadaver during routine dissection of the M.B.B.S students as well as from the well formalin fixed museum specimens in the Department of Anatomy at Saraswati Medical College, Unnao, and Uttar Pradesh. Each specimen was well examined for the size, shapes and variations and if any variations in porta hepatis, any other associated anomalies like absence of lobes, enlargements of lobes, hypoplasia of lobes. Then they were photographed and labeled

OBSERVATIONS:

In Present study THREE LIVERS showed variations of lobes and fissures and one liver showed absence of gall bladder. These morphological variations of liver and gall bladder are not common, but they are rare.

Specimen-1, Showed fusion of left lobe of liver with quadrate lobe of liver. No fissure for ligamentum teres

Specimen-2, Fossa for gall bladder absent. Deep notch is present, no place gall bladder –Suggestive of Floating gall bladder, Quadrate lobe is not marked, caudate process is well marked

Specimen -3, Ligamentum teres is **patent**. There is presence of **left umbilical vein that can cause Portocaval Anastomosis** resulting in Caput Medusae. Most of the visceral impressions were deep.

Specimen pictures -



Specimen-1



Specimen-2



Specimen-3

DISCUSSIONS:

Anatomical Variations of liver is quite common but anomalies of liver are rare. The common liver anomalies are accessory hepatic lobe, Riedel's lobe hypoplasia or agenesis of lobes. The knowledge of variations is very important, because these may be misinterpreted in pathological conditions. **Vybhav et al [2014]** studied on 80 livers, showed sulci on anterior surface in 20 livers [25%], anomalies in caudate lobe in 24 livers [30%], anomalies in quadrate lobes in 10 livers [12.5%], extra lobes in 2 livers [2.5%]. **Chaudhari HJ [2017]** et al also studied on 80 livers that showed normal liver in 14 [17.5%] anomalies in 66 livers [82.5%]. Out of them, abnormal fissures were seen in 28 livers, abnormal lobes in 29 livers [36.5%], large papillary process in a single liver (1.25%), Pons hepatis joining the left lobe with quadrate lobe also in a single liver (1.25%) liver, deep renal impression in single liver (1.25%), deep on groove on diaphragmatic surface seen in 6 livers (7.5%).

Narayanaperumal Mugunthan et al [2012] conducted a study on vascularity of liver during routine dissection of cadaver at Mahatma Gandhi Medical College & Research Institute, Pillaiyarkuppam on seventy years old man, where Right hepatic artery was taking origin from superior mesenteric artery & accessory left hepatic artery arising from left gastric artery; middle hepatic artery (artery to quadrate lobe) was found to arising from gastro duodenal artery. These knowledge variations of blood supply do have clinical & embryological significance.

Sachin et al [2014] studied 50 cadaveric specimens of liver from the Department of Anatomy, Maulana Azad Medical College, and New Delhi. The study showed normal fissures and lobes in twenty eight livers, while remaining twenty two livers showed variations. They were 5 [10%] were having accessory fissures on the different lobes. In two specimens [4%] a transverse fissure was seen in the quadrate lobe

which divided the same lobe into upper and lower lobe, single liver showed [2%] mini accessory fissure, two livers [4%] showed absence of fissure for ligamentum teres. Then they were classified into six groups according to Netter's classification.⁹

Human liver congenital anomalies are not common. There are many varieties of congenital anomalies namely, i] Agenesis of lobes, ii] absence of segments of liver, iii] hypoplasticity of lobes of liver, iv] decrease in size of liver, v] atrophy of the lobes, vi] deformity of lobes of liver, vii] presence of Riedel's lobe, viii] segments absence, ix] gall bladder transposition¹⁰. There is association of biliary tract disease, portal hypertension, and other congenital anomalies when there is agenesis of Right lobe of liver¹¹, [Kakitsubata & Kakitsubata 1991]. Agenesis of right lobe of liver which is rare congenital anomaly has been reported by Vasudha Ravindra Nikam, & Balkrishna Shankar Kitture [2015] in a 22 years old female was that incidentally diagnosed radiologically for the abdominal distention. CT Scan & Doppler studies showed absence of Right lobe and hypertrophy of left lobe of liver and low velocity flow in left portal vein¹². Organ and Hayes have reported the presence of right lobe of liver & gall bladder above the diaphragm [supra diaphragmatic in position]¹³. Atrophy of liver in one or two lobes can take place due to vascular disease¹⁴.

Aktan et al studied liver anomalies, in 54 cadavers and in 383 patients making use of CT scan. This study was done between 1997-1999. The patients were 190 men and 193 women between age group of 32-64 years with mean age of 49.2 years were studied. There was neither hepatic pathology nor abnormality of parenchyma of liver¹⁵. The rare anomaly of liver is Absence of hepatic lobe [16, 17, 18]. If there is absence of right and left lobe of liver, then they are asymptomatic [17]. In the studies of Aktan et al, there was absence of Right lobe in one liver only in 48 years old man [15]. There was involvement of left lobe of liver when there is agenesis of liver. [16, 11, & 19]. In patients with agenesis of right lobe of liver there will be associated absence of Right hepatic vein. [19, 20].

DEVELOPMENT:

Endodermal bud give rise to liver from its ventral aspect at junction of foregut and midgut. From there the bud grows through mesogastrum and then extending into the septum Transversum. Later bud enlarges and divides into two divisions namely larger Pars Hepatica on its cranial aspect and smaller Pars Cystica on caudal aspect will later form the gall bladder. Pars Hepatica further divides into Right and Left lobes. The cells from these lobes give rise to hepatic trabeculae in the form of interlacing column. As a result there will be break down of umbilical and vitelline veins to form Sinusoids. It is mesenchyme of the septum Transversum give rise sinusoids. Parenchyma of liver and biliary capillaries arises from the endodermal cells of hepatic bud. Capsule arises from the mesoderm of septum Transversum. Formation of bile starts from third month of intra uterine life [IUL]. Fetal liver is an important organ of Haemopoiesis. Anomalies of liver are i] presence of left lobe rudimentary, ii] lobation of liver, iii] Reidel's lobe, iv] Quadrate lobe and gall bladder absence, v] Accessory lobe in Falciform ligament²¹.

IN PRESENT STUDY:

Only three livers have shown the variations. There was no absence of any lobe, hypoplasia, no vascular anomalies, No fissures seen on anterior surface unlike in the studies of Vybhav et al studies. There was no agenesis of right lobe of liver unlike in studies of Vasudha Ravindra Nikam. Mini accessory fissure were present in two livers. In one liver, visceral impressions were comparatively deep, in other liver patency of ligamentum teres with left umbilical vein was present was in it. There was neither hepatic pathology nor abnormality of parenchyma of liver. There was no transposition of gall bladder, but in this study gall bladder was compressed and dorsally ventrally flattened. Sizes of liver were variable and in one liver size of both liver were of equal size No situs inversus were seen.

CONCLUSION:

This study will be of paramount importance for Radiologists & Surgeons in order to prevent wrong interpretations, misdiagnosis and also for surgical planning during preoperative period.

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specimens of liver to study.

TAKE HOME MESSAGE: This study on liver variations will impart knowledge to clinicians especially to the Radiologist, Physicians and Anatomists. Hence the study has **great clinical importance**

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