# *Management of Benign liver cysts &tumors in pediatric age group*

Thesis

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General Surgery

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# Abstract

Most of benign liver cysts &tumors in pediatric age group are asymptomatic &require no treatment , for just follow up clinically or by abdominal UlS is enough e.g.simple hepatic cysts

Abdominal U/S is initial diagnostic tool for benign liver cysts & tumors.

*Abdominal Triphasic CT is the gold standard for diagnosis of most of benign liver cysts & tumors.e.g. hemangioma &pyogenic liver abscess*

*Some of them need additional investigation as serological tests e.g. Hydatid cyst&amaebic abscess ,others require biobsy for sure diagnosis e.g. Mesenchymal Hamartoma*

Others require medical treatment e.g. pyogenic hepatic abscess & some cases of Hemangioma ,

Others require aspiration e.g. pyogenic hepatic abscess. In combination with antibiotics



## Key Words :

Benign liver cysts – Hemangioma .

## *Contents*

| ***List of abbreviation*** | |
|---|---|
| *MHL* | *Mesenchymal hamartoma of the liver* |
| *HCA* | *Hepatocellular adenoma* |
| *HCC* | *Hepatocellular carcinoma* |
| *FNH* | *Focal nodular Hyperplasia* |
| *OC* | *Oral contraceptives* |
| *PCLD* | *Polycystic liver disease* |
| LCD | Liver-cell dysplasia |
| *PLA* | *Pyogenic liver abscess* |
| *LA* | *Liver abscess* |
| | |

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# Review of the Literature

## Embryology

### *Development of the Liver*

- The liver arises in the form of a diverticulum or hollow outgrowth from the ventral surface of that portion of the gut which afterward becomes the descending part of the duodenum.

- This diverticulum is lined by endoderm and grows upwards and forward into the septum transversum. which is a mass of mesoderm between the vitelline duct and the pericardial cavity.

- Then, it gives off two solid buds of cells which represent the right and the left lobes of the liver. The solid buds of cells grow into columns or cylinders, termed the hepatic cylinders**,** which branch and anastomose to form a close meshwork.

- This network invades the vitelline and umbilical veins, and breaks up these vessels into a series of capillaries like vessels termed sinusoids (Minot), which ramify in the meshes of the cellular network and ultimately form the venous capillaries of the liver. By the continued growth and ramification of the hepatic cylinders the mass of the liver is gradually formed..

- The original diverticuhitm from the duodenum forms the common bile duct, and from this the cystic duct and gall bladder arise as a solid outgrowth which later acquires a lumen. The opening of the common duct is at first in the ventral wall of the duodenum, later, owing to the rotation of the gut, the opening is carried to the left and then dorsalwards to the position it occupies in the adult. ***(1)***

- As the liver undergoes enlargement, both it and the ventral mesogastrium of the foregut arc gradually differentiated from the septum transversum; and from the under surface of the latter the liver projects downward into the abdominal cavity

- By the growth of the liver the ventral mesogastrium is divided into two parts ,of which the anterior forms the falciform and coronary ligaments and the posterior the lesser omentum..About the third month the liver almost fills the abdominal cavity, and its left lobe is nearly as large as its right. From this period the relative development-of the liver is less active, more especially that of the left lobe, which actually undergoes some degeneration and becomes smaller than the right; but up to the end of fetal life the liver remains relatively larger than in the adult. . ***(1)***

- The hepatic artery and portal vein, accompanied by numerous nerves, ascend to the porta, between the layers of the lesser omentum. The .bile duct and the lymphatic vessels descend from the porta between the layers of the same omentum. The relative positions of the three structures are as follows: the bile duct lies to the right, the hepatic artery to die left, and the portal vein behind and between the other two. They are enveloped in a loose areolar tissue, the fibrous capsule of Glisson, which accompanies the vessels in their course through the portal canals in the interior of the organ. ***(1)***

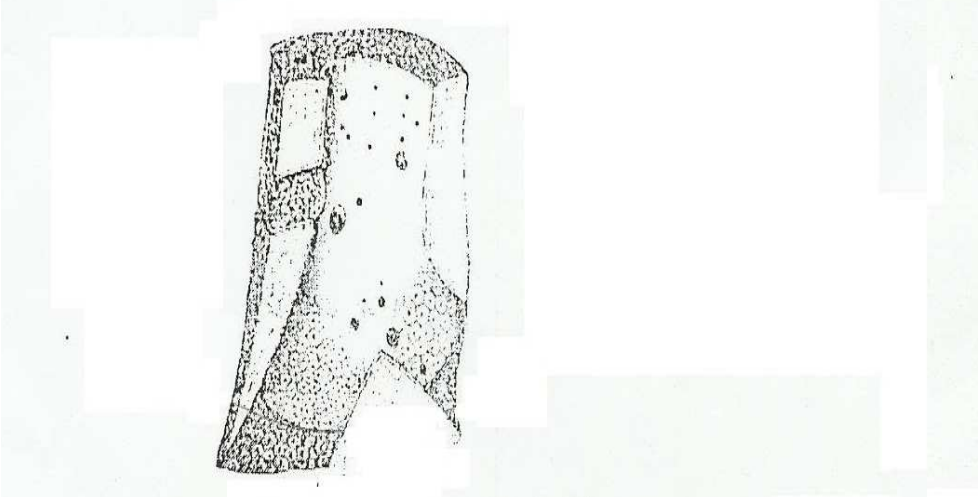

FIG. I- Longitudinal section of a hepatic vein,. (After Kiernan). *(1)*

**Development of Hepatic veins:**

• If one of the sublobular veins laid open, the bases of the lobules may he seen through the thin wall of the vein on which they rest, arranged in a form resembling a lesselated pavement, the center of each polygonal space presenting a minute aperture, the mouth of an intralobular vein (Fig- 1).

• Arrived at the center of the lobule, the sinusoids empty themselves into one vein, of considerable size, which runs down the center of the lobule from apex to base, and is called the intralobular vein. At the base of the lobule this vein opens directly into the sublobular vein, with which the lobule is connected. The sublobular veins unite to form larger and larger trunks, and end at last in the hepatic veins; these converge to form three

large trunks which open into the inferior vena cava while that vessel is situated in its fossa on the posterior surface of the liver (Fig. 2).

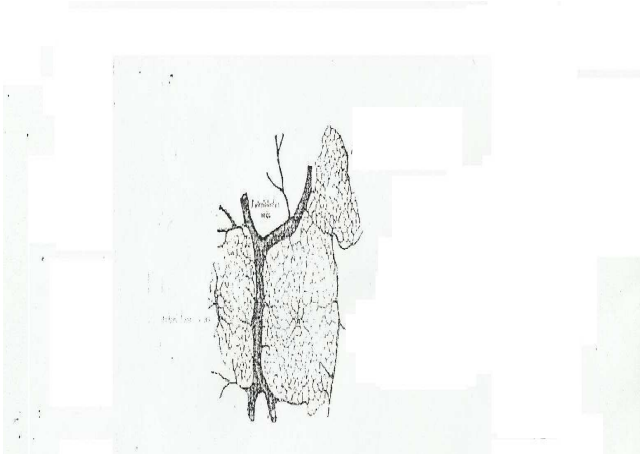

FIG. 2- Section of injected liver *(1* )

• The right hepatic vein (RHV) is the remnant of superior part of the right vitelline vein. The inferior part of the right vitelline vein forms the branches of the right main portal branch. During vein regression, with the closing of cross-communications between the right and left vitelline veins, the portal vein is formed, while the right umbilical vein completely obliterates ***(2)***

• Since the liver tissue grows intensively, the tributaries of the RHV and the branches of the right main portal brunch interdigitate at the level of the second portal bifurcation ***(3))***

**Embryology of Hepatic Circulation**

• The umbilical vein in the fetus runs obliquely upwards, backwards, and to the right side, in the posterior or free margin of the falciform ligament of the liver.

• Having arrived in the Umbilical or horizontal fissure of this gland, it sends several branches to the left lobe, and one or two small ones to the quadrate lobe.

• Then while continuing its course backwards, it receives the left branch of the portal-vein; after having communicated with this branch, it passes between the Spigelian (caudate) and

left lobes of the liver, and in this part of its course receives the name of the ductus venosus, which terminates finally in inferior vena cava or left hepatic vein.

- The portal vein in the fetus divides into two branches one of which sinks into the right lobe, the other runs towards the left lobe of the liver and terminates in communicating with the umbilical vein.
- On examining the distribution of these two large veins in the fatal liver, we will perceive that in reality the right lobe receives blood from the portal vein only, but the left from both the portal and umbilical veins. This explains why the left lobe is so well developed at this period of life. After birth, however, the ductus venosus becomes entirely obliterated, but left branches of the umbilical vein and a part of its trunk remain patent.way for the blood of the porta to arrive at the left lobe of the liver. All the rest of the umbilical vein is obliterated.

Each lobule of the liver has a conical form, and when divided longitudinally presents a foliated appearance; and through its axis passes a small vein, termed the intra -lobular vein. This vein terminates at a right angle in a larger vein, which is applied to the base of the lobule; this is accordingly called a sub- lobular vein. The sub-lobular veins terminate in the hepatic veins and these again terminate in the inferior vena cava. Now, all that portion of the exterior of a lobule, which does not constitute its base, is termed its capsular surface, because it is in contact with, and separated from, the surrounding lobules by a process of the capsule of Gliason, which serves as a capsule for the lobule***.(1)***

# *Anatomy*

The liver is the largest gland and the second largest organ in the body (second only to skin). The liver is the largest internal organ, representing 2-3% of the total body weight in an adult. It occupies the right upper quadrant of the abdomen, surrounding the inferior vena cava and attaches to the diaphragm and parietal peritoneum by various attachments that are commonly referred to as ligaments. Liver anatomy can be described in two main forms: the *classical or morphological* anatomy and the *functional* or surgical anatomy A complete understanding of the surgical and interventional approach to the liver requires a comprehensive understanding of its anatomy and vascular supply ***(4)***

- THE VASCULAR **SUPPLY:**

The vascular supply of the liver includes 2 sources of inflow that travel in the hepatoduodenal ligament: the hepatic artery and the portal vein. The hcpatic artery is generally derived from the celiac axis, which originates on the ventral aorta at the level of the diaphragm. Common variations include a replaced right hepatic artery, which originates from the superior mesenteric artery, a replaced left hepatic artery, which is derived from the left gastric artery, or a completely replaced common hepatic artery, which can originate from the superior mesenteric artery or aorta. The hepatic artery supplies 30% of the blood flow to the normal liver parenchyma but greater than 90% of blood going to hepatic tumors, including both hcpatocellular carcinoma and metastatic lesions ***(5)***

The other major inflow vessel is the portal vein which carries 70-85% of the blood into the liver. The portal vein is the confluence of the splenic

vein and the superior mesenteric vein, which drain the intestines, pancreas, stomach, and spleen.

**Variation in hepatic arterial anatomy**: is seen in 40 - 45% of people. Classic branching of the common hepatic artery from the celiac artery, and the proper hepatic artery into right and left hepatic arteries to supply the entire liver, is seen in 55- 60%.

In general, the common hepatic artery may arise From the abdominal aorta or SMA, and all or part of the right and left hepatic arteries may arise from be replaced to other vessels. The two commonest variants are right hepatic artery stemming from the SM A and left hepatic artery coming from the left gastric artery.

Another common finding, though not considered a variant by many authors, is trifurcation of the common hepatic artery into right hepatic artery, left hepatic artery and gastroduodenal artery (GDA). with this branching pattern there is no ‘‘proper hepatic artery’’***(4)***

***Most common variants:***

- ***Common hepatic artery:***
    1. front aorta : 2%
    2. from SMA : 2%
    3. trifurcation into RHA, LHA and GDA : 4 -8%
- ***Right hepatic artery( RHA):***
    1. From celiac artery : 1- 4%
    2. from SMA: 9 - 15%
    3. accessory RHA from SMA : 1- 7%
- **Left *hepatic artery (LHA):***

1. from left gastric artery (LGA) : 4 - 11%
2. accessory LHA from LGA : 4 - 1 1%