THE ASSESSMENT OF DIMINISHED RESPONSE OF THE PORTAL VEIN MAIN TRIBUTARIES TO RESPIRATION AS A CHARACTERISTIC SIGN IN THE DIAGNOSIS OF PORTAL HYPERTENSION

Thesis
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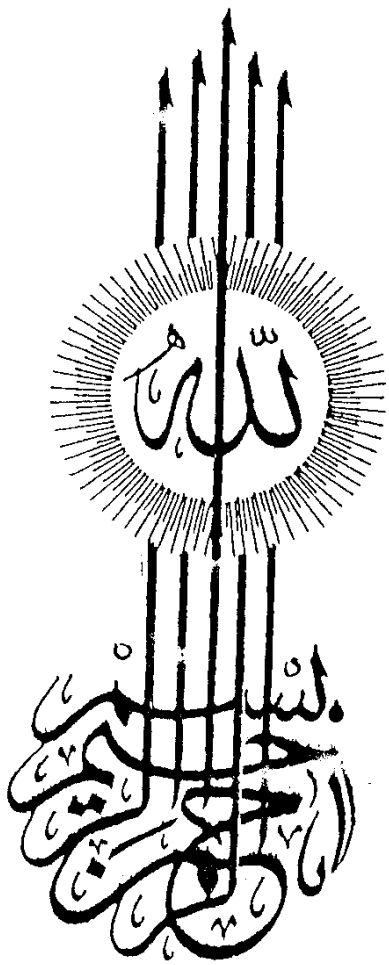

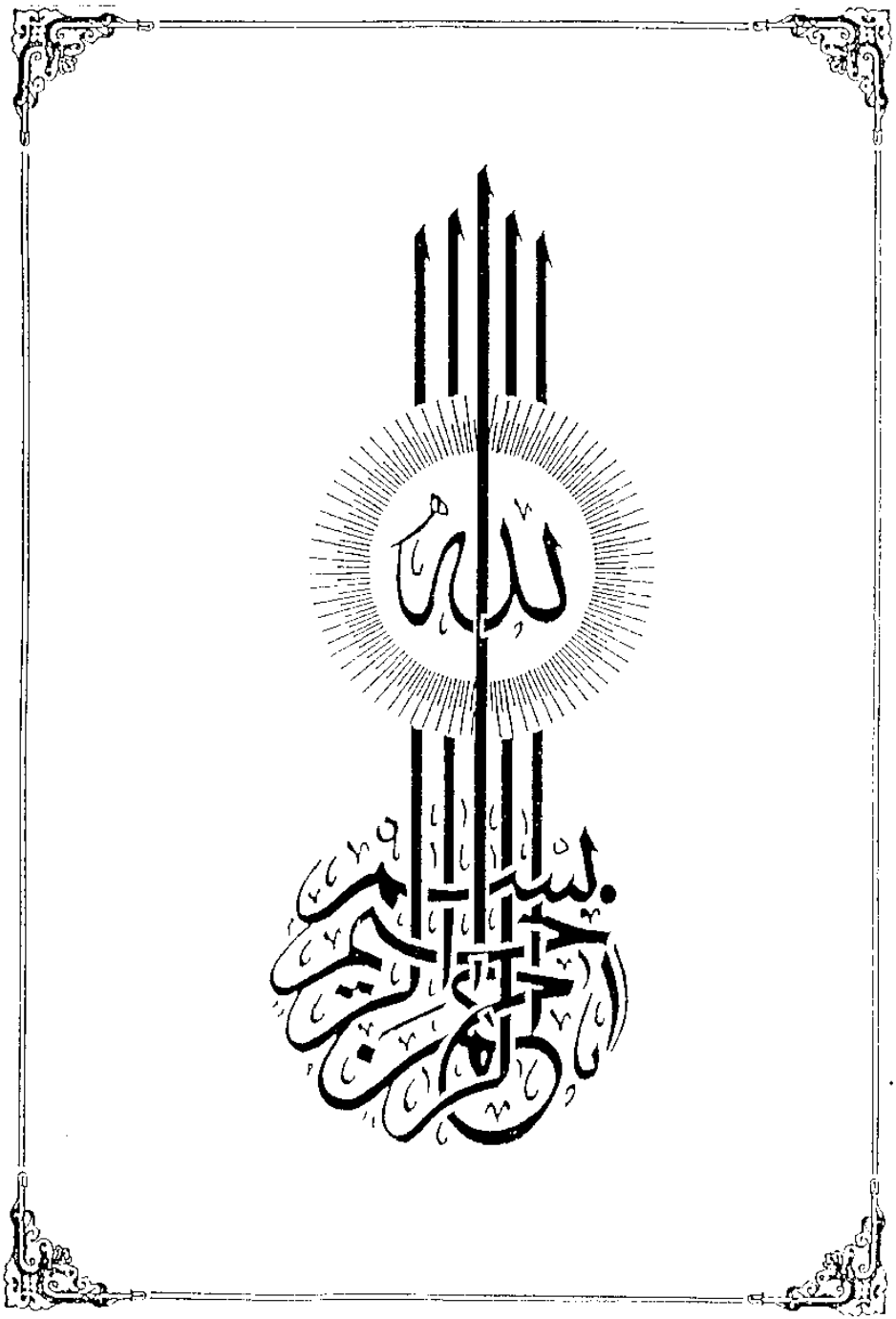

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I N D E X

INTRODUCTION
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The morpholgical and haemodynamic changes in the portal system in liver cirrhosis with portal hypertension are the basic factors in the development of its most important complications namely haemorrhage from oesophageal varices and ascites. Yet detection of such changes usually necessitates the use of angiography with all its drawbacks such as high risk and great technical skill which therefore usually limit its use to patients in whom shunt surgery is planned. Also the less risky procedures such as endoscopy and barium meal studies still bear varying degrees of discomfort to the patient, and more important is that they fail to give a clear picture of the morphological changes in the portal system which may exist long before the development of these varices.

Therefore, the need has arisen for a relatively simple non-invasive technique which may provide information about the portal circulation with a degree of accuracy which would make it dependable. Due to impressive technological developments in recent years, ultrasonography seems able to satisfy this need, providing images of the portal splenic, and superior mesenteric veins (Sarti et al, 1975 and Bolondi and Gandolfi 1978). This technique could represent a valid initial screening method for the diagnosis of portal hypertension, the detection of portal vessel obstruction and the evaluation of the patency of surgical portocaval shunts. (Webb et al, 1977).

In most studies which were aimed at researching the existence of ultrasonographic signs of portal hypertension and evaluating their diagnostic importance, dilatation of the portal vein could be considered a fair characteristic sign. However, this observation was challenged by Cottone et al., 1983 who, using an upper limit for normal caliber as 1.2 cms, found it missing in 40 % of patients with established cases of portal hypertension, and Bolondi et al., 1982 using a caliber of 1.3 cms, again found it absent in 50 % of the cases.

Also the accumulation of periportal echoes, the coma shaped appearence of the portal trunk, the visualization of splenic radicles in an enlarged spleen should all be considered non specific signs of portal hypertension that cannot support the diagnosis with a sufficient degree of certainty.

The only ultrasonographic finding that is so far considered specific for portal hypertension is recanalization of the umbilical vein, but unfortunately it is a rather scarce finding (Schabel et al 1980).

Variation of the size of the main portal vein and its two main components (superior mesenteric and splenic veins) with respiration is noted in normal subjects.

The increase may amount to 50-100% during inspiration particularly in the splenic and superior mesenteric veins and to a less extent in the main portal vein (Moreno et al., 1967) .

It is our aim to assess the validity of the impaired respiratory response of these veins and compare it with the change in size of the main portal vein in order to establish whether this ultrasonographic finding should be considered more specific in the ultrasonographic diagnosis of portal hypertension in its early stages.

REVIEW OF LITERATURE

ANATOMY OF THE PORTAL VENOUS SYSTEM

The liver constitutes approximately one-fiftieth of the total body weight. The liver may be visualized as a mass of blood in which innumerable plates of liver cells are suspended, each being a single cell of thickness. Actually only 50 percent of the liver's weight is in the form of hepatocytes and liver parenchyma, the rest is loaded vascular channels, therefore the liver cellular component versus vascular content is in the ratio of 1:1, in fact Gross has likened the liver to a sponge of blood (Du Plesis, 1975). This reflects the complexity of its function.

The efferent blood supply to the liver arises from two sources, the hepatic artery, arising from the coeliac axis, carries oxygenated blood and accounts for approximately 25 percent of hepatic blood flow, and the portal vein. According to the best available estimates indicating that about 75 percent of the hepatic blood flow and about 50 percent of the oxygen consumption are supplied by the portal vein (Tygstrup et al., 1962).

The portal system included all the veins which drain the blood from the abdominal part of the digestive tube (with the exception of the lower part of the anal canal) and from the spleen, pancreas and gall bladder. From these viscera the blood is conveyed to the liver by the portal vein (Gray's, 1973).

Embryology of the portal vein

The portal vein derives from the omphalo-mesenteric vein which brings blood from the yolk sac and the intestine to the liver (Rappaport, 1975).

The omphalic portion of the vein regresses with the disappearance of the yolk sac. With the growth of the intestine, the mesenteric portion persists and becomes the tributaries of the portal vein. (Rappaport, 1975).

Its stem is formed by the omphalomesenteric trunks arranged in a figure of "8" around the first and third portions of the duodenum. Its spiral course is formed by dropping out of the posterior (right) limb of the "8" below and the anterior (left) limb of the "8" above (Rappaport, 1975).

Anomalies of the portal system

These are extremely rare, but have been reported and may result in portal hypertension which can be fatal.

In 1954 Child reported some variations in the portal system which are:

a- The portal vein may empty directly in the inferior vena cava.

b- The vein, its formative vessels and its tributaries may be located anterior to the pancreas and first part of the duodenum in which circumstance it is frequently associated with a partial or complete situs inversus.

c- The pulmonary veins join the portal.

Leger et al., 1962 stressed the point that the post natal obliterative process in the umbilical vein may spread to the portal system, leading to congenital stricture or obliteration.

Other rare anomalies of the portal vein include agenesis of the vein, a bifid vein, valves present in the vein (Rousselot and Burchell, 1975).

Extrahepatic portion of the portal vein

The portal vein begins at the level of the second lumbar vertebra just posterior to the neck of the pancreas by the confluence of the superior mesenteric and splenic veins and, at times the inferior mesenteric vein (Gray's, 1973).

The splenic veins originate at the splenic hilum and join near the tail of the pancreas with the short gastric veins to form the main splenic vein. This proceeds in a transverse direction behind the body and head of the pancreas and receives numerous tributaries from the head of the pancreas. The left gastro-epiploic vein enters it near the spleen.

The inferior mesenteric vein draining blood from the left part of the colon and the rectum usually enters the middle third of the splenic vein, although occasionally it enters the junction of the superior mesenteric and splenic veins. (Gray's 1973).

The superior mesenteric vein collects blood from the small intestine, the cæcum, the ascending and transverse part of the colon. It usually begins in the right iliac fossa by the union of its numerous tributaries and ascends in the mesentery until the neck of the pancreas to meet the splenic vein (Gardner et al., 1975).