

1. Features of Liver

The liver (Greek, hepar: hence the adjective hepatic) lies in the right upper quadrant of the abdomen, immediately inferior to the diaphragm. The liver, the largest gland in the body, has both external and internal secretions, which are formed in the hepatic cells. Its external secretion, the bile, is collected after passing through the bile capillaries by the bile ducts, which join like the twigs and branches of a tree to form two large ducts that unite to form the hepatic duct. The bile is either carried to the gall-bladder by the cystic duct or poured directly into the duodenum by the common bile duct where it aids in digestion. The internal secretions are concerned with the metabolism of both nitrogenous and carbohydrate materials absorbed from the intestine and carried to the liver by the portal vein. The carbohydrates are stored in the hepatic cells in the form of glycogen which is secreted in the form of sugar directly into the blood stream. In the male it weighs from 1.4 to 1.6 kilogram, in the female from 1.2 to 1.4 kilogram. It is relatively much larger in the fetus than in the adult, constituting, in the former, about one-eighteenth, and in the latter about one thirty-sixth of the entire body weight. Its greatest transverse measurement is from 20 to 22.5 cm. Vertically, near its lateral or right surface, it measures about 15 to 17.5 cm., while its greatest anterior-posterior diameter is on a level with the upper end of the right kidney, and is from 10 to 12.5 cm. Opposite the vertebral column its measurement from before backward is reduced to about 7.5 cm. Its consistence is that of a soft solid; it is friable, easily lacerated and highly vascular; its color is a dark reddish brown and soft organ, and its specific gravity is 1.05.

2. Development

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 entoderm, and grows upward and forward into the septum transversum, a mass of mesoderm between the vitelline duct and the pericardial cavity, and there 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 capillary-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 diverticulum 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 dorsal ward to the position it occupies in the adult.

As the liver undergoes enlargement, both it and the ventral mesogastrium of the fore-gut are 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.

3. Peritoneal Relations

The liver is nearly surrounded by peritoneum, which (as the ventral mesogastrium of the embryo) attaches it to the body wall (falciform ligament) and to the stomach. The falciform ligament connects the anterior abdominal wall and diaphragm to the liver. The free edge of the falciform ligament meets the inferior border of the liver at a notch for the ligamentum teres, where that ligament (obliterated left umbilical vein) is conveyed to the porta. As the two layers of the falciform ligament reach the liver, the left layer becomes continuous superiorly with the left triangular ligament and the right layer with the upper layer of the coronary ligament. The upper and lower layers of the coronary ligament, which meet at the right as the right triangular ligament, diverge toward the left and enclose the triangular "bare area" of the liver, which is in direct contact with the diaphragm. The junction of the left triangular and coronary ligaments leads to the lesser omentum, which has an L-shaped attachment to the liver.