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MORPHOLOGICAL AND ANATOMICAL FEATURES OF THE LIVER IN NEWBORNS

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Abstract
The article examines the anatomical and morphological structures of the liver in 24 newborns and elderly individuals (cadavers). As a result of scientific research, it was established that the liver of newborns consists of lobules separated by connective tissue layers. Longitudinal connective tissue fibers pass under the capsule, predominantly of collagen type. Sinusoidal capillaries, hepatic cells, and central veins are clearly visible. In newborns, the weight of the liver averages 120

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to 150 g, constituting approximately 4-5% of body weight. In elderly individuals, the liver surface becomes denser, and its parenchyma undergoes gradual replacement with fibrous tissue. At old age, the liver weight averages 1200 - 1500 g.

Introduction

Relevance of the topic

Children's health is a complex indicator, the formation of which, according to the World Health Organization, should be considered in unity with the health of the mother and the state of the external environment [WHO, 2007]. Today, one of the most important problems for researchers is the study of morphology, physiology, and pathology of the hepatobiliary system, which is primarily due to the demands of clinical medicine. Given that the human body has begun to experience significant impact from new environmental, social, and other factors, the liver — as the largest parenchymal organ — plays a central role in metabolism, detoxification, and immune regulation [1, 4-6, 11, 13]. Newborns with pathology of the liver have a high morbidity and mortality rate [5, 7, 8, 11]. The main functions of the liver (metabolic, hematopoietic in the fetal period, detoxifying, and immune) are carried out mainly due to the activity of hepatocytes and Kupffer cells. Literature data indicate the functional significance of the liver at all postnatal stages of life. At the same time, data on the age characteristics of the structural components of the liver remain contradictory, primarily associated with different gradations used by researchers for age groups and the study of this organ mainly during the neonatal period. Scientific data are a necessary element in clinical medicine for proper treatment and preventive measures in individuals with varying degrees of hepatic dysfunction and pathology [1-3, 6, 9, 10, 12].

Purpose of the study.

Study of the structure and biometric, anatomical indicators of the liver in newborns.

Methodology and research methods

In newborns, the longitudinal dimensions of the right hepatic lobe range from 6.2 ± 8.4 cm (on average 7.3), left lobe — from 3.1 ± 4.8 cm (average — 3.9).

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Transverse dimensions of the right lobe range from 5.5 ± 7.2 cm (average — 6.3), left — from 2.8 ± 4.0 cm (average — 3.4). Thickness of the right lobe ranges from 3.5 to 5.2 cm (average 4.3). Thickness of the left lobe is 2.0 ± 3.1 cm (average 2.5). The upper border of the liver in newborns is located at the level of the IV intercostal space on the right midclavicular line. The lower border of the right lobe extends 2.5 ± 3.5 cm (average 3.0) below the costal margin. In elderly individuals, during autopsy, the liver appears brownish-red with a firmer consistency. Its surface may be irregular, and connective tissue content increases significantly. As liver parenchyma decreases functionally with age, it is gradually replaced by fibrous tissue. In the elderly, the liver weight averages 1200–1500 g. The morphological features of the liver in newborns are determined by its critical functions in metabolism and immune defense. The liver is an extremely active organ at birth, involved in hematopoiesis during the fetal period and subsequently in the regulation of metabolic processes and detoxification.

Morphological structure of the liver

Structure: The liver consists of two main lobes — the right and the left — separated by the falciform ligament. Histologically, the liver is organized into classical lobules, portal lobules, and acini. Classical hepatic lobule: The classical lobule is hexagonal in shape, with a central vein at its core and portal triads at its periphery. Hepatocytes are arranged in radiating cords (trabeculae) separated by sinusoidal capillaries. Portal triad: Each portal triad contains a branch of the portal vein, hepatic artery, and bile duct. In newborns, the interlobular connective tissue is sparse, and lobule boundaries are less distinct compared to adults. Sinusoidal system: Between hepatic cords, sinusoidal capillaries are lined by fenestrated endothelial cells and Kupffer cells. The Space of Disse, located between sinusoids and hepatocytes, is the site of metabolic exchange. Size and shape: At birth, the liver is relatively large, bright reddish-brown, and smooth in surface texture. It is located predominantly in the right hypochondrium and epigastric region.

At birth, the liver weighs approximately 120–150 g, which constitutes 4–5% of total body weight — proportionally much greater than in adults. Cell composition: Hepatocytes constitute approximately 80% of liver cells. They are responsible for protein synthesis (albumin, clotting factors), glycogen storage, lipid metabolism, and bile production. Kupffer cells: These resident macrophages are located in sinusoids and play a key role in immune defense by phagocytosing

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bacteria, cellular debris, and foreign particles. Stellate cells (Ito cells): Located in the Space of Disse, these cells store vitamin A and are involved in fibrosis when activated. Histological features: The liver is surrounded by a thin fibrous capsule (Glisson's capsule). In newborns, hepatocytes are larger, with more prominent nuclei and abundant glycogen content. Extramedullary hematopoiesis may be observed in neonatal liver specimens, reflecting residual fetal function. Functional features: The liver plays a central role in regulating the metabolic and immune activity of the newborn. It synthesizes plasma proteins and coagulation factors, metabolizes bilirubin, and continues limited hematopoiesis in the early neonatal period. The liver also participates in the regulation of blood glucose and lipid transport.

Conclusions

Thus, in newborns, the liver is large, reddish-brown, and consists of multiple lobules of varying sizes separated by thin layers of connective tissue. The liver has a delicate connective tissue capsule (Glisson's capsule) consisting mainly of collagen fibers. The hepatic parenchyma beneath the capsule consists of organized cords of hepatocytes arranged around central veins with intervening sinusoidal spaces. Kupffer cells are more numerous in the periportal zones. Interlobular partitions are poorly developed in newborns compared to adults. Extramedullary hematopoiesis, central veins, and portal triads are clearly identifiable. In the elderly, unlike in newborns, hepatocyte mass is progressively replaced by fibrous tissue and lipofuscin accumulates in hepatocytes, reflecting age-related involution.

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