

Specific characteristics of the blood supply of the sphincteric apparatus of the extrahepatic bile ducts during the prenatal period of human ontogenesis

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The formation of the intraorgan blood stream and the source of vascularization of the sphincteric apparatus of the extrahepatic bile ducts have been traced on 32 series of histologic sections of human fetuses, ranging from 14,0 to 79,0 mm of the parietococcygeal length by means of the microscopy, morphometry, graphical and 3D-reconstructing methods.

Key words: sphincteric apparatus, extrahepatic bile duct, fetus, human being.

INTRODUCTION

The blood supply of the extrahepatic bile ducts in man is notable for variability which is important to take into account during surgical interferences on the organs of the hepatobiliary system [1]. The publications of recent years adduce only scanty information, pertaining to the formation of the blood channel of the derivatives of the intestinal tube during the intrauterine development (IUD) in a human [2-5]. At the same time, ascertaining the specific characteristics of the formation of the blood vessels of the common bile duct (CBD) at an early stage of human ontogenesis will enable to understand deeper the consistent patterns of the vascularization of the biliary tract [6, 7].

The aim of the research is to study the specific features of the organization of the blood stream of the CBD during the prenatal period of human ontogenesis.

MATERIALS AND METHODS

The research has been carried out on 32 series of histological sections of human fetuses from

14.0 to 79.0 mm of parietococcygeal length (PCL) by means of the methods of microscopy, morphometry, graphic and 3D-reconstruction. The IUD period are systematized on the basis of the classification of G.A.Schmidt (1968).

RESULTS AND DISCUSSION

It has been established that at the end of the VII week of the IUD in fetuses of 18.0-19.0 mm of PCL the CBD is located in the thickness of the mesenchyma of the ventral mesogastrium behind the superior portion of the duodenum and is joined with the duct of the ventral anlage of the pancreas on the concave surface of the descending portion of the intestine. The layer of the mesenchymal cells adjacent to the CBD walls delimited from the neighboring cells of the surrounding mesenchyma in a caudal direction assumes a clear-cut circular orientation.

Isolated lumens of the blood vessels of the capillary type are detected in the said mesenchymal layer, primarily on the left and caudally from the CBD, corroborating the formation of its intraorgan blood channel during this period. One can differentiate 3 portion in the VIII week of IUD in fetuses of 23.0-29.0 mm PCL in the CBD: the retroduodenal section located behind the superior part of the duodenum, the pancreatic segment between the pancreatic head and the medial wall of the descending portion of the duodenum and the intramural one — in the thickness of the medial wall of the latter. The duodenal branch of the gastroduodenal artery is located on the left and in front at a distance of 150 μ m from the retroduodenal portion of the CBD. On the right at a distance of 90 μ m the pancreatic section of the CBD is accompanied with the superior posterior pancreaticoduodenal artery in a descending direction (Fig. 1). The branch of the inferior pancreaticoduodenal

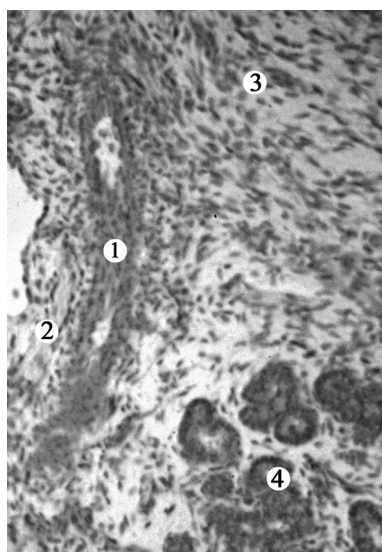


Fig. 1. Frontal section of terminal portion of common bile duct of the prefetus of 27.0 mm PCL. Hematoxylin and eosin staining. Lens: x8; ocular: x7.

1 – common bile duct; 2 – superior posterior pancreaticoduodenal artery; 3 – mesenchymal cells; 4 – pancreas.

artery approaches caudally at a distance of 120 μ m to the terminal portions of the CBD and the pancreas.

Tiny duodenal branches from the gastroduodenal artery approach the left wall of the retroduodenal portion of the CBD, primarily, at the front and behind in a longitudinal direction in the IX week of the IUD in prefetuses of 32.0-40.0 μ m PCL. The pancreatic portion of the CBD obtains branches from the superior pancreaticoduodenal artery on the right in an oblique transverse direction. Tiny blood vessels, passing mainly from the inferior pancreaticoduodenal artery, are located cranially and on the left between the circular and longitudinal fascicles of myoblasts, surrounding the intramural portion of the CBD and the hepatopancreatic junction.

At the end of the X week of the IUD the lumens of the blood vessels are identified, their walls are covered by the endothelium and surrounded by the circular layer of the mesenchymal cells in prefetuses of 45.0-52.0 mm PCL around the hepatopancreatic junction and among the muscular fascicles of Oddi's sphincter (Fig. 2).

It is indicative of the formation of the subepithelial and intramuscular vascular plexuses of the major duodenal papilla. The branches of the inferior pancreaticoduodenal artery are the source of its vascularization and that of the intramural CBD portion.

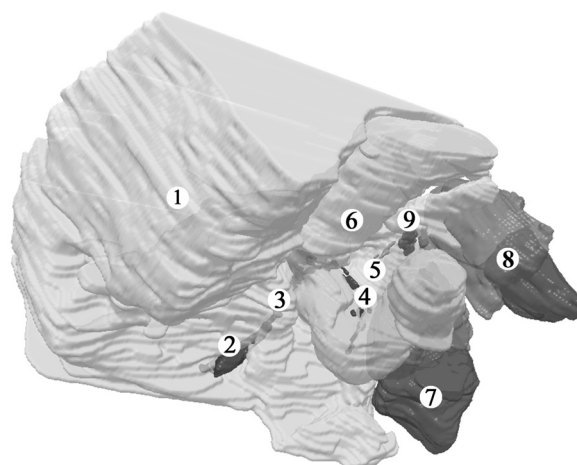


Fig. 2. 3D-reconstruction of serial saggital histotopographic sections of abdominal organs of the male prefetus 48.0 mm PCL. Left antero-inferior projection.

1 – liver; 2 – gallbladder; 3 – cystic duct; 4 – common bile duct; 5 – main pancreatic duct; 6 – duodenum; 7 – right kidney and suprarenal gland; 8 – left kidney and suprarenal gland; 9 – pancreaticoduodenal artery.

CONCLUSIONS

1. The forming of the intraorgan blood channel of the common bile duct is detected at the end of the VII week of the intrauterine development in prefetuses measuring 18.0-19.0 mm PCL.

2. The source of the vascularization of the common bile duct in its retroduodenal and pancreatic portions is the branches of the gastropancreatic artery, whereas in the intramural portion – of the inferior pancreaticoduodenal artery.

In order to detect possible variants of the blood supply of the common bile duct it is expedient to investigate the specific characteristics of the formation of its blood channel in human fetuses and newborns.

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О.В.Цигикало. Особливості кровопостачання сфінктерного апарату позапечінкових жовчних проток у пренатальному періоді онтогенезу людини. Чернівці, Україна.

Ключові слова: сфінктерний апарат, позапечінкові жовчні протоки, передплід, людина.

На 32 серіях гістологічних зрізів передплідів людини 14,0-79,0 мм тім'яно-куприкової довжини за допомогою методів мікроскопії, морфометрії, графічного та 3D-реконструювання простежено формування інтраорганного кровоносного русла і джерела васкуляризації сфінктерного апарату позапечінкових жовчних проток.

А.В.Цигикало. Особливості кровоснабження сфінктерного апарату внепеченочних желчных протоков в пренатальному періоді онтогенеза человека. Черновцы, Украина.

Ключевые слова: сфинктерный аппарат, внепеченочные желчные протоки, предплод, человек.

На 32 сериях гистологических срезов предплодов человека 14,0-79,0 мм теменно-копчиковой длины с помощью методов микроскопии, морфометрии, графического и 3D-реконструирования прослежено формирование интраорганного кровеносного русла и источники васкуляризации сфинктерного аппарата внепеченочных желчных протоков.

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