ORIGINAL PAPERS

FEATURES OF THE UMBILICAL VEIN TOPOGRAPHY IN AN ADULT

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ABSTRACT

Background: In modern medicine, umbilical vein in an adult can be bougienaged in order to fulfil an extraperitoneal transumbilical portohepatography and transumbilical manometry for the diagnosis of portal hypertension. The scientific work describes the features of the umbilical vein topography, as well as the possibility of its bougienage in 6 macroscopic preparations of liver of the adult patients.

Methods: Studied the topography of the umbilical vein and its branches in 6 macroscopic preparations of liver of the adult patients, who died of pathologies unrelated to hepatobiliary system.

Results: Umbilical vein is divided into two branches, one of which (the ductus venosus) flows into the inferior vena cava, and the other - in the left branch of the portal vein, preliminary forming an expansion - umbilical-portal transition. It was carried out the measuring of length and diameter of the branches of this vessel. The length of the ductus venosus was 36-40 mm, the length of branch flowing into the left branch of the portal vein - 15-16 mm. The diameter of the ductus venosus and branches, flowing into the left branch of the portal vein, was 3-4 mm, an outer diameter of umbilical-portal transition was 5-7 mm. Before the bifurcation by umbilical vein depart 3-7 additional branches, going to the liver parenchyma. Umbilical vein normally in a healthy person is obliterated. In the absence of pathology from the side of hepatobiliary system, its clearance is maintained only in the field of umbilical-portal transition. However, this vessel can be bougienaged throughout.

Conclusion: The greatest diameter umbilical vein has in the area of umbilical-portal transition, which is 5-7 mm. Before the bifurcation by umbilical veins depart from 3 to 7 additional branches in the liver parenchyma. Umbilical vein normally retains the lumen only in its upper part in the area of umbilical-portal transition.

KEYWORDS

Umbilical Vein, Venous Flow, Portal Vein

INTRODUCTION

In modern medicine, umbilical vein in an adult can be bougienaged in order to fulfil an extraperitoneal transumbilical portohepatography and transumbilical manometry for the diagnosis of portal hypertension [1,2,3]. In addition, this vessel is widely used in neonatology and paediatric reanimation, among children during the first 3-4 weeks of life as the primary central venous access for carrying out infusion therapy [4,5,6,7].

During embryogenesis, in fetus lay 2 umbilical veins draining into the venous sinus of the heart: the right and left. From 4 to 7 weeks of intrauterine development occurs gradually obliteration of the right umbilical vein and portion of the left umbilical vein, which flows into the venous sinus. Between the left umbilical vein and the left hepatic vein forms an anastomosis, also there is a gradual merging of sinusoidal capillaries, thereby forming a vascular channel, known as the ductus venosus, which forms a direct continuation of umbilical vein and flowing into the inferior vena cava. And itself left umbilical vein, becomes larger, transforming itself into the umbilical vein, which lies in the umbilical cord and is involved in the circulation of the fetus [8,9].

In the absence of pathology from portal system umbilical vein obliterates to 12th days of extrauterine life of a child. The lumen is preserved only in the area of umbilical-portal transition [10].

In adults, umbilical vein passes in round ligament of liver (ligamentum teres hepatis), which runs from the navel up to the visceral surface of the liver (Figure 1). In this area, umbilical vein is located in front of the left longitudinal furrow (fissura ligamenti teretis), and then goes up to the porta of hepar (porta hepatis), which empties into the left branch of the portal vein. The rear of the left furrow (fissura ligamenti venosi) contains a fibrous cord that represents the residue of overgrown venous or Arantius’ duct (ligamentum venosum) and is a continuation of right transverse fissure of liver. In the front part of right longitudinal furrow of the liver (fossa vesicae felleae) is located the gallbladder (vesica fellea), and in the rear of this furrow (sulcus

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VENAE CAVAE INFERIORIS) passeS the lower hollow vein (VENA CAVA INFERIOR) [11,12,13].

METHODS

The objective of this research is to study the topography of umbilical vein, its connection with the portal vein and ductus venosus, also the measurement of diameter and length of the umbilical vein branches, as well as the possibility of bougienage this vessel.

To achieve this goal was dissected visceral surface of 6 macroscopic samples of liver of the adult patients who died between the ages of 45 and 60 years from the pathologies unrelated to diseases of the hepatobiliary system (Figure 2).

During the dissection was conducted study of umbilical vein topography in the visceral surface of the liver and measured the length and diameter of vessel branches.

To investigate the possibility of umbilical vein bougienage in an adult, at this vessel in 6 macroscopic preparations was inputted the catheter for infusion in small veins № 19.

RESULTS

During the research was dissected visceral surface of the liver: umbilical vein in the round ligament of the liver (ligamentum teres hepatitis), located in front part of the left longitudinal furrow, ductus venosus (ductus venosus) occupying the rear of the furrow, inferior vena cava (VENA CAVA INFERIOR), passing in the rear of right longitudinal furrow and the area of porta hepatitis [11,12,13]. Before getting into the liver umbilical vein is divided into bifurcation at a sharp angle into 2 large branches, one of which, called the ductus venosus (ductus venosus), bypassing the liver and empties into the inferior vena cava, and the other - in the left branch of the portal vein (ramus sinister vena cavae inferioris), preliminary forming an expansion, called umbilical-portal transfer or umbilical volvulus (recessus umbilicalis) (Figure 3, 4) [14,15,16,17].

It was carried out the measuring of length and diameter of the umbilical vein branches on 6 macroscopic preparations.

The length of the ductus venosus was 36-40 mm, the length of branch flowing into the left branch of the portal vein - 15-16 mm. The diameter of the ductus venosus and branches, flowing into the left branch of the portal vein, was 3-4 mm, an outer diameter of umbilical-portal transition was 5-7 mm.

Also on 6 macroscopic preparations during dissection were identified from 3 to 7 additional branches extending from the umbilical vein to the bifurcation. These branches with a diameter of 2-3 mm, directs to liver parenchyma (Figure 5) [14].

Umbilical vein normally in a healthy person is obliterated. The lumen of this vessel is maintained only in its upper part, in the umbilical-portal transition [10,14]. This was revealed in all macroscopic preparations of the liver. However, umbilical vein was bougienaged throughout on 6 investigated macroscopic preparations by inputting the catheter.
into this vessel for infusion into the small veins №19 (Figure 6).

DISCUSSION
In the dissection process were identified from 3 to 7 additional branches extending from the umbilical vein to the bifurcation. This fact is rarely considered in the medical literature, however, there is a single number of sources in which the information is reflected. According to some information sources, branches extending from the umbilical vein are associated in the liver parenchyma with portal vein [18]. According to other authors, these branches are...
divided into capillaries in liver parenchyma carrying blood through the system of sinusoidal capillaries in the hepatic vein and then into the inferior vena cava. [19].

Based on the results of measurements of the umbilical vein and its branches the greatest diameter detected in umbilical-portal transition and amounted to 5-7 mm. This fact confirms the existence of the lumen in the upper part of the umbilical vein in an adult during the entire life [10,14].

On 6 macroscopic preparations of the liver the lumen of umbilical vein is obliterated till the umbilical-portal transition, but this vessel can be bougienaged throughout.

Possibility of conducting the bougienage of the umbilical vein throughout, as well as the presence of additional branches extending from this vessel and going into the liver parenchyma, can be used in medical practice in order to fulfil an extraperitoneal transumbilical portohepatography, transumbilical manometry for the diagnosis of portal hypertension and the drug administration [1,2,3,4,5,6,7].

CONCLUSION
1. The greatest diameter umbilical vein has in umbilical-portal transition, which is 5-7 mm.
2. Before the bifurcation by umbilical veins depart from 3 to 7 additional branches in the liver parenchyma.
3. The umbilical vein normally retains the lumen only in its upper part in the umbilical-portal transition, but it can be bougienaged throughout.

CONFLICT OF INTEREST
The author confirms that this article content has no conflicts of interest.

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REFERENCES
1. Metody issledovaniya pecheni (Methods of


