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PECULIARITIES OF EMBRYOGENESIS OF HUMAN RESPIRATORY SYSTEM

Summary. *One of the topical issues of morphology is studying general regulations of development and structural formation dynamics of respiratory system. Aim of the study was to determine peculiarities of respiratory system organs' embryogenesis during prenatal development in human. In order to achieve the aim, we have studied 22 specimen's series of human embryos with 4,5-8,0 mm of parieto-coccygeal length (PCL) by using a complex of morphological research methods (histological methodic, morphometrics, graphic and three-dimensional computer reconstruction, and statistical analysis). It has been found that with the absence of external signs of lung division on lobes, bronchial tree already begins to branch, which concludes that process of entodermal laying of lungs is slightly ahead in its development, comparing to mesenchymal, and consequently plays a major role in formation of lungs. It was also established that starting from the 5th week there is an asymmetry in size of right and left lungs primordium's, as well as in main bronchi branching. The source of human lung primordium is a tracheo-pulmonary primordium, which at the end of 4th week of fetal development is represented by odd bud-shaped entity which departs with an acute angle from ventral wall of the foregut and is located in front of foregut. Beginning of the 5th week of human prenatal development is considered to be a critical period, which holds intensive processes of organogenesis of respiratory system and is possible time for occurrence of some congenital defects and structural variants. Sources of pulmonary vessels are islands of intraorgan hematopoiesis and extraorgan main vessels, communication between which occurs during end of 4th and start of 5th weeks of prenatal development.*

Key words: *respiratory system, morphogenesis, prenatal development, human.*

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Стаття надійшла до редакції 29.12.2016р.

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УДК: 612.014.5-053.81:616.53-002.25-08

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FEATURES SIZES OF LIVER IN HEALTHY MEN WITH DIFFERENT SOMATOTYPES

Abstract. *As a result of the research set limits of percentile scale sonographic liver size in healthy men from Podilia region of Ukraine with different somatotypes. When comparing the data of sizes between men of different somatotypes only the thickness of the right lobe of the liver on inhaling in representatives of endo-mesomorphic somatotype was significantly higher compared with representatives of ecto-mesomorphic somatotype and the thickness of the caudate lobe of the liver in representatives of endo-mesomorphic somatotype significantly smaller or has the tendency to lower values compared with men mesomorphic and ecto-mesomorphic somatotype. The rest of the sonographic liver size had not significant differences or trends between healthy men of different somatotypes.*

Key words: *liver, sonography, healthy men, somatotype.*

Introduction

The widespread use of the method of ultrasound diagnosis in surgical practice shows that the change in the size of the internal organs are not always reflect their pathology, but may be a risk factor for its development. Any penetration into the abdominal cavity provides precise tool guidance during tumor biopsy, drainage of cysts, abscesses, hematomas evacuation, organ transplantation or stem cell [5, 8].

New methods of surgery of the liver also require detailed knowledge of its morphometry, subject to sexual dimorphism, age and constitutional variability. It should be noted that sometimes the interpretation of high-quality ultrasound images obtained at the right methodically study, may have difficulty in assessing the size of the liver, due to their distinct individual variability [1, 7].

Based on the identified differences in the shape and size fractions of the liver in patients with various anthropo-

somatometric indicators, a number of scientists proved that the mentioned dependence may also affect patients and the constitution [2]. Therefore, when deciding whether an increase or decrease in the studied body must first pay attention not to the average ratios of its size, and the size and configuration features of the liver features of different constitutional types.

Population studies of constitutional characteristics of liver in practically healthy investigated significantly complements the existing morphological data about regularities of growth and development the inhabitants of a certain region at various stages of ontogeny and can serve as a scientific basis in the development of regional biomedical health promotion programs [10].

The *aim* of this study was to determine the features of sonographic parameters of the liver in healthy men from

Podilski region of Ukraine with different somatotypes.

Materials and methods

At basis of Scientific and Research Center VNMU named after Pirogov (Ukraine) conducted a comprehensive survey of 93 apparently healthy urban male of the first mature age who are in the third generation living in the Podillya region of Ukraine and had no complaints at the time of the survey on health and chronic disease in anamnesis.

Decision of the Bioethics Committee VNMU n.a. Pirogov (protocol № 7 of 08.06.2015) proved that bioethical studies meet moral and legal requirements of the Helsinki Declaration, the European Convention on Human Rights and Biomedicine (1977), the relevant provisions of the WHO and the laws of Ukraine (Order Ministry of Health of Ukraine №281 from 01.11.2000).

Echo metric indicators of the liver measured by ultrasound diagnostic system "CAPASEE" SSA-220A (Toshiba, Japan) convex detector with a working frequency of 3.75 MHz under conventional methods [4]. Given the possibility of changing the position of the liver depending on the phase of the respiratory cycle, which can lead to errors in determining certain size (primarily relates oblique vertical size of the right lobe, since the maximum inspiration followed by breath movement of the lower edge of the liver down leads to a false reduction this size) - the size of the right and left like particles carried on the exhale and inhale. Define: oblique vertical size of the right lobe of the liver exhale (OVSRL) and on inspiration (OVSRLI); anteroposterior dimension (thickness) right lobe on exhalation (TRLE) and on inspiration (TRLI); upper lower (cranio-caudal) size of the left lobe on exhalation (CCSLE) and on inspiration (CCSLI); anteroposterior dimension (thickness) of the left lobe on exhalation (TLLE) and on inspiration (TLLI); upper lower size of the caudate lobe of the liver (LCP); anteroposterior (thickness) of the caudate lobe of the liver (ACP).

Anthropometric examination was conducted in accordance with the scheme of V. V. Bunak [6]. To evaluate the somatotype used mathematical scheme of J. L. Carter, B. H. Heath [11].

Statistical analysis of the results was conducted in the package "STATISTICA 6.1" using nonparametric methods of evaluation of the result.

Results and discussion

As a result of our research limits the scope percentile (25,0 percentl and 75,0 percentl) sonographic liver size in men mesomorphic, ecto-mesomorphic and endo-mesomorphic somatotype (Table 1).

In comparison of sonographic liver size in men of different somatotypes determined that only the thickness of the right lobe of the liver on inhaling in representatives of endo-mesomorphic somatotype was significantly higher compared with representatives of ecto-mesomorphic somatotype (respectively $121,3 \pm 12,3$ and $112,7 \pm 10,0$; $p < 0,01$) and the thickness of caudate lobe of the liver among representatives

Table 1. Percentile scope of sonographic parameters of liver in healthy men with different somatotypes from Podillya region of Ukraine.

Sonographic sizes	Mesomorph (n = 42)	Ecto-mesomorph (n = 12)	Endo-mesomorph (n = 21)
OVSRL (mm)	142,0 - 155,0	139,5 - 149,0	144,0 - 160,0
OVSRLI (mm)	109,0 - 131,0	110,5 - 123,0	113,5 - 128,5
TRLE (mm)	134,0 - 145,0	130,5 - 140,5	130,0 - 146,0
TRLI (mm)	111,0 - 128,0	109,5 - 117,0	117,0 - 129,0
CCSLE (mm)	97,5 - 108,0	93,5 - 113,0	96,4 - 107,0
CCSLI (mm)	100,0 - 113,0	100,5 - 114,0	100,0 - 107,0
TLLE (mm)	59,5 - 67,0	57,0 - 65,3	59,0 - 71,0
TLLI (mm)	60,0 - 68,0	57,5 - 69,0	61,3 - 73,6
LCP (mm)	40,5 - 51,0	45,0 - 51,5	36,4 - 45,0
ACP (mm)	18,4 - 24,0	17,8 - 21,3	13,9 - 19,7

endo-mesomorphic somatotype significantly smaller or has the tendency to lower values compared with men mesomorphic (respectively $17,18 \pm 4,19$ and $20,59 \pm 3,79$; $p < 0,01$) and ecto-mesomorphic somatotypes (respectively $17,18 \pm 4,19$ and $20,15 \pm 4,26$; $p = 0,066$).

Standard ultrasound liver size until today were focused more on the criterion of age and almost did not consider constitutional characteristics of the patient [14, 15]. The literature contains few works that show higher correlation liver parameters with anthropo-somatic indices than age [3, 7, 9].

In a number of studies found that anatomical variability parameters ultrasound liver in investigated of different ages is determined by somatotype and anthropometric parameters such as length and weight [12, 13]. According to A. V. Condrasheva etc. [7] all studied performance ultrasound of liver in patients youthful and first period of mature age, except for the diameter of the portal vein, have significant differences in individuals of different somatotypes, while the value of each of them tends to increase in the number from microsomal to macrosomal type of constitution. In contrast to the above is the work in which there are study of a range of regulatory variations liver size in infants, children and adolescents determined the most age and gender differences and the smallest constitutional [14, 15].

Conclusions and recommendations for further development

In almost healthy men from Podilia endo-mesomorphic somatotype set higher ($p < 0,01$) thicknesses of the right lobe of the liver during inspiration compared with representatives of ecto-mesomorphic somatotype and lower values ($p < 0,05$) the width of the caudate lobe of the liver compared with representatives of mesomorphic somatotype.

The obtained results bring us closer to understanding the concept of "population standards" for liver sonographic parameters and enable diagnosis of the pathology of the body, accompanied by changes in its size, even at the preclinical stage of the disease.

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ОСОБЛИВОСТІ РОЗМІРІВ ПЕЧІНКИ У ЗДОРОВИХ ЧОЛОВІКІВ РІЗНИХ СОМАТОТИПІВ

Резюме. В результаті проведених досліджень встановлені межі процентильного розмаху сонографічних розмірів печінки практично здорових чоловіків Подільського регіону України різних соматотипів. При порівнянні даних розмірів між чоловіками різних соматотипів лише товщина правої частки печінки на вдиху у представників екто-мезоморфного соматотипу достовірно більша порівняно із представниками екто-мезоморфного соматотипу та товщина хвостатої частки печінки у представників екто-мезоморфного соматотипу достовірно менша, або має тенденції до менших значень порівняно із чоловіками мезоморфного й екто-мезоморфного соматотипів. Решта сонографічних розмірів печінки не мали достовірних або тенденцій відмінностей між практично здоровими чоловіками різних соматотипів.

Ключові слова: печінка, сонографія, здорові чоловіки, соматотип.

Гунас І.В., Мельник М.П., Прокопенко С.В., Серебреннікова О.А., Глушак А.А.
ОСОБЕННОСТИ РАЗМЕРОВ ПЕЧЕНИ У ЗДОРОВЫХ МУЖЧИН РАЗНЫХ СОМАТОТИПОВ

Резюме. В результате проведенных исследований установлены границы процентильного размаха сонографических размеров печени практически здоровых мужчин Подольского региона Украины разных соматотипов. При сравнении данных размеров между мужчинами разных соматотипов лишь толщина правой доли печени на вдохе у представителей экто-мезоморфного соматотипа достоверно больше в сравнении с представителями экто-мезоморфного соматотипа и толщина хвостатой доли печени у представителей экто-мезоморфного соматотипа достоверно меньше, или имеет тенденции к меньшим значениям в сравнении с мужчинами мезоморфного и экто-мезоморфного соматотипов. Остальные сонографические размеры печени не имели достоверных или тенденций отличий между практически здоровыми мужчинами разных соматотипов.

Ключевые слова: печень, сонография, здоровые мужчины, соматотип.

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Стаття надійшла до редакції 26.12.2016

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