ULTRASOUND LANDMARKS OF THE SPLEEN IN CHILDREN

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Keywords: spleen, child, ultrasound	Abstract: The spleen is the largest lymphatic organ of the body. In the context of incomplete data, the spleen size in healthy children has to be assessed in the age dynamics since the first year of life until the age of 17 years. To get data on normal and build upon the discussion of pathology, we have set physiological benchmarks in children. Spleen length and similar in both sexes in close correlation with the height of this study is consistent with international studies. The relationship between subject height and size of the spleen is confirmed to be an ultrasound evaluation criterion.
Cuvinte cheie: splină, copil, ecografie	Rezumat: Splina este cel mai mare organ limfatic al organismului. Datele din literatură fiind lacunare, se impune evaluarea dimensiunilor splinei la copilul sănătos în dinamica vârstei din primul an de viață și până la vârsta de 17 ani. Pentru a avea date asupra normalului și o bază de plecare în discutarea patologicului am stabilit reperele fiziologice la copil. Lungimea splinei analogă la ambele sexe și în strânsă corelație cu înălțimea din prezentul studiu este în concordanță cu studiile internaționale. Relația dintre înălțimea subiectului și dimensiunile splinei se confirmă a fi un criteriu de evaluare ecografică.

INTRODUCTION

The spleen has four major functions: the humoral and cellular immunology, the sequestration and destruction of normal and pathological blood cells, the regulation of portal blood flow and the one in the hematopoiesis. Therefore, the diagnosis of the splenomegalic syndrome is of great importance. In order to achieve this, the morphological data about the normal spleen in children are of great importance (length, transverse diameter, anteroposterior diameter). The data have been collected on age and by gender. The early diagnosis of the splenomegaly syndrome is of fundamental importance in the further evolution of the sick child, for the necessary treatment and for monitoring the response of the dimensions of the spleen to the treatment.

There is lack of information regarding the children's spleen and we have found only the maximum and minimum values.

OBJECTIVES

- 1. Evaluation of spleen size in healthy children in the age dynamics since the first year of life until the age of 17 years, in the context of incomplete data.
- 2. Setting the physiological landmarks in children, to have data on normal and build upon the discussion of pathology.

MATERIAL AND METHOD

The study ran from January 2008 -March 2009 in Sibiu County. The study included a total of 158 subjects (79 girls, 79 boys) of similar age (p=0,94) and height (p=0,76). Healthy children were selected after a preliminary analysis of history and we put emphasis on somatic growth, nutrition and morbidity presented.

The children's age in the study group is between one month and 17 years, and their residence is in Sibiu County.

The medical examination has been performed with a Medison 8800-MT with opportunities for review in 2D, Color Doppler and Power Doppler.

The statistical evaluations of data we have performed was with the factorial analysis of variance (ANOVA) and the Spearman's rank correlation coefficient, with the level of significance $p\leq 0,05$.

RESULTS AND DISCUSSIONS

The length of the spleen had a homogeneous, progressive increase with increasing age and there were no differences between sexes (p=0,50). The mean values of the length of the spleen were progressively increased (p=0,75) with increasing age (Table 1) and have been correlated with the subjects' height (r=0,99). The increase of the length of the spleen presented an acceleration at the age of 11 years.

In both sexes, the length of the spleen has been correlated with the subjects' height and has been higher correlated with the length of the left kidney (Fig.1)

Depending on the height of the subjects and length of the spleen we have made the following nomogram (Fig.2)

The transverse diameter of the spleen presented a progressive increase in the dynamics of the child's age in both sexes (Figure 3).

The transverse diameter of the spleen and the subjects' age recorded an acceleration of growth after the age of 11 years. The transverse diameter of the spleen was in relation to length (r = 0.71), which confirms the overall harmonious development of the spleen in the first 17 years of age.

At the age of 17 years, the length and transverse diameter of the spleen in children reach adult values.

The length of the spleen in a smooth and gradual increase was correlated with the subjects' height in the dynamics of age (1). A gradual and consistent growth dynamics of the

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length of the spleen was also reported by Al-Imam et al. (2) to 184 Jordanian children aged 0-20 years, Haddad-Zebouni et al. (3) in children of 0-15 years in Lebanon, the Megremis et al. (4) in 512 Greek children aged one day to 17 years and by Şafak et al. (5) to 712 school children aged 7 to 15 years in Turkey.

Table no. 1. The length and the transverse diameter of the spleen by age

AGE	The subject's	The length of	The transversal
(years)	(cm)	(cm)	(cm)
0	$66,66 \pm 6,18$	$5,66 \pm 0,516$	$2,\!66 \pm 0,\!516$
1	$75,26 \pm 7,38$	$6{,}10\pm0{,}93$	$3,\!15\pm0,\!37$
2	$87,00 \pm 3,20$	$6{,}50\pm0{,}53$	$3,25 \pm 0,46$
3	$90,\!57 \pm 11,\!92$	$7{,}57 \pm 1{,}39$	$3,57 \pm 0,53$
4	$106,25 \pm 2,63$	$8,\!25\pm0,\!50$	$3,50 \pm 0,57$
5	$109,\!16\pm2,\!92$	$7,\!66 \pm 1,\!21$	$3,83 \pm 0,40$
6	$114,\!90 \pm 3,\!63$	$8{,}50\pm0{,}52$	$4,00 \pm 0,32$
7	$126{,}00\pm3{,}00$	$8,\!33\pm0,\!57$	$4,\!00\pm0,\!38$
8	$129{,}00\pm3{,}05$	$8,\!40\pm0,\!89$	$4,\!20\pm0,\!44$
9	$136,00 \pm 0,00$	$10,\!00\pm0,\!00$	$5{,}00\pm0{,}25$
10	$139{,}00\pm1{,}41$	$8,\!00\pm0,\!00$	$4,\!00\pm0,\!35$
11	$147,\!00\pm2,\!00$	$9,\!33\pm0,\!57$	$4,\!66\pm0,\!57$
12	$153{,}50\pm0{,}70$	$9{,}50\pm0{,}70$	$5{,}00\pm0{,}53$
13	$158,\!02\pm0,\!35$	$10{,}00\pm0{,}00$	$5{,}00\pm0{,}47$
14	$161,\!33\pm1,\!52$	$9,\!66\pm0,\!57$	$5,00 \pm 0,33$
15	$169,25 \pm 0,95$	$11,25 \pm 0,95$	$5,00 \pm 0,46$
16	$166,00 \pm 4,51$	$9,\!16\pm2,\!13$	$4,83 \pm 0,40$
17	$170,\!90\pm4,\!25$	$11,\!80\pm0,\!91$	$5{,}50\pm0{,}52$
Р	P=0,000	P = 0,000	P = 0,000

Figure no. 1. Length of the spleen and of the left kidney



Figure no. 2. Length of the spleen by the subjects' height



The length of the spleen by ultrasound is thus a reference parameter.

The transverse diameter of the spleen in a gradual increase in dynamic age in both sexes in close correlation with

height shows the harmonious development of the spleen in the first 17 years of age.

Figure no. 3. Changes in transverse diameter of the spleen with the age of subjects

Transverse diameter of the spleen (cm)



CONCLUSIONS

- 1. The length of the spleen in healthy children is in relation with the child's age, with its length or height, without gender differences.
- 2. The transverse diameter of the spleen is the relationship with the child's age, without gender differences.
- 3. The transverse diameter of the spleen is a more precise ultrasound parameter in assessing spleen size in childhood.
- 4. The relationship between the subject's height and the size of the spleen is confirmed to be an ultrasound evaluation criterion.

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