THE CONTRIBUTION OF ULTRASONOGRAPHY IN THE DIAGNOSIS
OF CONGENITAL ANOMALIES OF THE URINARY SYSTEM IN
CHILDHOOD

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Key-words: ultrasonography — congenital renal anomalies — venous urography — hydro­
nephrosis — children

Recently, investigations of renal pathology in childhood indicate congeni­
tal anomalies of the urinary system as a main problem. According to several
statistical studies (4 and oth.), anomalies of the urinary system amount to about
35 — 40 per cent of all congenital malformations in childhood. Timely diag­
nosis of urinary tract diseases and, particularly, of congenital anomalies enables
the adequate therapeutic behaviour and the prevention of an early inva­
idization of these patients and the development of chronic renal failure as well.

Venous urography has occupied till recently a leading position in the com­
p lex of diagnostic methods in urinary tract diseases. Recently, ultrasound di­
agnostics advanced together with traditional roentgenologic examinations,
too. Ultrasonography was introduced into clinical practice since 1950 mainly
for investigations of the abdomen and brain. In our country, it has been intro­
duced in the recent years and its application increases day after day because
it enables to obtain data about the size, location and mutual location of abdo­
minal tissues and organs as well as about the localization, size, structure of
their pathological alteration (1, 3, 9). During the first world congress on ultra­
sound application held in Vienna in 1969 the perspectives of ultrasonographic
diagnosis in pediatrics were noted, too. Pediatric nephrology is a field where
the application of ultrasonographic methods is markedly valuable and perspec­
tive for search for and proof of congenital anomalies, of the urinary system (2,
5, 8).

The purpose of the present study is to specify the advantages of ultrasono­
graphy and of its contributions in the diagnosis of certain congenital anomalies
of the urinary tract.

Material and methods

The present work is based on the ultrasound examinations of a total of 302
children hospitalized in the Third Pediatric Clinic of the Higher Institute of
Medicine, Varna for an one-year period. An apparatus of the «Siemens» firm is
used in our study. Children were examined in well-known standard positions:
lying on the back, on the stomach, in lateral left-side and right-side position.
Venous urography, miction cystography, scintigraphy and isotope nephrography
were carried out in order to specify the information value of ultrasonography.
The patients were aged between 1 month and 14 years. They had been hospitalized on the occasion of: abdominal pain, leukocyturia, bacteriuria, haematuria, proteinuria and of their combination. Ultrasonographic examination was performed in all the patients parallelly to routine investigations of the urine, urocultures, Stansfeld, blood urea, creatinine, uric acid. Ultrasonography preceded the other instrumental investigations.

Results and discussion

Of the 302 children, in 70 (23.84 per cent) a congenital malformation of the urinary system was established. The distribution of single anomalies was demonstrated on fig. 1). A double kidney was a frequent anomaly of the upper urinary tract. A suspicion about a double pyelic system was expressed by the aid of ultrasonography in 34 patients. Diagnosis was then confirmed by venous urography in 25 of them (fig. 2). The proof of a double pyelic system by means of the ureteric reflux was shown in 18 cases and by the simultaneous passage of the contrast agent into both pyelical systems in 7 of them.
The contribution of ultrasound requires a careful examinations of the kidneys and an obtaining of a series of transversal and longitudinal sections. The clinical practice demonstrates that transversal sections obtained are of sufficient information value, indeed, because of a better outlining of the two pyelons. When at longitudinal section is used, more rarely, a typical image of a figure of eight with a median parenchyma invagination and formation of a septum can be observed. The larger size of the kidney studied can serve as an indirect criterion, too.

Hydronephrosis of the 1st—IIIrd degree was ultrasonographically proved in 45 children. Pyelic dilatation in the internal part was considered a hydronephrosis of the 1st degree. Dilatation of pyelon and calices both was considered a hydronephrosis of the second degree and when parenchyma thinning was added — a hydronephrosis of the third degree (6). Present hydronephrosis was proved by ultrasonography in our patients. The search for the etiology of the hydro-
nephrotic transformation insisted us to carry out a venous urography and miction cystography. Out of 45 children, in 15 a vesico-ureteral reflux of the IIIrd – Vth degree was found out (fig. 3). Hydronephrosis was due to a concrement in the ureter in 20 patients (fig. 4) and to an additional blood vessel in the pelvioureteral transition in 10 cases (fig. 5).

Echographically, a hydrocalicosis of the upper calix was established in 10 children. Venous urography confirmed Fraley's syndrome in these cases.

Ultrasonography provided information about renal size and localization in four patient. Linear transducer was used to determine renal position during patient's examination in a lying and standing position. Renal ptosis was established in 10 children.

Two children showed an echographically small left kidney. This fact required a differential-diagnostic interpretation — if it was a primary or a secondary hypoplasia. Primary hypoplasia was characterized by reduction of renal size and remaining

Fig. 3a

Fig. 4
of a smooth outline and an intact renocortical index. The alterations in our patients possessed the features of a primarily hypoplastic kidney. Scintigraphically, a small kidney with regularly distributed nucleotide was confirmed.

A lack of a kidney was ultrasonographically established in one child. There was no kidney in the abdominal cavity, too. Both venous urography and scintigraphy proved a missing kidney and an enlarged contralateral one (fig. 6).

On the basis of these data we can assume that ultrasonographic investigation is successfully used in the diagnosis of the congenital anomalies of the urinary system (7, 10). The additional instrumental investigations revealed the advantages of ultrasonography when these children were concerned. Comparison of data obtained by means of various methods confirmed the high information value of ultrasonography. Typical echographic
changes were revealed in children with hydronephrosis where the information value of this investigation reached up to 100 per cent. This value was near to 80 per cent in cases with a double pyelic system, between 80 and 90 per cent in cases with renal hypoplisia and near to 70 per cent in cases with Fraley's syndrome.

We can draw the following conclusions:

1. Ultrasonographic examination having certain advantages such as harmlessness, rapidity and capacity for dynamic control presents a valuable method in the diagnosis of the congenital anomalies of the urinary tract.

2. The comparison between ultrasonography and other instrumental methods of examination such as venous urography, scintigraphy, and cystography demonstrates the high information value of the ultrasonographic method.
3. Early diagnosis of congenital urinary tract anomalies is considered a prophylaxis of nephrolithiasis and chronic renal failure in childhood.

REFERENCES


ЗНАЧЕНИЕ УЛТРАЗВУКОВОГО ИССЛЕДОВАНИЯ ДЛЯ ДИАГНОСТИКИ ВРОЖДЕННЫХ АНОМАЛИЙ ВЫДЕЛИТЕЛЬНОЙ СИСТЕМОЙ В ДЕТСКОМ ВОЗРАСТЕ

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РЕЗЮМЕ

Исследования почечной патологии в детском возрасте в последнее время направлены на главную проблему — врожденные аномалии выделительной системы. По статистике Иссакова и соавторов из всех рожденных мальформаций с детским возрасте 35—40% приходятся на долю мальформаций выделительной системы.
Ультразвуковой метод диагностики занимает ведущее место в определении заболевания. Неинвазивность, быстрота, частая повторяемость, возможности динамического контроля составляют основные преимущества исследования ультразвуком.

Настоящая работа основана на исследовании ультразвуком выделительной системы. 302 госпитализированных больных детей. Исследование проведено с помощью аппарата фирмы «Сименс». При проведенном исследовании ультразвуком установлены мальформации 72 детей (23,84% всех больных детей). Обнаружены мальформации, относящиеся к числу почек, их положению, наличию везикоуретерального рефлюкса. Эхографическая находка была доказана и методами венозной урографии, микционной цистографии, сцинтиграфии.

Учитывая преимущества исследования ультразвуком, этот метод является ведущим при диагностике врожденных аномалий выделительной системы.