IMAGING ASPECTS
OF RENO-URINARY MALFORMATIONS IN CHILD

ABSTRACT

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ABSTRACT

Renourinary malformations represent one of the main causes of the renourinary pathology in child. They reach 1% of the population.

The hereby dissertation analyses a group of 800 patients of ages between 0 and 18 years old, who have shown malformations of the reno-urinary system and who have been hospitalized for the first time within the “Grigore Alexandrescu” Emergency Hospital for Children, Bucharest, Surgery department, over a period of 5 years, proving that, by radiological exploration modern methods, a correct and precocious diagnosis can be achieved.

The hereby paper formed a retrospective and prospective survey focused on “Grigore Alexandrescu” Emergency Hospital for Children, Bucharest, pediatric surgery departments’ casuistry and has the following goals: specific epidemiologic issues analysis; cases’ analysis based on distribution by sex; specifying the found reno-urinary malformation type; the significance of the imaging investigations and the survey upon specific issues of the imaging diagnosis.

KEY WORDS: malformations, renourinary system, imaging, child
INTRODUCTION

Using of Roentgen radiations in medicine revolutionized the diagnostic art, succeeded to give a new content of the concept of medical diagnosis.

CHAPTER 1. GENERAL

Under the term of reno-urinary malformations are known the embryogenesis disorders of the kidney and/or urinary tract resulting in alterations in morphology and overall urinary system function [5].

Some authors use at random the anomaly-malformation terms, others make the difference between them. There is a category of authors which propose replacing of these two terms with that of dimorphism, idea which we are tempted to adhere, but in the paper we will keep the classic terminology. The urogenital anomalies are among the most frequent anomalies in the body, but most of them are either asymptomatic or mild symptoms.

CHAPTER 2. EMBRYONIC DEVELOPMENT OF THE RENO-URINARY SYSTEM

During the embryo-fetal 3 temporary excretory organs are distinguished, which are followed each other and partially overlap in time and space: pronephros, mesonephros, metanephros [9].
CHAPTER 3. NOTIONS OF ANATOMY

The urinary system with role in urine’s formation and elimination has a complex structure, in its composition being found parenchymal organs (kidneys), tubular organs (pyelocaliceal systems, ureters and urethra), and hollow organs (bladder) [3].

CHAPTER 4. INVESTIGATION METHODS

Among the used investigation methods in the urinary system exploration we mention: renal ultrasound, urography, mictional cistography, pyelography and urethrography (less used), ultrasound, computer tomography, magnetic resonance imaging, arteriography and phlebography [1, 2, 4, 6, 7].

CHAPTER 5. RADIOLOGICAL ANATOMY

The kidney are retroperitoneal organs. They and the urinary tract can be evaluated by imaging methods.

CHAPTER 6. CLASSIFICATION OF CONGENITAL MALFORMATIONS OF THE KIDNEYS AND URINARY TRACT

Kidneys and urinary pathways show the most and varied malformations in the human body. They can be divided in: 1) renal malformations and 2) urinary pathways malformations [8, 9].
CHAPTER 7. THE IMPORTANCE AND JUSTIFICATION OF THE DISSERTATION

Reno-urinary malformations represent one of the main causes of reno-urinary pathology in children. They reach 1% of population, and 13%-20% of the antenatal deaths are associated with malformations of the reno-urinary system. Giving the increasing in the progresses related to congenital malformations finding, is necessary a depth knowledge of them, while still in the womb. In this situation, we consider that a through knowledge in the field will provide a useful ground in the future to find these congenital reno-urinary malformations.

CHAPTER 8. MATERIAL AND METHOD

The hereby paper analyses a group of 800 patients with reno-urinary system malformations, who were hospitalized within the surgery department of “Grigore Alexandrescu” Emergency Hospital for Children, Bucharest for a period of 5 years. These patients came from allover the country and they were hospitalized for the first time in our hospital.

CHAPTER 9. FINDINGS

During period January, 2006 – December, 2010, in the surgery department of “Grigore Alexandrescu” Emergency Hospital for Children, Bucharest 800 children between 0 and 18 years were hospitalized for the first time, coming from urban or rural environment, who have showed deviations from the normal development of the reno-urinary system: 22 cases, renal agenesis; 34 cases, renal hypoplasia; 26 cases, renal ectopia; 17 cases, horseshoe kidney; 58 cases, cystic diseases; 133
cases, pyeloureteral duplication; 4 cases, ureteral ectopia; 156 cases, megaureter; 170 cases, hydronephrosis caused by obstruction of pyeloureteral junction; 54 cases, ureterocele; 90 cases, congenital posterior urethral valve; 2 cases, urethral duplication; 3 cases, bladder extrophy; 5 cases, congenital neurogenic bladder; 26 cases, bladder diverticulum.

- Sex ratio for reno-urinary system malformations were in the favor of the males, they being represented by 532 cases, 67%, and the females by 268 cases, 33%.
- The most, the diagnosis was set under the age of 1 year old.
- The most common malformations were hydronephrosis caused by obstruction of pyeloureteral junction, megaureter and pyeloureteral duplication.

**HYDRONEPHROSYS CAUSED BY OBSTRUCTION OF PYELOURETERAL JUNCTION**

I found obstruction of pyeloureteral junction in 170 children of the total cases of studied reno-urinary malformations. This represents a percent of 21% of the total of this group’s malformations. Males are the most affected, 115 cases, than the females, 55 cases. The anomaly has an increased incidence on the right side, 78 cases (46%), but I have found it also bilateral in 20 cases (12%). We notice the fact that most of the cases the diagnosis has been put under the age of 1 year old, 63 (37%). In 15 (9%) situations the pyelocaliceal dilatation has been reported intrauterine life, and postpartum the new born were evaluated in order to confirm and treat the hydronephrosis.
MEGAURETER

The occurrence of the megauter was of 156 cases, representing 19% of the total of patients of the studied group. As described in the literature, I found it mostly at boys, 137 (88%) cases against 19 cases at girls (chart no. 12). Depending on location I observed a higher occurrence of the bilateral magauter, 90 cases. When is unilateral, more frequent is interested the left ureter, 49 cases.

PYELOURETERAL DILATATION

Within the studied group I have found 133 cases of pyeloureteral dilatations, representing 15% of the all reno-urinary system malformations. In this chapter I excluded the pyeloureteral duplications accompanied by ureterocele (32 cases), ureteral ectopia (2 cases), congenital posterior urethral valve (2 cases), urethral duplication (1 case) or combination of them, because these forms will be discussed in other chapter.

It noticed that females are affected in percent of 54% (72 cases), data which chimes with that in literature, which shows a bigger proportion at girls. Duplication interests the right side in 44 cases and the left in 72 cases. In literature, these parts, right and left, are affected about equally. Related to localization, we notice the way it occurs also in literature’s data, that the lesion is unilateral with ratio of 3-6/1. In our statistics, the unilateral localization exceeds 88% of cases.
CHAPTER 10. MEDICAL-SOCIAL ASPECTS

Congenital maformative pathology has a special medical-social impact, intense requiring the family budget and/or the society budget for maintenance, education and recuperation, in some situations being necessary also a psychological and social sustaining of the patient (at the big children) and/or parents (at little children).

CHAPTER 11. CONCLUSIONS. DISCUSSIONS

1. The possibility to precocious find and diagnose the urinary system congenital affections by imaging means is beneficial in establishing the therapeutic behavior and the evolution on long term.

2. The correct and complete diagnosis of the excretory system affections is difficult. The oligosymptomatic way of most of the renal sufferings occurrence and the non-specific character of the biohumoral modification make necessary the use of imaging techniques for diagnosis completing.

3. Intravenous urography represented and continues to be a reference method in kidneys’ morphological evaluation, due detailed anatomical information and the possibilities to appreciate at the same time the excretory function.

The development of ultrasound, computer tomography and magnetic resonance imaging as alternative imaging techniques, resulted in progressive decreasing of the diagnostic role fulfilled by urography. Yet the urography is still a significant method for diagnosis in morphological and functional evaluation of the reno-urinary system. Major disadvantages of the urography are the presence of ionizing
radiations, the possibility of risk to contrast substances and lack of the direct information upon the renal parenchyma structure.

4. Computer tomography allows detailed morphofunctional evaluation of the kidneys and peritoneal space, as well as perirenal viscera, in this way facilitating the positive and differential diagnosis of the excretory system affections. The disadvantages related to ionizing radiations and the risks to contract substances persist, plus the necessity of sedation the little children, the relatively high cost and the reduced accessibility.

5. US represents the screening imaging method in evaluation of urinary tract. In the context of specific symptoms or the urinary infections occurrence, as well as in case of palpable masses at the level of the abdominal flanks, the ultrasound examination is the first intention imaging investigation, guiding the further imaging diagnosis steps (UIV, mictional cystography, CT, etc.). The ultrasound is a method to choose when you deeply evaluate the kidney and perineal space. It has a non-invasive feature, low cost and wide accessibility. The disadvantage of the method is the lack of information upon the renal function. Partially, these limits of the ultrasonography have been reduced by introducing techniques of vascular examination. The development of the fetal ultrasound gives the possibility to recognize a bigger number of renal anomalies, affections that can not be diagnosed at birth because they do not have clinical expression. The prenatal ultrasound diagnosis is a necessity in evaluation of a malformation occurrence in the fetus, which could have serious consequences upon the future newborn’s health.

6. The diagnosis of a renal congenital malformation must be done as precocious as possible after the birth, because it threatens the renal
function. The malformations, especially the obstructive ones, can produce irreversible lesions.

7. The hereby survey has been unfolded during on a period of 5 years, between years. From the total of the performed hospitalizations within this period in the departments of pediatric surgery, 800 children with age between 0 and 18 years were diagnosed with anomaly of the reno-urinary system.

8. There is no exact border between anomaly and malformations. Some authors sustain that the malformations are a subgroup of the congenital anomalies. Still, a gradation variant-anomaly-malformation seems to be plausible, they being determined, probably, by the action of the noxious agents in different stages.

9. It is possible as in the future the terms of “malformation/anomaly” to be replaced by that of “dysmorphia” which we consider to be closer to the truth.
SELECTED REFERENCES

6. ROSE de BRUYN.: Echographie pediatrique.