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Causes and Consequences of Late Diagnosis, Treatment of Congenital Hydronephrosis in Children

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ABSTRACT

Objective: *This study aims to analyze the causes and consequences of late diagnosis of congenital hydronephrosis in children, focusing on its impact on renal function and the outcomes of surgical correction in cases diagnosed after the early stages of childhood.* ***Methods:*** *Retrospective analysis was conducted on 99 children (aged 8 months to 17.5 years) diagnosed with hydronephrosis postnatally, from 2010 to 2023, at the SODMC of Termez. All patients underwent clinical, laboratory, and radiological investigations, including ultrasound, CT scans, and urography, to evaluate the extent of renal involvement and determine appropriate surgical interventions.* ***Results:*** *Late diagnosis, primarily after 3 years of age (73.7% of cases), was linked to a latent disease course, often masked by nonspecific symptoms such as pyelonephritis. Hydronephrosis was more prevalent on the right side (51.5%), with 31.3% of children diagnosed with stage IV disease requiring nephrectomy. The most common etiology included aberrant vessels and pyeloternal segment stenosis. Surgical treatments included pyeloplasty (58.6%), antevasal anastomosis (10.1%), and nephrectomy (22.1%). Postoperative recovery was generally uncomplicated, with 68.6% of children showing reduced renal pelvis size and improved kidney function.* ***Novelty:*** *This study highlights the significant risk of renal damage associated with delayed diagnosis and emphasizes the need for early detection and timely surgical intervention to preserve renal function. It provides valuable insights into the management of hydronephrosis in children, particularly in regions with limited access to advanced diagnostic tools.*

INTRODUCTION

Congenital hydronephrosis is one of the most common diseases in pediatric surgery and accounts for 50% of all pathologies in the structure of "obstructive uropathies", its incidence is 1:500-800 newborns [1], [2], [3]. The relevance of the problem is associated not only with the prevalence of the disease, but also with its latent course, leading to late hospitalization, which negatively affects the state of the renal parenchyma [4], [5], [6]. Antenatal detection of dilation of the upper urinary tract is 1 in 500 studies in the fetus, while the postnatal frequency of this pathology is represented by a ratio of 1:1250-1500 newborns [1], [2], [7], [8] undergoing surgical correction. According to P. Menon et al. [9], a significant proportion of newborns with congenital hydronephrosis have progressive deterioration of renal function, which probably occurs early and in many cases may be irreversible [4], [10]. E. Ruiz et al. [11], having compared early and late pyeloplasty in 41

patients, concluded that correction of PUS obstruction before 1 year allows for the maximum improvement of renal function.

Surgical treatment is impossible without analyzing the condition of the renal parenchyma, which is often significantly damaged by atrophic processes [2], [4], [3], [12].

The kidney does not have a high regenerative capacity, especially in cases where diagnosis is late. Therefore, timely examination of the patient will lead to the preservation of the renal parenchyma and good long-term results [13], [10], [12]. Thus, despite the constant interest in the problem of PUS and VH, questions about clear criteria for determining the timing of surgical treatment are still quite debatable [14], [15]. Purpose of the work is analyze the causes and consequences of late diagnosis of congenital hydronephrosis in children.

RESEARCH METHOD

The work is based on the analysis of the remote results of examination and treatment of 99 children with postnatally detected dilation of the renal pelvis, aged from 8 months to 17.5 years [16]. There were 75 boys (75.7%), 24 girls (24.3%), who were admitted for inpatient treatment to the pediatric urology department in the period from 2010 to January 2023, in the SODMC of Termez.

In the vast majority of cases, parents of sick children sought medical attention at the stage of manifestation of the main symptoms of congenital hydronephrosis. The proportion of patients with antenatal signs of hydronephrosis was 4.1% (4 children), postnatally the diagnosis was established in 95 (95.9%) children. Such a large difference in the diagnosis of congenital hydronephrosis in children in the antenatal and postnatal periods is explained by the lack of qualified specialists, as well as the lack of modern diagnostic equipment in medical institutions in remote areas of the Surkhandarya region. In -73.7% of cases, when diagnosing congenital hydronephrosis, the age of patients was over 3 years [17].

All patients of the urology department during their stay in the hospital were examined and treated according to the generally accepted plan and technical equipment of the hospital, which included anamnesis study, clinical laboratory, radiological, ultrasound, endoscopic research methods, functional tests in the Table 1.

Table 1. Structure and volume of studies performed Table.

Research methods	**Number of children examined**	
	abs.	%
Clinical and anamnestic study	99	100
Laboratory research		
- Clinical blood test	99	100
- General urine analysis	99	100

- Biochemical blood test	99	100
- Urine culture for sensitivity to microflora	35	35,3
Radiation research methods		
- Ultrasound of the kidneys and bladder with dopplerography	99	100
- Diuretic ultrasonography	22	22,2
- I/V urography	99	100
- Voiding cystography	99	100
- Contrast-enhanced CT	23	23,2

RESULTS AND DISCUSSION

In the anamnesis (at the consultation with a pediatrician), urinary tract infection was the reason for referral for ultrasound in 31 (31.3%) children, 36 (36.4%) patients complained of pain in the abdomen and lumbar region, 15 (15.3%) patients were examined due to a palpable formation in the abdominal cavity, dysuria was the reason for visiting a doctor in 18.8% of cases, pastosity or swelling under the eyes - in 18 children (18.2%).

In 11 (11.1%) cases, hydronephrosis could be caused by concomitant pathology: aberrant vessel - 10 (10.1%), urolithiasis 1 (1%). After diagnosis, conservative treatment was administered to only 20 (20.2%) children, 14 (14.1%) were under dispensary observation by a urologist at their place of residence with a diagnosis of pyelonephritis.

The disease was detected by chance during an ultrasound examination for other diseases: when diagnosing pyelonephritis or urinary tract infection - in 15 children (15.1%), in 8 (8.1%) cases this defect was detected during a preventive ultrasound examination of the abdominal organs and retroperitoneal space. Localization of the pathological process: on the left - in 36 cases (36.4%), on the right - in 51 children (51.5%), on both sides in 12 (12.1%).

When making a diagnosis, the degree of hydronephrosis was assessed according to the classification of the "Society for Fetal Urology (SFU)" (2003) [4]:

Hydronephrosis of the II degree was detected in 10 children (10.1%), grade III - in 56 children (58.6%), grade IV - in 31 children (31.3%). When analyzing the urinary sediment, leukocyturia was predominant - in 28 children (28.3%), erythrocyturia was in 12 (12.1%), proteinuria in 7 children (7%), the presence of epithelium in the urine - in 12 (121%), mucus - in 8 (8.1%).

During the X-ray urological examination, all children had clinically significant deviations from the norm [18], 1[9]. Of these, CT was performed in 32 children (32.3%) - a decrease in the excretory function of the kidneys was revealed in 88 cases (88.9%), in 15 cases (15.2%) there was no visualization of the kidney and its function. According to excretory urography, a decrease in kidney function was noted in 76 cases (767%). All children underwent ultrasound examination of the kidneys, supplemented by

ultrasound Doppler imaging of the vessels in 35 cases (35.3%), which revealed decreased vascularization of the affected kidney in 40 cases (40.5%), an aberrant artery was visualized in 10 cases (10.1%); these patients underwent disengaging pyeloplasty with the formation of an antevasal anastomosis. In 58 cases (58.6%), pyeloplasty was performed using the Heinz-Andersen method, in 22 children (22.1%), with complete loss of kidney function, nephrectomy was performed. Stenting of the urinary tract was performed in 9 children (9.1%). The postoperative period was uncomplicated in 73 cases (73.6%), with the development of urinary tract infection in 14 children (14.1%). In all cases, infectious complications were successfully stopped by antibacterial therapy. Remote results were monitored in all patients, control examination was conducted not earlier than 3 months after surgical treatment) - urine passage was restored in all children. In most children, a decrease in the size of the renal pelvis and calyces was observed in dynamics - in 68 cases (68.6%). In 9 cases (9.1%), dilation of the renal pelvis persisted, which required further monitoring of the dynamics of the process. In 13 cases (13.1%), normal functioning of the remaining kidney was observed after nephrectomy.

CONCLUSION

Fundamental Finding : The study revealed that late diagnosis of congenital hydronephrosis in children, particularly after age 3, leads to significant renal damage due to the disease's latent progression and nonspecific early symptoms. Advanced cases, particularly those reaching stage IV, often require nephrectomy, highlighting the need for timely intervention. **Implication :** These findings underscore the critical need for early screening and effective diagnostic protocols in pediatric urology, especially in areas lacking modern diagnostic equipment. Timely diagnosis can prevent severe renal impairment and reduce the need for invasive treatments like nephrectomy. **Limitation :** The study's focus on a single institution limits generalizability, as outcomes may differ in settings with more comprehensive diagnostic resources. Additionally, the lack of longitudinal data limits insight into long-term renal function after surgical intervention. **Future Research :** Further research is needed to establish standardized early detection protocols and explore non-invasive diagnostic advancements. Multi-institutional studies and long-term follow-ups could enhance understanding of the long-term outcomes of surgical treatments for hydronephrosis in children.

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