Original Article

ISSN (O): 2635-0823; ISSN (P): 2635-0815

Effect of Antibiotic Therapy in Children with Pyeloureteral Segment Obstruction

Abdusattor Akhatovich Nasirov[1], Fatkhillo Fayzievich Bayakhmedov[1], Sayyora Markhamatovna Sobitova[2], Shakhnozakhon Ikboljon qizi Fozilova[2], Gulnoza Umidullo qizi Gaybullaeva[2]

[1]Department of Pediatric Surgery, Tashkent Pediatric Medical Institute, Tashkent, Uzbekistan, [2]Tashkent Pediatric Medical Institute, Tashkent, Uzbekistan.

Abstract

The present retrospective study, which was conducted from 2013 to 2018 years, includes data of 131 children with antenatally diagnosed grade III and IV hydronephrosis (SFU). All patients underwent surgical treatment at the age from 3 months to 3 years and did not receive antibiotic prophylaxis. Urinary tract infection was diagnosed in the presence of WBC in urine sample (> 10 WBC/field of view), positive bacterial growth (≥105 CFU/ml) and fever (≥38.5 ° C). Children with duplex system, obstructive megaureter, vesicoureteral reflux, posterior urethral valve, and neurogenic bladder were excluded from this study. Grade III hydronephrosis was detected in 113 children and grade IV in 18 patients. The total incidence of urinary tract infection was 9.2% (12 patients), while in the group of children with grade IV hydronephrosis it was higher (in 3 of 18 - 16.7%) than in children with grade III (in 9 out of 113 - 7.9%) (P <0.05). The incidence of urinary tract infections did not differ significantly depending on the sex or age of the patients. In 7 (58.3%) patients, urinary tract infection was noted before the age of 6 months, with an average age of 2.7 months. A bacteriological study revealed that in eight (66.7%) patients, E. Coli was the causative agent of urinary tract infection. Children with antenatal diagnosed and postnatal confirmed ureteropelvic junction obstruction do not need antibiotic prophylaxis because of the low incidence of urinary tract infection. However, patients with grade IV hydronephrosis under the age of 6 months should be closely follow-up by physicians for the early diagnosis and treatment of urinary tract infection.

Keywords: Prenatal, hydronephrosis, urinary tract infection, child.

Corresponding Author: Abdusattor Akhatovich Nasirov, Department of Pediatric Surgery, Tashkent Pediatric Medical Institute, Tashkent, Uzbekistan.

Received: 09 January 2022 **Revised: 17 February 2022** **Accepted: 28 February 2022** **Published: 10 March 2022**

Introduction

Antenatal hydronephrosis (AH) is a fairly common congenital anomaly of the urinary tract and is detected in 1-5% of fetuses during ultrasound screening.[1] Approximately half of them develop hydronephrosis due to obstruction of the pyeloureteral segment (PUS).[2] In most cases, the clinical picture of PUS obstruction is poor and may be asymptomatic.[3] At the same time, pathology is often accidentally detected during ultrasound examination (ultrasound) of the abdominal organs for other reasons at an older age.[4] Also, PUS obstruction often tends to spontaneously regress within the first two years of life. So, B. Chertin et al. reported that only about 50% of children with antenatal diagnosed hydronephrosis and postnatally confirmed PUS obstruction required surgical treatment.[5] At the same time, according to diuretic renography, preserved differential kidney function (>40%) and a non-obstructive curve type are independent factors indicating that there is no need for surgical intervention. Consequently, most of these patients undergo dynamic observation and conservative therapy (antibiotic therapy), due to the absence of signs of a decrease in renal function. Although prophylactic antibiotic therapy (PAT) is empiric and widely used in children with vesicoureteral reflux and megaurethra, there is no evidence that it is highly effective in children with PUS obstruction. Moreover, growing concern about the development of antibiotic resistance casts doubt on the need and effectiveness of PAT in this group of children.

Purpose of the study. Assessing the risk of urinary tract infection in children with PUS obstruction depending on the degree of dilatation of the upper urinary tract.

Materials and Methods

This retrospective study, which was conducted from 2013 to 2018, included data from 131 children with PUS obstruction. When determining the severity of dilatation of the pyelocaliceal system of the kidney, we used the classification proposed

by the society for fetal urology.[6] All patients underwent surgical treatment at the age of 3 months to 3 years (10.059.1 months) and did not receive PAT. In the distribution of patients by sex, there was a predominance of boys - 100 (76.3%), compared with girls - 31 (23.7%). Among patients, right-sided hydronephrosis was detected in 49 (37.4%) patients, left-sided obstruction in 73 (55.7%) children, and in 9 (6.9%) cases there was a bilateral lesion. Urinary tract infection (UTI) was diagnosed in the presence of leukocyturia (>10 leukocytes/field of view), bacterial growth in urine samples (≥105 (CFU)/ml) and high body temperature (≥38.5 C). Children with concomitant malformations such as duplication of the upper urinary tract, obstructive megaureter, vesicoureteral reflux (VUR), ureterocele, posterior urethral valve, and neurogenic bladder dysfunction were excluded from this study.

The data obtained during the study were subjected to statistical processing using SPSS Statistics 20 application software packages from StatSoft (USA). At the same time, the critical value of the significance level of the results was taken equal to p=0.05.

Results and Discussion

According to ultrasound, grade III hydronephrosis was detected in 113 children and grade IV in 18 patients. The majority of patients were in infancy (under 1 year) and amounted to 91 (69.5%), and the number of patients aged 1 to 3 years was 40 (30.5%) [Figure 1].

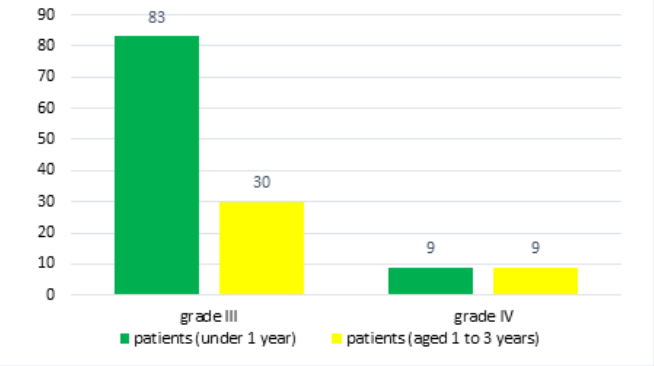

Figure 1: Distribution of patients depending on the severity of hydronephrosis

As follows from the data presented in Table 1, PUS obstruction was asymptomatic in 114 (87%) children. Four (3%) patients were examined for a palpable mass in the abdominal cavity. A characteristic clinical sign of the defect in one (0.8%) case was the child's restlessness without a clear localization, which was stated as a pain syndrome. The overall incidence of UTI was 9.2% (12 patients), while in the group of children with IV degree of hydronephrosis, it was observed more often (in 3 of 18 - 16.7%) than in children with III degree (in 9 of 113 - 7.9%) (P<0.05). The incidence of UTI did not differ significantly depending on the gender or age of patients [Table 2].

In 7 (58.3%) patients, UTI was noted before the age of 6 months, with a mean age of 2.7 months. Two of 9 children with bilateral hydronephrosis had repeated episodes of UTIs.

Bacteriological examination revealed that in eight (66.7%) patients the causative agent of urinary tract infection was Escherichia coli [Table 3].

It is important to note that hypertension due to PUS obstruction in most cases is a benign condition with a high probability of spontaneous regression. The realization of this possibility has led to the development of conservative treatments using antibiotics to prevent upper urinary tract infections. Unfortunately, questions about the incidence of UTIs, as well as the effectiveness of the use of PAT in children with AH, remain highly debatable [Table 4]. Thus, at present, PAT is widely used in children with hypertension, until VUR is excluded, since children with a high degree of reflux are most at risk of developing UTIs.[7] However, Lee J. H. et al., examining 430 children with hypertension without VUR, found a fairly high incidence of UTIs (19%) in children with PUS obstruction.[8] And according to Song S.H. et al., 30% of children with PUS obstruction have a UTI. Therefore, the authors are deeply convinced of the need for PAT during dynamic observation.[9] However, studies by other authors indicate an extremely low incidence of UTIs in children with PUS obstruction.[7,10] Moreover, Islek A. et al. when studying the data of 84 children with antenatal diagnosed hydronephrosis and postnatally confirmed PUS obstruction, no signs of UTI were found in any patient.[11]

OPUS, obstruction of the pyeloureteral segment; UTI, urinary tract infection; PAT stands for prophylactic antibiotic therapy.

In our study, the overall incidence of UTIs in children with PUS obstruction remains at a relatively low level. However, in children with IV degree of hydronephrosis, infection was found much more often than in children with III degree. More than half of patients had an infection before the age of 6 months. Escherichia coli was the most common uropathogen in children with UTI and PUS obstruction, which is consistent with the data of other authors.[12]

Conclusion

Children with antenatally diagnosed hydronephrosis and PUS obstruction do not need PAT due to the low incidence of UTIs. However, patients with grade IV hydronephrosis under the age of 6 months should be under more careful supervision of specialists for the timely diagnosis and treatment of UTIs. If an infection is detected in this category of children, antibiotic

Table 1: Distribution of patients depending on the clinical manifestation

Clinical course	Number of patients	
	Abs.	%
Asymptomatic course	114	87
Palpable mass	4	3
Child anxiety (abdominal/lower pain)	1	0,8
urinary tract infection	12	9,2
Total amount	131	100

Table 2: Distribution of patients depending on the degree of hydronephrosis, sex and age

Degree of hydronephrosis	Number of patients	Number of UTIs /%	P
III degree	113	9/7,9%	<0,05
IV degree	18	3/16,7%	
Gender			>0,05
Boys	100	10/10%	
Girls	31	2/6,5%	
Age			>0,05
Under 1 year	91	8/8,8%	
From 1 year to 3 years	40	4/10%	

Table 3: Causative agents of UTIs in children with PUS obstruction

	Pathogen	Number of patients	%
1	Escherichia coli	8	66,7%
2	Pseudomonas aeruginosa	1	8,3%
3	Klebsiella	1	8,3%
4	Enterobacter	1	8,3%
5	Enterococcus	1	8,3%

Table 4: The incidence of UTI in children with antenatal hydronephrosis according to various data

	Generalnuml patients (N)	Quantitypati with obstruction of the pyeloureteral segment (N)	Observation period (months)	FrequencyUT (%)	Mean age at the time of UTI (months)	PAT during the observation period	Indication for PAT
Song S.H. et al. 2007	105	75	12	30,7	2,6	No	Yes
Lee J.H. et al. 2008	430	-	12	19	4,1	No	Yes
Roth C.C. et al. 2009	92	56	24	1,8	-	No	No
Islek A. et al. 2011	84	84	18	0	-	No	No
Visuri et al. 2016	192	135	30	6	3-12	Yes	No

therapy should be carried out taking into account the spectrum of action of antibacterial drugs on possible uropathogens.

References

1. Braga LH, Mijovic H, Farrokhyar F. Antibiotic prophylaxis for urinary tract infections in antenatal hydronephrosis. Pediatrics. 2013;131(1):251–261. Available from: https://doi.org/10.1542/peds.2012-1870.
2. Mudrik-Zohar H, Meizner I, Bar-Sever Z. Prenatal sonographic predictors of postnatal pyeloplasty in fetuses with isolated hydronephrosis. Prenat Diagn. 2015;35(2):142–149. Available from: https://doi.org/10.1002/pd.4505.
3. Sharkov SM, Rusakov AA, Semikina EL. Urine cell composition in children with monolateral hydronephrosis. Detskaya khirurgiya. J Pediatr Surg. 2014;4:20–22.
4. Tubre RW, Gatti JM. Surgical Approaches to Pediatric Ureteropelvic Junction Obstruction. Curr Urol Rep. 2015;16(10):72. Available from: https://doi.org/10.1007/s11934-015-0539-1.
5. Chertin B, Pollack A, Koulikov D, Rabinowitz R, Hain D, Hadas-Halpren I, et al. Conservative treatment of ureteropelvic junction obstruction in children with antenatal diagnosis of hydronephrosis: lessons learned after 16 years of follow-up. Eur Urol. 2006;49(4):734–738. Available from: https://doi.org/10.1016/j.eururo.2006.01.046.
6. Fernbach SK, Maizels M, Conway JJ. Ultrasound grading of hydronephrosis: introduction to the system used by the Society for Fetal Urology. Pediatr Radiol. 1993;23(6):478–480. Available from: https://doi.org/10.1007/bf02012459.
7. Visuri S, Jahnukainen T, Taskinen S. Incidence of urinary tract infections in infants with antenatally diagnosed hydronephrosis-A retrospective single center study. J Ped Surg. 2017;52(9):1503–1506. Available from: https://doi.org/10.1016/j.jpedsurg.2016.11.038.
8. Lee JH, Choi HS, Kim JK, Won HS, Kim KS, Moon DH, et al. Nonrefluxing neonatal hydronephrosis and the risk of urinary tract infection. J Urol. 2008;179(4):1524–1528. Available from: https://doi.org/10.1016/j.juro.2007.11.090.
9. Song SH, Lee SB, Park YS, Kim KS. Is antibiotic prophylaxis necessary in infants with obstructive hydronephrosis? J Urol. 2007;177(3):1098–1101. Available from: https://doi.org/10.1016/j.juro.2006.11.002.
10. Roth CC, Hubanks JM, Bright BC, Heinlen JE, Donovan BO, Kropp BP, et al. Occurrence of urinary tract infection in children with significant upper urinary tract obstruction. Urology. 2009;73(1):74–78. Available from: https://doi.org/10.1016/j.urology.2008.05.021.
11. Islek A, Güven AG, Koyun M, Akman S, Alimoglu E. Probability of urinary tract infection in infants with ureteropelvic junction obstruction: is antibacterial prophylaxis really needed? Pediatr Nephrol. 2011;26(10):1837–1841. Available from: https://doi.org/10.1007/s00467-011-1889-7.
12. Morozov DA, Morozova OL, Zakharova NB, and DYL. Modern principles of diagnosis and prognosis of the course of chronic obstructive pyelonephritis in children. Urologiia. 2013;3:68–73.

How to cite this article: Nasirov AA, Bayakhmedov FF, Sobitova SM, Fozilova SI, Gaybullaeva GU. Effect of Antibiotic Therapy in Children with Pyelouretheral Segment Obstruction. Adv Clin Med Res. 2022;3(1):18-21.

Source of Support: Nil, **Conflict of Interest:** None declared.