Profile of Pediatric Hydronephrosis in Saiful Anwar General Hospital, Malang, Indonesia

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Abstract

Background & Objective: Pediatric hydronephrosis may correspond to very different clinical situations, ranging from fully benign reversible dilatation to severe obstructive nephropathy lead to end-stage renal disease. We aim to know profile of paediatric hydronephrosis in our hospital in order to give better treatment for patients.

Materials & Methods: Total of 51 paediatric patients ≤17 years between January 2012–December 2017, diagnosed to have pediatric hydronephrosis, were included in study. Data from single-center medical records were collected into profile followed with comparative analysis.

Results: Most of patients were boys (70.5%), average age was 61.4 months-old ranged from 0 to 180 months-old. Etiology of pediatric hydronephrosis were found UPJ Stenosis (37.35%), VUR (29.41%), stone (7.8%), abdominal tumor (5.8%), complete double-system (5.4%), incomplete double-system (3.9%), PUV (1.9%), and phimosis (3.9%). In location parameter, we found bilateral hydronephrosis head major count on data (43,14%), followed by left-side (35.29%), and lastly by right-side (21,57%). Severity of hydronephrosis of patients were 4th (62.74%), 3rd (15.68%), 2nd (13.73%), and 1st degree (7.8%). Study found significant difference between whether operative or non-operative treatment compared to single or both hydronephrosis and age ($p<0.05$ each). Data showed there was significant difference between prenatal care choices (midwife vs OBG) compared to degree of hydronephrosis of patient diagnosed for pediatric hydronephrosis ($p <0.0001$).

Conclusion. Most of patients were boys, aged 0 to 180 months-old. UPJ Stenosis was most common cause of pediatric hydronephrosis, and it involved both side of kidneys. Fourth grade of hydronephrosis were most common presentation. We found patients came to OBG for prenatal care had lower incidence of more severe clinical appearance of hydronephrosis. Age difference and bilateral hydronephrosis had more tendency for operative management

Keywords: *Profile pediatric hydronephrosis, UPJ Stenosis, Grade of Hydronephrosis*

Introduction

Hydronephrosis (HN) is a pathological condition where renal pelvis and calyces dilate due to urine reflux or stagnation. HN in pediatric patients were found in about 1-5% of all births, of which 41-88% consist of temporary or clinical HN and physiological HN. Ureteropelvic junction obstruction-related HN (UPJO) is the most common variant, occurring in 10-30%.[1]

The intersection between the kidney and ureter is known as the ureteropelvic junction (UPJ). Dysfunction in this part of urinary tract is suspected to be responsible for most urology referral, for pediatric and also adults. UPJ disease (UPJD) is often regarded as an obstruction, but nowadays a true obstruction is rarely observed. The

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more accurate description for UPJD is an abnormal flow of urine from renal pelvis to ureter resulting in a gradual and progressive destruction to the kidney. Using an ultrasound scan (USS), physicians commonly found hydronephrosis, which means renal pelvic dilation, which is often related to calyceal dilation, but rarely a ureter dilation in isolated UPJD.[2]

In certain pediatric patients, ultrasound, VCUG, excretory urography, renogram, and functional MR urography were the most powerful diagnostic imaging techniques to evaluate urinary tract dilation. However, there were still many questions regarding the ideal strategy to distinguish between pediatric patients who would benefit from complete examination and pediatric patients who had benign lesion that did not need much of these imaging techniques.[3]

Due to the clinical significance and potential risk of long term complication, such as UTI and chronic kidney disease,[4] this study aims to describe pediatric hydronephrosis patients visiting Saiful Anwar Hospital.

This study attempts to determine hydronephrosis causes and the frequency of diagnosis for hydronephrosis, and also the complication occurring in the studied population.

Material & Methods

This study is a descriptive and cross-sectional study to determine the spectrum of patients with hydronephrosis in pediatric population and the correlation between hydronephrosis degree and conservative or surgical management.

Population for this study included all pediatric patients with hydronephrosis in Saiful Anwar General Hospital Malang from January 2018 to March 2020.

Population for this study included all pediatric patients with hydronephrosis visiting the emergency unit in Saiful Anwar General Hospital or Urology Outpatient Clinic from January 2018 to March 2020.

The inclusion criteria were (1) all pediatric patients who visited the Emergency Unit in Saiful Anwar General Hospital or Urology Outpatient Clinic and were diagnosed with hydronephrosis, (2) patients or guardian/parents of underaged patients agreed to be enrolled in the study. The exclusion criteria were (1) unclear follow-ups, (2) incomplete data, (3) patients or the guardian/parents of underaged patients who refused to be enrolled in the study. Free variable in this study included age, gender, degree of hydronephrosis, etiology, therapy, history of antenatal care, evaluation of the involved kidney side. Dependent variable in this study included the correlation between the degree of hydronephrosis with conservative or surgical management. Hydronephrosis in this study is defined as a pathological condition where renal pelvic and calyces dilated due to urinary reflux or stagnation. The procedure in this study consisted of data collection from (electrical and physical) medical records of pediatric patients with hydronephrosis visiting Saiful Anwar General Hospital from January 2018 to March 2020, sample selection by using the inclusion criteria, and data processing with SPSS 20 for Mac.

This study was conducted in Saiful Anwar General Hospital Malang by using patients' medical records from January 2018 to March 2020.

Data analysis was performed using SPSS for Mac ver. 20.0. Data analysis used Chi-Square hypothesis test.

Result

Fifty-one pediatric patients with hydronephrosis was recorded throughout January 2018 to March 2020. All patients enrolled in the study have fulfilled the inclusion and exclusion criteria. Characteristics of the patients were presented in Table 3. There were 36 boys (70.6%) and 15 girls (29.4%) in this study. The mean age was 61.41 months. Degree of hydronephrosis at first visit to hospital varied from grade 1 (7.8%), grade 2 (13.7%), grade 3 (15.7%), and grade 4 (62.7%). The kidneys affected were left kidney in 35.3% of the patients, right kidney in 21.6%, and bilateral in 43.1% of the patients in this study. Antenatal care in this study consisted of visits to obstetrician (21.6%) and midwives (78.4%).

Table 1. General characteristics of patients with hydronephrosis.

Characteristics		n	%
Sex			
	Boys	36	70.6
	Girls	15	29.4
Age			
	Neonate (0-1 months)	1	2.1
	Infant (1-12 months)	6	11.7
	Child (>12 months)	44	86.2
Age Mean (SD)	61.41(52.97)		
Grade of Hydro-nephrosis			
	Grade 1	4	7.8
	Grade 2	7	13.7
	Grade 3	8	15.7
	Grade 4	32	62.7
Etiology			
	UPJ Stenosis	19	37.3
	VUR	15	29.4
	Stone	4	7.8
	Complete Double System	3	5.9
	PUV	1	2
	UVJ Stenosis	2	3.9
	Abdominal Tumor	3	5.9
	Incomplete Double System	2	3.9
	Phimosis	2	3.9
Management			
	Percutaneous nephrostomy	12	23.5
	Pyeloplasty	8	15.7
	Clean Intermittent Catheterization	14	27.5
	PCNL	1	2

Cont... **Table 1. General characteristics of patients with hydronephrosis.**

	Hemiuretero-nephrectomy	1	2
	Conservative therapy	4	7.8
	CAPD	1	2
	Neo-implantation	4	7.8
	DJ Stent Insertion	2	3.9
	URS	2	3.9
	Circumcision	2	3.9
Kidney side affected			
	Left	18	35.3
	Right	11	21.6
	Bilateral	22	43.1
Antenatal care			
	Obstetrician	11	21.6
	Midwives	40	78.4
Hydronephrosis involvement			
	Unilateral	3 non-surgical, 26 surgical	
	Bilateral	15 non-surgical, 7 surgical	

Comparative analysis on correlation between the location of hydronephrosis and hydronephrosis management, along with correlation between degree of hydronephrosis and conservative or surgical management was performed using Chi Square test.

Table 2. Chi Square analysis for variables tested with analytical test.

Variable	P value
Location of hydronephrosis and hydronephrosis management	0.000
Degree of hydronephrosis and conservative vs surgery	0.779
Antenatal care and degree of hydronephrosis	0.993

Discussion

Crucial steps in congenital hydronephrosis management rely on early diagnosis and evaluation of any pathological conditions leading up to congenital hydronephrosis. Hydronephrosis can be caused by an obstruction, due to urological and non-urological factors. Anatomical anomaly can occur in every level of urinary tract and can impact one or both sides of the kidney, although it most likely occurs where the embryo structure cleaved, such as ureteropelvic or vesicoureteral obstruction.[5]

In this study, the most common causes for hydronephrosis in pediatric population at Saiful Anwar Hospital were UPJ stenosis in up to 37.3% of the cases

and vesicoureteral reflux in up to 29.4%. Managements performed most frequent in this study were conservative management with CIC in 14 cases (27.5%) and percutaneous nephrostomy in 12 cases (23.5%). In the comparative analysis, it was concluded that the location of hydronephrosis was significantly related to management decision with P value = 0.000. Between antenatal care and degree of hydronephrosis, there were no significant effect found in those visiting obstetrician or midwives on the degree of hydronephrosis (P = 0.933).

The key to successful hydronephrosis management in pediatric patients relies on selection of appropriate patients and tailoring the treatment according to the etiology, but this condition posed many challenges in the decision-making process, which also takes vascular location into consideration and this may determine surgical or conservative management for the patient.[6] In this study, there were no data for vascular location, so the surgical management was conducted by percutaneous nephrostomy. CIC was applied in patients with hydronephrosis occurring within the bladder to the urethra, and were resulting in successful outcomes.[7] This showed that different location of hydronephrosis needed different management through appropriate etiological examination in this study.

Regarding the degree of hydronephrosis, the decision for conservative or surgical management was reviewed based on the severity of hydronephrosis. Theoretically, surgery will be performed in symptomatic obstruction and bilateral decrease of renal function as much as <40% and a decrease of >10% in follow-up examination, no improvement in drainage after diuretic therapy, increase of anterior renal pelvic diameter in USG or hydronephrosis grade 3 or 4 in pediatric hydronephrosis classification.[8]

Antenatal USG was not significant in determining the degree of nephrosis in this study, albeit being performed by midwives or even obstetricians. In a descriptive study by Putra, it was found that the ability to detect urological congenital defect with USG in West Java was still poor. USG examination still depended on clinical findings such as birthweight, gender, heart rate, placenta, and nuchal cord.[9]

Limitations of this study include the small number of subjects enrolled and the absence of post-management follow-up to identify clinical improvements. Other limitations included the low strength of this study and the failure to describe in more detail about whether there was any complications in the sub-analysis that could explain differences in management or decision making from the original condition.

Conclusion

Hematuria This study has showed the spectrum of pediatric patients population with hydronephrosis in Saiful Anwar Hospital. Correlation between location of hydronephrosis and the management performed was significant in this study. Meanwhile, the degree of hydronephrosis was not significantly related with conservative or surgical management. Moreover, antenatal care visit was also not significantly related to the degree of hydronephrosis detected in this study.

As shown in this study, the amount of patients enrolled and classified as the low risk group was very low. This could be caused by patients often found visiting smaller healthcare facilities and were not referred to bigger facilities, such as our hospital. To overcome this issue, future studies should also be conducted at smaller healthcare facilities, where patients were recorded prior to referral.

Ethical Clearance : Saiful Anwar Hospital Ethics Committee No 400/83/k.3/302/2018

Conflict of Interest : Nil

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