

A comparative study for outcome of diagnosed vesicoureteral reflux after urinary tract infection with diagnosed following other causes in children

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Abstract: Purpose: The difference between diagnosed patients with vesicoureteral reflux (VUR) after urinary tract infection (UTI) and diagnosed VUR patients following non-UTI causes in terms of severity, laterality, scar formation, breakthrough infection and necessity for surgery was evaluated. **Methods and Materials:** In this analytic cross-sectional study 120 neonates and children with VUR were followed-up in two separate groups: diagnosed VUR after UTI (78 patients) and diagnosed VUR after non-UTI causes (42 patients). All patients were taken prophylactic antibiotic. Variables were included: gender, severity of VUR, laterality, renal scar at the time of diagnosis and during follow-up, incidence of break-through infection and necessity for surgery. Information during follow-up were entered in data forms and the results remained statistically analyzed. **Results:** Average follow-up time in VUR group after UTI were 46.2 ± 3.4 months compared with VUR group following non-UTI causes, 48 ± 5.2 months. Considering severity of reflux, Uni or bilateral VUR, diagnosis of renal scarring and new scar formation, frequency of break-through infection and necessity for surgery, there was no expressive statistical difference between two VUR group after UTI and non-UTI causes. **Conclusion:** The consequence of this study reveals that patients whom diagnosis of VUR were not after UTI should be followed-up entirely like VUR group after UTI and the UTIs in this group must be diagnosed promptly and well be treated to prevent development of scar formation. [Abolhassan Seyedzadeh, Nooshin Milady, Akram Soleimani, Raha Khosravi. **A comparative study for outcome of diagnosed vesicoureteral reflux after urinary tract infection with diagnosed following other causes in children.** *Life Sci J* 2014;11(8):720-723]. (ISSN:1097-8135). <http://www.lifesciencesite.com>. 106

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1. Introduction

Urine reflux from bladder to ureter and upper urinary tract is called vesicoureteral reflux (VUR). It is reported about 0.5-1.8% in children "(Sung, 2012)". Primary VUR is a congenital insufficiency of valvular like mechanism in junctional place between bladder and ureter "(Cooper, 2009)". There are relations between renal damage, recurrent urinary tract infection (UTI), renal malfunctions and ultimately physical growth retardation and VUR in children "(Chenn, 2003)". A VUR with UTI can contribute to Pylonephritis, thus screening for bacteriuria is advantageous for follow-up "(Smellie, 1994)" and also NICE2007 guideline recommends routine use of prophylactic antibiotics in recurrent UTIs in children "(NICE 2007)".

Otherwise 40% of children with UTI have some abnormalities like reflux, hydronephrosis, megaureter, etc" (Benador, 1997)". Different investigations declared that mild and unilateral VUR has high incidence which almost has spontaneously amendment but in severe VUR there is minor spontaneously recovery" (Sung, 2012-Cooper, 2009-Chenn, 2003-Smellie, 1994-NICE, 2007)".

Nowadays diagnostic imaging for neonates, whose prenatal investigations had revealed hydronephrosis and/or other urinary impairment, is reasonable. Further there is an ambivalence that does

renal damage have any difference in children that their VUR is determined before UTIs according to sibling screening or diagnosed prenatal hydronephrosis or not?" (Chenn, 2003-Smellie, 1994-NICE, 2007-Benador, 1997-Ylinen, 2006)".

Achieving the answer of this question can lead to early interventions that result in reducing renal damages in neonates and children.

In this study, we compared consequences of diagnosed VUR after UTI with diagnosed VUR following non-UTI causes.

2. Material and Methods

In this study, 120 newborn and children whom referred to Nephrology clinic in Emam Reza hospital, Kermanshah and had been diagnosed VUR, were followed-up.

Inclusion criteria were diagnosed primary VUR in voiding cystourethrogram (VCUG). Patients were divided in two groups: First group were children with diagnosed VUR after UTI (78 patients) and second group were children with diagnosed VUR following non-UTI causes (42 patients). All patients in two groups treated with prophylactic antibiotic (cephalexin 10mg/kg in patients under 2 months old and sulfamoxazol- trimethoprim 2 mg/kg according to trimethoprim in older than two months). For all of them at baseline and after one year follow-up

Dimercaptosuccinic acid scan (DMSA) carried out to evaluate the presence of renal scar at time of diagnosis and new scar formation during follow-up. VCUG was repeated annually. Patients were followed with monthly routine urine culture and when UTI was suspected. Surgery was considered facing recurrent BTI, persistence of high-grade VUR and parent's preference. The assessment criteria were included gender, severity of VUR, uni or bilateral VUR, presence of scars at time of diagnosis and during follow-up, BTI and necessity of surgery in two groups.

Results were analyzed with Chi-square and Fisher exact tests using SPSS (V.16).

P value <0.05 was considered as the significant difference between variables.

3. Results

The results were analyzed for whole 120 patients. Average follow-up time for VUR group after UTI was 46.2±4.3 months and for VUR group following non-UTI causes was 48±5.2 month (PV=0.5).

Findings revealed that according to sex distribution in VUR group after UTI dominance is for female (PV<0.05) however in VUR group following non-UTI causes, male and female did not show any significant difference (PV>0.05).

In VUR group after UTI, 42 patients (53.8%) had unilateral and 36 patients (46.2%) had.

Bilateral VUR and in VUR group following non-UTI causes, 21 patients (50%) had unilateral and 21 patients (50%) bilateral VUR. There was no statistically significant difference between uni and bilateral VUR (PV=0.7) (Table 1).

According to severity of VUR, patients were divided in three groups: mild, moderate and severe.

In VUR group after UTI, number of patients with mild, moderate and severe VUR were 44(56.4%), 27 (34.6%), 7 (9%) and in VUR group following non-UTI causes were 20(47.6%), 17(40.5%), 5(11.9%) respectively and there was no significant difference statistically (PV=0.8) (Table 1).

Frequency of renal scar at diagnosis time based on primary DMSA scan, in VUR group after UTI and non-UTI causes were 44.9% and 42.9% respectively and there was no significant difference statistically (PV>0.05).

Along follow-up time, new scar formation rate in all patients whom were followed-up completely, in two groups were 10.3% and 15% respectively with no significant difference statistically (PV >0.05) (Table 1).

Patients with no or only one episode of break-through infection (BTI) were defined as low

and patients with two or more BTI were defined as high BTI occurrence. High BTI rate in VUR group after UTI and VUR group followed non-UTI causes were 10.3% and 20.5% respectively and there was no significant difference statistically (PV=0.50) (Table 1).

Necessity for surgery in all followed-up patients, in two groups were 2.8% and 14.1% respectively and there was no significant difference statistically (PV=0.07) (Table 1).

Findings are summarized in table 1.

4. Discussions

In our study, 120 neonates and children with VUR divided in two groups: group 1 included 78 patients (63 female and 15 male) with VUR diagnosed after UTI and statistically significant female dominance (PV<0.05) and group 2 included 42 patients (20 male and 22 female) with VUR diagnosed after non-UTI causes (consist of congenital hydronephrosis, sibling screening and accidentally diagnosed) and no sex dominance (PV>0.05). This study focused on differences in natural history and outcome of VUR in two groups.

In a study 202 neonates with VUR were divided in two groups, prenatally diagnosed group and diagnosed after UTI group. Results declared that in prenatally diagnosed group, gender dominance was male significantly whereas in the other group females were dominant "(Chen, 2003)".

In **Chen et al.** study, in both VUR groups after UTI and non-UTI causes, renal damage was similar [3] that was in agreement with our results.

Ylinen et al. compared 21 prenatally diagnosed neonates with VUR and 30 patients with VUR diagnosed after infection. Their study revealed that bilateral dilatation and also severe VUR were more common in second group "(Ylinen, 2006)".

Management of primary VUR has remained controversial for many years. American Urology Association recommends continuous prophylactic antibiotic for most children with VUR and Surgery is suggested for patients with persistent reflux and other requirements "(Peters, 2010)".

In **Kangin et al.** study, 227 neonates with prenatally diagnosed hydronephrosis were investigated. 36 neonates including 25 male and 11 female had VUR. They revealed that most prenatally diagnosed refluxes occurred in males "(Kangin, 2010)".

Kangin et al. study showed among 227 neonates with prenatal hydronephrosis, 36 neonates had VUR. 85% of them had severe VUR and annual rate of UTI was 1.25 episodes.

Table 1: Distribution of sex, laterality, severity, renal scar, BTI and need for surgery in patients with diagnosed VUR after UTI (group 1) and non UTI causes (group 2)

		Group 1		Group 2		
		Prevalence	Relative prevalence	Prevalence	Relative prevalence	
Sex	male	15	19.2%	20	47.6%	
	female	63	80.8%	22	52.4%	PV:0.01
laterality	unilateral	42	53.8%	21	50%	
	bilateral	36	46.2%	21	50%	PV: 0.4
VUR severity	mild	44	56.4%	20	47.6%	
	moderate	27	34.6%	17	40.5%	
	severe	7	9%	5	11.9%	PV:0.36
Renal scar at diagnosis	+	35	44.9%	18	42.9%	
	-	43	55.1%	24	57.1%	PV:0.49
New scar formation*	+	8	10.3%	6	15%	
	-	70	89.7%	34	85%	PV:0.31
B T I **	Low(0-1)	70	89.7%	31	79.5%	
	High2≤	8	10.3%	8	20.5%	PV: 0.1
Necessity of anti-reflux surgery ***	+	11	14.1%	1	2.8%	
	-	67	85.9%	35	97.2%	PV:0.07

*Two patients in group 2 lost follow-up DMSA

** Three patients in group 2 lost follow-up urine culture

*** Six patients in group 2 lost follow up

In another study also most of prenatal diagnosed VUR were bilateral and severe “(Herndon, 1999)”.

In our study, Uni or bilateral VUR in both VUR groups after UTI and following non-UTI causes like prenatal hydronephrosis or sibling screening were similar statistically and there was not any difference also in severity of VUR in two groups statistically.

Also **Sweeney et al.** studied 127 patients with average 4 months of age whom had severe VUR (grade IV and V), 76% were diagnosed after UTI and 24% through sibling screening and/or evaluation of hydronephrosis. Long term follow-up of patients, revealed higher incidence of reflux nephropathy in patients with diagnosed VUR after UTI. They came to the conclusion that early diagnosis and treatment of high grade reflux with screening programs can prevent renal damage “(Sweeney, 2001)”.

In our study , renal scaring in both VUR groups were compared .Renal scaring at time of diagnosis and new scar formation showed no difference between two groups(PV>0.05).

Two limitations affected our study:

1- In group 2, VUR was diagnosed in some patients postnatally and because of different causes. Although, there was not any history of UTI in these patients, but some episodes of undiagnosed UTI could not be rule out exactly.

2-According to our policy, parent’s preference was one of the reasons for surgical treatment of VUR in some cases, therefore this matter

could lead to a bias in evaluation of necessity for surgery in both groups.

5. Conclusion:

As regards aforementioned limitations, results of our study reveals that patients whose VUR diagnosis is not after UTI, should be followed-up completely as like as diagnosed VUR after UTI and also episodes of UTI in such patients should be detected and treated promptly to prevent renal parenchymal damage.

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