The Role of Foley Catheter in the Treatment of Low Grades Vesico-Ureteric Reflux (VUR)

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Abstract

Vesicoureteral reflux can be defined as a congenital anomalies of the lower urinary tract characterize by a defect in the vesico-ureteric valve (which is a functional valve result from the oblique intramural passage of the lower 2.5 cm. of the ureters in wall of the bladder) resulting in retrograde passage of urine into one or both ureters up to the kidneys during voiding. From March 2014 to June 2016, 60 (38 males and 22 females) children with low-grade primary VUR (10 with G1, 16 had G2 and 34 had G3) who are seeking medical advice in the urological department of Alhilla teaching and Alsadiq teaching hospitals and private clinics were included in this study. All patients evaluated by thorough medical history, complete physical examination, send for urinalysis, PCV, and ultrasonography, and confirm the diagnosis by voiding cystography. No Foley catheter put for patients with G1 VUR, while Foley catheter put for eight patients with G2 VUR (50%) and for 20 patients with G3 reflux (58.8%). Patients are fallowed for at least 1 year for any breakthrough upper or lower urinary tract infection and for the grade of reflux by frequent urinalysis and ultrasonography for any new renal scaring while voiding cystography repeat every 6 months. Conservative treatment is the first option in the treatment of low grade VUR. The use of indwelling Foley catheter in the treatment of low grade VUR remain controversy regarding its role in decreasing the back pressure on the renal parenchyma and its increasing rate of UTI .however this study reveal that the incidence of UTI occur in 6.25% of cases treated with continuous prophylactic antibiotic (CPA) alone and occur in 25% of cases treated with CPA with Foley catheter placement.

Keywords: *Foley catheter, low grades, vesico-ureteric reflux (VUR).*

Introduction

Vesicoureteric reflux can be defined as a congenital anomalies of the lower urinary tract characterize by a defect in the vesico-ureteric valve (which is a functional valve result from the oblique intramural passage of the lower 2.5 cm. of the ureters in wall of the bladder) resulting in retrograde passage of urine into one or both ureters up to the kidneys during voiding[1,2]. The definite diagnosis and grading is best done by voiding cysturethrogram (VCU) which can classify the condition into five grades . The low grades VUR includes grade [1, 2, 3]. The treatment options for children with low grade VUR remain controversy regarding the use of long-term prophylactic antibiotic and the use of indwelling Foley catheter[1,2]. Early diagnosis and use appropriate method of treatment for children with VUR increase the opportunity to prevent renal damage [2, 3]. Urinary tract infection in children with VUR increase the risk of pyelonephritis, which associated with renal scaring and damage[4]. Many of the interventional clinical trials (controlled and randomized) which try to investigate the causal association between VUR and the frequency of febrile UTI and renal scaring are recently proved[1,4,5]. AUA Guideline for Pediatric VUR establish the correlation between VUR and the frequency of febrile UTI and renal scaring in 1997[4,5,6]. AUA Guideline state that renal scarring in children with VUR and pyelonephritis are 2.8 times greater than

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the odds of scarring for children with pyelonephritis without VUR[4,5,6]. So treatment of VUR is considered to reduce the morbidity of acute pyelonephritis and the risk of permanent renal injury, observation, continuous antibiotic prophylaxis,continuous bladder drainage by Foley catheter and surgical interventions are the main options used for treatment of children with VUR[1,3,4,5,6,7]. Most of the studies which try to compare the outcomes of continuous prophylactic antibiotics versus surveillance alone in treatment of children with VUR regarding the renal scaring and damage state that renal scaring an damage occur less in children with reflux who are treated with continuous prophylactic antibiotics than those who are treated with antibiotics only when urinary tract infection occur [8,9] .while other studies denial any benefit from the use of CPA over surveillance in decreasing the risk of recurrence of UTI and renal scaring [6,7]. Although American Urology Association guideline in 2010 recommend that CPA is indicated during the waiting period in the conservative treatment [7, 10].

Patients and Method

From March 2014 to June 2016, 60 (38 males and 22 females) children with low grade primary VUR(10 with G1, 16 had G2 and 34 had G3) who are seeking medical advice in the urological department of Alhilla teaching and Alsadiq teaching hospitals and private clinics were included in this study. Age of the patients ranging from (7 days- 6 years). All patients evaluated by thorough medical history, complete physical examination, send for urinalysis, p.c.v., and ultrasonography, and confirm the diagnosis by voiding cystography. Children with high-grade reflux and those with secondary reflux excluded from the study. Those children treated by conservative treatment, which include prophylactic antibiotics with or without Foley catheter placement. No Foley catheter put for patients with G1 VUR, while Foley catheter put for 8 patients with G2 VUR (50%) and for 20 patients with G3 reflux (58.8%). Patients fallowed for at least 1 year for any breakthrough upper or lower urinary tract infection and for the grade of reflux by frequent urinalysis and ultrasonography for any new renal scaring while voiding cystography repeat every 6 months. Data was collected and analyses by meta analyses with P-value of>0.05 is consider significant and of > 0.001 is considered highly significant.

Results and Discussion

1. **VUR and SEX distribution:** In this study, the male to female ratio is (1.7:1) as in Table (1) which seems to be near the results of most studies.

Table (1) Male to female ratio of VUR

Gender	No. of patients	Percentage%
Male	38	63.3
Female	22	36.7

2. **The severity of VUR according to the grading:** For 60 children with primary VUR who are included in the study, 10 children(16.6%) had grade 1 reflux while 16 children (26.7%) had grade 2 VUR and 34 children (56.6%) with grade 3 reflux this percentages can be presented in figure 1:

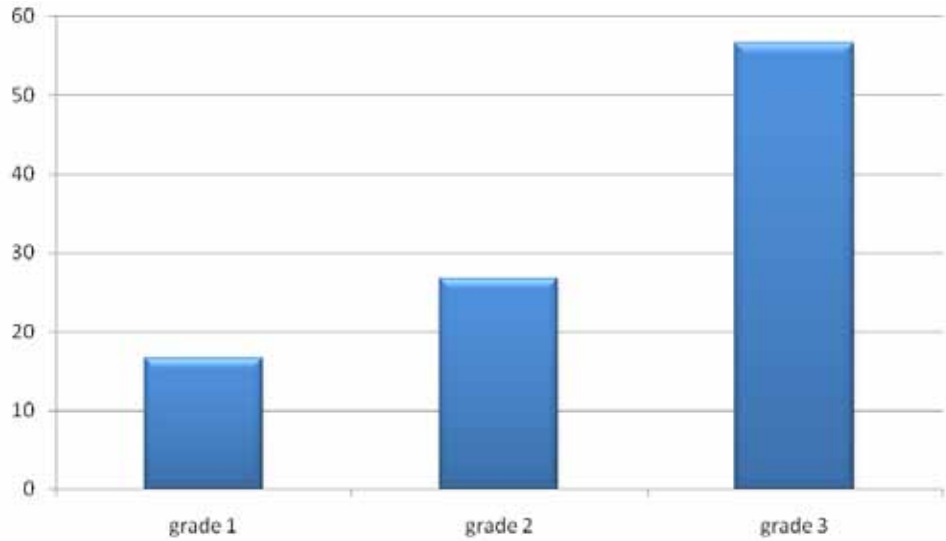

Figure (1) distribution of patients according to the grade of VUR

3. **The relation between VUR and UTI episodes:** For the 32 patients who are treated with prophylactic antibiotics alone without catheter placement only 2 patients had breakthrough febrile UTI (6.25%) and those 2 patients had grade 3 VUR.

For the 28 patients who are treated with prophylactic antibiotics with indwelling Foley catheter replaced every 10 days, 7 children had breakthrough febrile UTI (25%) 4 of them had grade 3 VUR and the remaining 3 children with grade 2 VUR. As showed in figure (2).

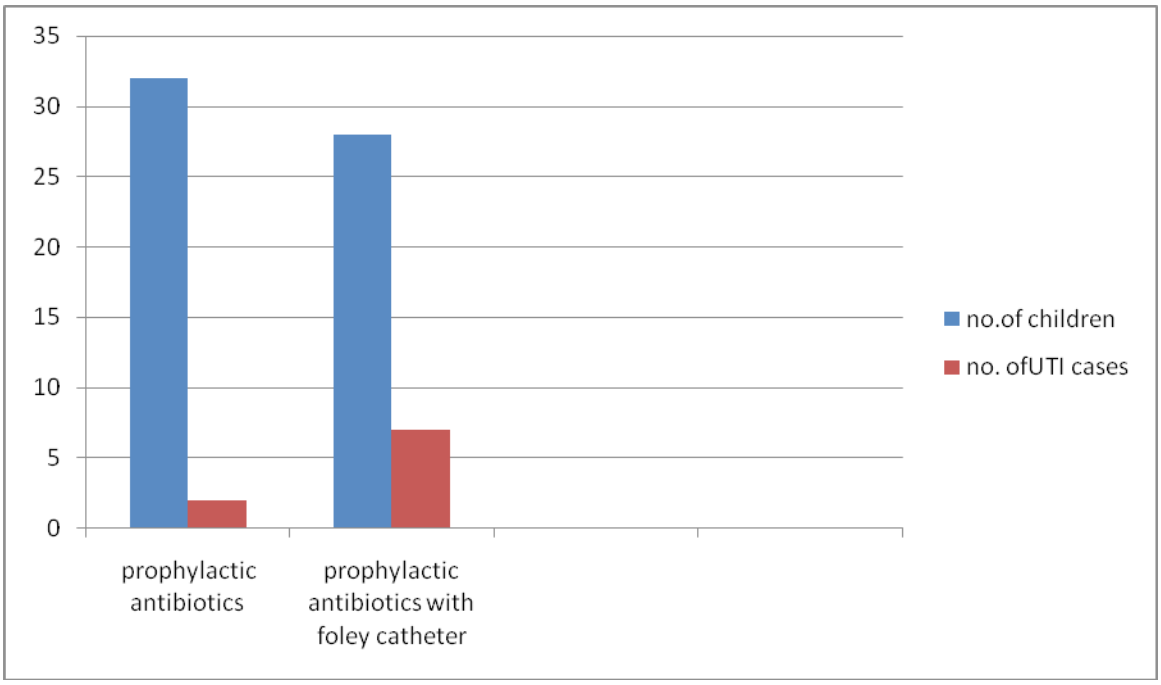

Figure (2): The relation between the use of Foley catheter and the occurrence of UTI:

4. **The relation between VUR and renal scaring:** Renal scaring assessed by ultrasonography and for the 32 patients who are treated with prophylactic antibiotic alone, 8 of them (25%) develop new renal scars.

While for the group who treated with prophylactic antibiotics and indwelling Foley catheter, 7 out of 28 children (25%) develop new renal scars as appear in table (2).

Table (2): The relation between Foley catheter placement and occurrence of renal scaring

			scar		Total
			scar	no scar	
Treatment	With Foley catheter placement	Count	8	20	28
		% within UTI	50.0%	45.5%	46.7%
	without Foley	Count	8	24	32
		% within UTI	50.0%	54.5%	53.3%
Total		Count	16	44	60
		% within UTI	100.0%	100.0%	100.0%

Fisher's Exact Test= 0.097, P-value= 0.78 (not significant).

5. **Rate of resolution and/or improvement in the grade of VUR:** All the 10 patient with primary VUR of grade 1,six patients (60%)has complete resolution of the reflux with in the period of fallow up (about 1 year) .

While of the 16 patients who had grade 2 reflux; 8 patient who treated with CPA alone, no one had complete resolution for the fallow up period and only 2 patient had improvement in the grade (change to grade 1) which account 25%. While those treated, with CPA and indwelling foley catheter 2 patient had complete resolution and other 3 patients change to grade during the fallow up period so the improvement rate in this group is 62.5%.

Regarding the 38 patients with grade 3 reflux, 18 patients who treated with CPA alone, only 3 patients had improvement in the VCU and change to a lower grade (27%), while 8 patients (73%) of the 20 patients who treated with CPA with indwelling catheter had improvement in VCU. Patients with grade 2 71% of them improve with Foleys while 29% improved without Foleys. There is significant association between grade of VUR and improvement with Foleys catheter. These results showed in table (3).

Table (3): The relation between the Foley catheter placement and improvement in the grade of VUR:

			Grade 1		Grade 2		Grade 3	
			Total	Improved	Total	Improved	Total	Improved
Treatment	With Foley catheter placement	Count	0	0	8	5	20	8
		% improvement	0%		71%		73%	
	Without Foley	Count	10	6	8	2	18	3
		% improvement	100%		29%		27%	
Total improvement according to the grade		Count	10	6	16	7	38	11
		% improvement	100%		100%		100%	

Pearson Chi-Square = 9.457 DF = 2 P-value= 0.009 (significant).

Discussion

The male to female ratio differ with different studies and in different communities.[4, 11] In this study, the male to female ratio is about (1.7:1) and this male predominance may be due to the society preference of male gender makes the families who had male child seek medical advices even with mild symptoms which not fit for female patients who are usually present late and of high grades.

Regarding the grade of VUR at time of presentation, most cases included in this study are of grade 3 (56.6%) while those of grade 2 (26.7%) and of grade 1 (16.6%) this is because most cases of primary VUR diagnose postnatal when present as UTI and most studies[11,13,16,17,18,19,20] reveal that the risk of UTI in VUR patients increase with increase the grade of reflux which mate the results of this study.

Although most previous studies reveal that UTI is commoner in VUR patients than those without VUR, this study also show that the percentage of UTI is higher in the group treated conservatively with CPA with indwelling foley catheter (25%) than the group treated with CPA alone (6.25%) although these results are statistically insignificant with p- value of 0.7 (>0.5) and this higher percentage mostly due to the effect of foley catheter which regard as a foreign body in the bladder and increase the risk of infection.

While the study did by Mattoo TK in 2011 relate the reflux nephropathy to the occurrence of upper UTI [15,] in this study the rate of new renal scaring identified in primary VUR patients by ultrasonography seems to be statistically insignificant between the 2 groups as it occur in 50% of patients treated with CPA alone and also in 50% of VUR patients treated by CPA with indwelling foley catheter these results may be due to the effect of foley catheter while it increase the risk of UTI and in the same time decrease the back pressure on the kidneys by decreasing the degree of dilatation of the ureters and pelvicalyceal system and this decrease in the degree of

dilatation of the ureters and pelvicalyceal system which showed in table (3) explain why the group of patients who are treated with CPA and indwelling foley catheter had higher resolution and improvement rate than the group of patients who are treated with CPA alone which seems to be statistically significant and these results are mate the results of shiraishi and . Knudson [12, 14]

Conclusion

Conservative treatment is the first option in the treatment of vesicoureteric reflux of low grades (grades 1, 2, 3). It included good hydration, good feeding with CPA. The use of indwelling Foley catheter remain controversy and this study show that the use of indwelling Foley catheter insignificantly increase the risk of UTI and renal scaring for cases of low grades VUR while it led to higher percentage of improvement in the degree of dilatation of the ureters and pelvicalyceal system which decrease the grade of reflux and may increase the spontaneous resolution rate. Although longer period of fallow up needed to know the exact effect of indwelling Foley catheter on the resolution rate of VUR.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq.

Conflict of Interest: Non

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