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Original Research Article

Profile and pattern of primary vesicoureteral reflux in children seeking care at a tertiary care teaching centre of Southern India

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ABSTRACT

Background: Previous studies have suggested that the clinical features of vesicoureteral reflux in infants differ from those of older children with regard to the male-to-female ratio and severity of renal parenchymal damage. Aim of the study is to know the profile and pattern of primary vesicoureteral reflux in subjects seeking care at a tertiary care teaching centre of southern India.
Methods: This was a hospital based study, conducted at the Department of Paediatrics, Kasturba Medical College located at Manipal during August 2004 - August 2012 over a period of 8 years. All the children in the age group of 1 month to 18 years with Vesicoureteral Reflux, who presented to the study centre during study period, were included in the study.
Results: Majority (78.5%) presented before 5 years, youngest age at presentation was 1 month and oldest at 14 year 8 months. Among 93 children studied, 65 were males and 28 were females with male to female ratio of 2.3. The commonest presenting complaint was fever (58%), followed by recurrent Urinary tract infection (UTI) (40.8%), dysuria 32 (34.4%) and reports of documented UTI was available in 23 (24.7%) cases. Four children had hypertension at presentation. Thirteen of them had associated posterior urethral valve. Neurogenic bladder was present in 3 children, 2 had associated Anorectal malformation and one had meningomyelocele.
Conclusions: Majority of vesicoureteral reflux cases presented before 5 years of age. There was a preponderance of males. Majority had grade IV and V reflux. The mean age at presentation of vesicoureteral reflux was 3.6 years. The commonest presenting complaint was fever, followed by recurrent UTI.

Keywords: Children, Kidney, Pattern, Profile, Retrospective studies, Vesico-ureteral reflux

INTRODUCTION

Vesicoureteral reflux (VUR), or the retrograde flow of urine from the bladder into the ureter, is an anatomic and functional disorder that can result in substantial morbidity, both from acute infection and from the sequelae of reflux nephropathy.[1] VUR is a predisposing factor for UTI, which may cause renal scarring leading to reflux nephropathy and end stage renal disease.[2] It is this potential for significant morbidity that has led to the current emphasis on early diagnosis, prompt antibiotic therapy, and early evaluation of the urinary tract of infants and young children with documented UTI.[3]

Exact prevalence of VUR is not known because many children are asymptomatic and the invasive testing required for diagnosis is performed only when clinically indicated.[4] Although exact prevalence in the general population is unknown, However, 30-50% children and 40-50% of infants with UTI have VUR.[5] VUR is unusual in healthy children with an estimated prevalence in newborns of 0.4% to 1.8%.[6,7]

Previous studies have suggested that the clinical features of vesicoureteral reflux in infants differ from those of older children with regard to the male-to-female ratio and severity of renal parenchymal damage.[8] To gain further insight into the characteristics of primary vesicoureteral reflux, we conducted a study to know the profile and pattern of primary vesicoureteral reflux in subjects seeking care at a tertiary care teaching centre of southern India.

METHODS

This was a hospital based study, conducted at the Department of Paediatrics, Kasturba Medical College located at Manipal during August 2004-August 2012 over a period of 8 years. All the children in the age group of 1 month to 18 years with Vesicoureteral Reflux, who presented to the study centre during study period, were included in the study.

During follow up, Height, Weight, Blood Pressure, episodes of documented UTI, Serum Creatinine, follow up VCUG, DMSA scans whenever repeated was noted. BMI and Height standard deviations scores were calculated at the time of entry into the study and at last follow up.

Hypertension was said to be present if the blood pressure was above the 95th centile for Age, Sex and height on three or more occasions as per the task force report on BP control in children. Serum Creatinine and Serum Phosphorus above the reference range for the age was taken as elevated. Failure to thrive was said to be present if BMI was less than 3rd centile on WHO growth charts. HT SDS scores were calculated using NCHS Height charts at 1st visit and last follow up. UTI was said to be present if either the urinary nitrite was positive or there was significant bacteriuria >10 CFU/ml in a midstream clean catch urine.[5]

Written and informed consent was obtained from study subjects. Permission of ethical committee was obtained from the Institutional Ethics Committee. All the questionnaires were manually checked and edited for completeness and consistency and were then coded for computer entry. After compilation of collected data, analysis was done using Statistical Package for Social Sciences (SPSS), version 21 (IBM, Chicago, USA). The results were expressed using appropriate statistical variables.

RESULTS

A total of 93 children were included in the study. Majority (78.5%) presented before 5 years, youngest age at presentation was 1 month and oldest at 14 year 8 months. Among 93 children studied, 65 were males and 28 were females with male to female ratio of 2.3 (Table 1).

Table 1: Age and sex incidence at presentation of Vesicoureteral reflux.

Age group	Sex		Total n (%)
	Male n (%)	Female n (%)	
<1 year	23 (35.4)	6 (21.4)	29 (31.2)
1-5 years	31 (47.7)	13 (46.4)	44 (47.3)
5-10 years	6 (9.2)	8 (28.6)	14 (15.1)
10-15 years	5 (7.7)	1 (3.6)	6 (6.5)
Total	65 (100)	28 (100)	93 (100)

Nineteen children were lost for follow up - 6 with Grade I-II, 8 with Grade III, 5 with Grade IV-V. Outcome was evaluated in 74 cases. Mean duration of follow up was 3.8 years (range 2 years to 16.5 years).

The commonest presenting complaint was fever (58%), followed by recurrent UTI (40.8%), dysuria 32 (34.4%) and reports of documented UTI was available in 23 (24.7%) cases. H/o poor urinary stream was present in 43% of males (28/65) (Table 2).

Table 2: Symptoms at first visit (n=93).

Presenting symptom	N (%)
Fever	54 (58%)
Poor urinary stream (n=65)	28 (43%)
Dysuria	32 (34.4%)
Recurrent UTI	38 (40.8%)
Increased frequency of micturition	9 (9.6%)
Pain abdomen	8 (8.6%)
Vomiting	6 (6.4%)
Dribbling of urine	2 (2.1%)

Four children had hypertension at presentation. Thirteen of them had associated posterior urethral valve. One child had scarred poorly functioning left kidney with persisting hypertension on maximal doses of Nifedipine and Envas. BP normalized following left nephroureterectomy and child is currently off antihypertensives. One child with grade 4 VUR had hypertension and BP normalized following ureteric reimplantation.

Neurogenic bladder was present in 3 children, 2 had associated Anorectal malformation and one had meningomyelocele. One child with chronic kidney disease stage 4, the glomerular filtration rate (GFR) -17 ml/min, Serum Creatinine 1.7 mg/dl had clinical features of rickets (Table 3).

Table 3: Signs at presentation (n=93).

Signs	N (%)
Phimosis (n=65)	27 (41.5%)
Posterior urethral valve	13 (13.9%)
Failure to thrive	20 (21.5%)
Hypertension	4 (4.3%)
Associated anomalies	
1. Meningomyelocele	1 (1%)
2. Anorectal malformation	2 (2.1%)
3. Features of Rickets	1 (1%)
4. Neurogenic bladder	3 (3.2%)

DISCUSSION

Regarding age and sex incidence at presentation of Vesicoureteral reflux, our study observed that majority (78.5%) presented before 5 years, youngest age at presentation was 1 month and oldest at 14 year 8 months. Among 93 children studied, 65 were males and 28 were females with male to female ratio of 2.3. In a retrospective study conducted by Chand DH et al (n=15, 504), authors observed that black children were a third as likely as white children and females were twice as likely as males to have VUR. Compared to children 0 to 2 years old, the occurrence of reflux was 0.5 times as likely in those 3 to 6 years old, 0.3 times as likely in those 7 to 11 years old and 0.15 times as likely in those 12 to 21 years old. When analysing children with UTI, results were similar. Of the patients with VUR 65% were younger than 7 years. The incidence of VUR in black girls younger than 7 years with a diagnosis of UTI was less than 10% compared to white girls, and no black girl had high grade reflux.[9] In another study from Sri Lanka observed that majority (76%) were below the age of 2 years with male to female ratio being 1.7:1.[10] This is in accordance with reports describing a male preponderance of primary VUR in Indian children, although there are some studies from other countries that report a female preponderance.[11,12]

We observed that the commonest presenting complaint was fever (58%), followed by recurrent UTI (40.8%), dysuria 32 (34.4%) and reports of documented UTI was available in 23 (24.7%) cases. H/o poor urinary stream was present in 43% of males (28/65). Four children had hypertension at presentation. Thirteen of them had associated posterior urethral valve. One child had scarred poorly functioning left kidney with persisting hypertension on maximal doses of Nifedipine and Envas. BP normalized following left nephroureterectomy and child is currently off antihypertensives. One child with grade 4 VUR had hypertension and BP normalized following ureteric reimplantation. Neurogenic bladder was present in 3 children, 2 had associated Anorectal malformation and one had meningomyelocele. This is in variance with the nine year prospective by Greenfield et al (n=560), where majority of the children presented with recurrent UTI (54%), followed by voiding dysfunction (15%).[13]

It is documented that VUR is a predisposing factor for UTI, which in turn may involve the kidney parenchyma and cause permanent renal scarring.[14] Bailey first The severity of VUR is graded using the International Study Classification from grade I-V, based on the appearance of the urinary tract on contrast Micturating cystourethrogram (MCU).[15] Children with high-grade reflux (grade IV-V) who acquire a UTI are at significant risk for pyelonephritis and renal scarring. This relationship between scarring and the grade of reflux is shown in several studies. With bladder growth and maturation, there is a tendency for reflux to resolve or improve. Lower grades of reflux (grades I-III) are much more likely to resolve than higher grades IV-V.[16]

Renal scarring was detected in 55.3% in the study group. The prevalence of renal scarring in children with VUR has been reported to vary from 23-62%.[12] The correlation between reflux and scarring has been demonstrated in other studies. The proportion of scarring in our study was higher in patients with higher grades (IV-V) VUR when compared with lower grades (I-III). This is in accordance with the finding that the risk of scarring is higher in patients with major degrees of reflux who develop UTI, when compared with lower degrees.[17]

CONCLUSION

This study observed that majority of vesicoureteral reflux cases presented before 5 years of age. There was a preponderance of males. Majority had grade IV&V reflux. The mean age at presentation of vesicoureteral reflux was 3.6 years. The commonest presenting complaint was fever, followed by recurrent UTI. Neurogenic bladder, Meningomyelocele, chronic kidney disease stage 4 showing features of rickets and anorectal malformation were observed as associated anomalies.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. RIVUR Trial Investigators, Hoberman A, Greenfield SP, Mattoo TK, Keren R, Mathews R, et al. Antimicrobial prophylaxis for children with vesicoureteral reflux. N Engl J Med. 2014;370:2367-76.
2. Elder JS, Diaz M, Caldamone AA, Cendron M, Greenfield S, Hurwitz R, et al. Endoscopic therapy for vesicoureteral reflux: a meta-analysis. I. Reflux resolution and urinary tract infection. J Urol. 2006;175(2):716-22.
3. Wheeler D, Vimalachandra D, Hodson EM, Roy LP, Smith G, Craig JC. Antibiotics and surgery for

vesicoureteric reflux: a meta-analysis of randomised controlled trials. Arch Dis Child. 2003;88(8):688-94.
4. Belman AB. Vesicoureteral reflux. Pediatr Clin North Am. 1997;44(5):1171-90.
5. Bollgren I, Winberg J. The periurethral aerobic flora in girls highly susceptible to urinary infections. Acta Paediatr. 1976;65(1):81-7.
6. Arant Jr BS. Vesicoureteric reflux and renal injury. Am J Kid Dis. 1991;17(5):491-511.
7. Linshaw M. Asymptomatic bacteriuria and vesicoureteral reflux in children. Kid Int. 1996;50(1):312-29.
8. Marra G, Barbieri G, Dell'Agnola CA, Caccamo ML, Castellani MR, Assael BM. Congenital renal damage associated with primary vesicoureteral reflux detected prenatally in male infants. J Pediatr. 1994;124(5):726-30.
9. Chand DH, Rhoades T, Poe SA, Kraus S, Strife CF. Incidence and severity of vesicoureteral reflux in children related to age, gender, race and diagnosis. J Urol. 2003;170(4):1548-50.
10. Abeysekara CK, Yasaratna BM, Abeyagunawardena AS. Long-term clinical follow up of children with primary vesicoureteric reflux. Indian Pediatrics. 2006;43(2):150.
11. Menon P, Rao KL, Bhattacharya A, Mahajan JK, Samujh R. Primary vesicoureteral reflux: progress of disease, somatic growth and renal parameters. Ind Pediatr. 2004;41(10):1025-30.
12. Macedo CS, Riyuzo MC, Bastos HD. Renal scars in children with primary vesicoureteral reflux. J Pediatr. 2003;79(4):355-62.
13. Greenfield SP, Ng M, Wan J. Experience with vesicoureteral reflux in children: clinical characteristics. J Urol. 1997;158(2):574-7.
14. Rushton HG. Urinary tract infections in children: epidemiology, evaluation, and management. Pediatr Clin North Am. 1997;44(5):1133-69.
15. International Reflux Study in Children. International system of radiographic grading of vesicoureteric reflux. Pediatr Radio 1985; 15: 105-109.
16. Smellie JM, Jodal U, Lax H, Möbius TT, Hirche H, Olbing H. Outcome at 10 years of severe vesicoureteric reflux managed medically: Report of the International Reflux Study in Children. J Pediatr. 2001;139(5):656-63.
17. Olbing H, Smellie JM, Jodal U, Lax H. New renal scars in children with severe VUR: a 10-year study of randomized treatment. Pediatr Nephrol. 2003;18(11):1128-31.

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