LETTER TO THE EDITOR

Reliability of Ultrasonography in Prediction of Vesicoureteral Reflux in Children

Dear Editor,

Vesicoureteral reflux (VUR) is generally detected during radiographic evaluation of infants or children with urinary tract infection (UTI). Clinical features are not reliable to distinguish children with UTI having VUR from those without VUR.[1,2] The non-invasive nature, the lack of radiation, availability and the low cost of renal ultrasound (RUS) have made it an ideal tool for the initial screening investigation in infants and children with UTI.[3,4] In previous reports, the sensitivity of RUS to detect VUR has been variable, ranging from 26% to 90%.[5-7] RUS may be normal even with a high grade of VUR. Blane et al. found that 28% of refluxing ureters with grade III or higher had normal RUS.[5] This study was carried out to find out the correlation between RUS results and the presence or severity of VUR in our area. The medical charts of all the patients with documented VUR (primary or secondary) were reviewed. The first ultrasonographic reports available were interpreted and compared with the grade of VUR on voiding cystourethrography (VCUG). Totally, 268 patients with 402 refluxing ureters were included. The age range of the patients was 2 months to 16 years (mean= 4.3 years, SD=4.8), with male to female ratio of 0.25. The number and percent of refluxing ureters were 35 (8.7%), 166 (41.3%), 53 (13.2%), 83 (20.6%), 65 (16.2%) from grade I to V, respectively. Therefore, totally 402 refluxing ureters were evaluated. Statistical analysis was done using Chi-square test and a P value less than 0.05 was considered significant.

The results of RUS in different grades of VUR are shown in Table 1. The sensitivity of RUS to predict VUR in different grades of reflux was 20, 21, 30, 54 and 77% from grade I to V, respectively. It was significant for grades IV (P=0.001) and V (P<0.001) but not for lower grades. By considering RUS of 132 non-refluxing ureters, 18% had findings suggestive of VUR. Totally, the specificity of RUS to predict VUR was 82% with positive predictive value of 86% and negative predictive value of 30%. In this study, RUS was abnormal in 38% of the refluxing ureters of the ipsilateral kidneys, regardless of the grade of VUR. RUS was abnormal in about 24% of the refluxing ureters with grades III or lower and in 64% of the higher grades of VUR (P<0.001). In a previous similar retrospective study, RUS was abnormal in 26% of the kidneys with VUR.[5] In another report on patients aged 5 years or older, being evaluated for UTI, only two out of 21 children with VUR on VCUG had abnormal RUS scans.[8] In previously published investigations, the accuracy of RUS compared to VCUG in the diagnosis of VUR had a sensitivity up to 53% and a specificity up to 80%.[5-7] In the present study with considerable number of patients, although the sensitivity of RUS was low, the specificity was relatively significant. Some studies reported the reliability of color doppler sonography,[9] or ultrasound contrast agent voiding urosonography,[10,11] in the diagnosis of VUR in children. However, these findings did not apply to our study population.

We may conclude that the accuracy of RUS to predict VUR was low except for grades IV and V of VUR. Thus VCUG or another diagnostic procedure would be necessary to rule out VUR in suspected patients.

Table 1: Comparison of the results of RUS with different grades of VUR.

Grade of VUR	Normal US (Percent)	Mild caliectasis	Moderate caliectasis	Severe caliectasis (Hydronephrosis)	Small size kidney	Others	Total Abnormal RUS (percent)
VUR_1	28 (80)	5	0	0	2	0	7 (20)
VUR_2	131 (79)	29	1	1	1	3	35 (21)
VUR_3	37 (70)	9	3	0	4	0	16 (30)
VUR_4	38 (46)	18	12	3	7	5	45 (54)
VUR_5	15 (23)	6	12	19	11	2	50 (77)
Total	249 (62)	67	28	23	25	10	153 (38)

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References

1 Smellie JM, Normand ICS, Katz G. Children with urinary infection: a comparison of those with and those without vesicoureteral reflux. *Kidney Int* 1981;**20:**717.

2 Hoberman A, Charron M, Hickey RW, Baskin M, Kearney DH, Wald ER. Imaging studies after a first febrile urinary tract infection in young children. *N Engl J Med* 2003;**348:**195-202.

3 Leoniads JC, Mccauley RGK, Klauber GC. Sonography as a substitue for excretory urography in children with urinary tract infections. *Am J Roentgenol* 1984;**144:**815-19.

4 Mason WG. Urinary tract infection in children: renal ultrasound evaluation. *Radiology* 1984;**153:**109-11.

5 Blane CE, Dipietro MA, Zerin JM, Sedman AB, Bloom DA. Renal sonography is not a reliable screening examination for vesicoureteral reflux. *J Urol* 1993;**150:**752-55.

6 Stokland E, Hellstrom M, Hansson S, Jodal U, Odén A, Jacobsson B. Reliability of ultrasonography in identification of reflux nephropathy in children. *BMJ* 1994;**309:**235-39.

7 Tibbals JM, De Bruyn R. Primary vesicoureteric reflux-how useful is post-natal ultrasound? *Arch Dis Child* 1996;**75:**444-47.

8 Dipeitro MA, Blane CE, Zerin. Vesicoureteral reflux in older children: concordance of US and voiding cystourethrographic findings. *Radiology* 1997;**205:**821-2.

9 Kosar A, Yesildag A, Oyar O, Perk H, Gülsoy U. Detection of vesicoureteric reflux in children by color-flow Doppler ultrasonography. *BJU Int* 2003;**91:**856-59.

10 Piaggio G, Innocenti MLD, Toma P, Calevo MG, Perfumo F. Cystosonography and voiding cystourethrography in the diagnosis of vesicoureteral reflux. *Pediatr Nephrol* 2003;**18:**18-22.

11 Drage K, Riedmiller H. Current status of vesicoureteral reflux diagnosis. *World J Urol* 2004;**22:**88-95.