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Case Report

Polycystic kidney and Down Syndrome

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Abstract

Kidney disease is not a common complication in Down Syndrome (DS). A variety of renal and urologic problems have been described in these patients and some develop renal failure. Coincidence of polycystic kidney disease and DS is a rare entity. This is a report of a 3.5-month-old infant with DS, known to have early end-stage renal failure due to polycystic kidney disease.

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Down syndrome (DS) is the most common chromosomal abnormality with multiple-organ involvement. The incidence of renal and urologic anomalies has been estimated at 3.5-21.5% [1]. Some authors have suggested that the incidence of these anomalies is high enough to encourage systemic screening of these patients [2]. Also, due to increased survival the number of these patients with renal failure is growing [1,3]. Therefore, regular monitoring of patients with DS for renal and urinary tract disorders from early infancy to adulthood has been recommended [1,3,4].

Case Report

A 3.5-month-old infant was admitted for fever, poor feeding and anuria. He was the third child of healthy unrelated parents (mother's age was 35 and father's age was 40, with normal renal ultrasonography). There was no history of renal disease in their families. The patient had bilateral renal enlargement with severe hyperechogenicity in his prenatal period. Physical examination revealed all the hallmarks of DS, which was previously confirmed by chromosomal analysis. BP was 109/98 mm/Hg (on 95% standard curve). Both kidneys were palpable and enlarged. Laboratory exams upon admission were as follows: Hb 9 g/dl, serum Na 128 meq/L and K 4.5 meq/L, Ca 8 mg/dl, P 12.7 mg/dl, creatinine 5.7 mg/dl and BUN 68 mg/dl. He also had metabolic acidosis. A specific gravity of 1006, protein +, sugar ++, 10-15 RBCs, many WBCs and WBC clamps were reported in urinalysis. Urine culture was negative. In abdominal ultrasound, both kidneys were enlarged with marked hyperechogenicity, suggestive of infantile polycystic kidney disease (figures 1 and 2). In abdominal CT scan, both kidneys demonstrated a symmetric and smooth enlargement with low density of both kidneys, secondary to accumulation of urine in dilated renal tubules as an expected finding in the context of autosomal recessive polycystic kidney disease. It was impossible to use contrast material for IVP or to perform DMSA scan due to severe renal failure in this patient. Parents refused renal biopsy in their child. Peritoneal dialysis and antibiotic therapy were started for the treatment of renal failure, but serum creatinine stabilized at about 3.5 mg/dl in the following days. Therefore, continuous ambulatory peritoneal dialysis (CAPD) was started for the established end-stage renal disease in this patient.

Discussion

We present the case of a patient with DS with marked bilateral hyperechogenic enlarged kidneys since the prenatal period. Bilateral

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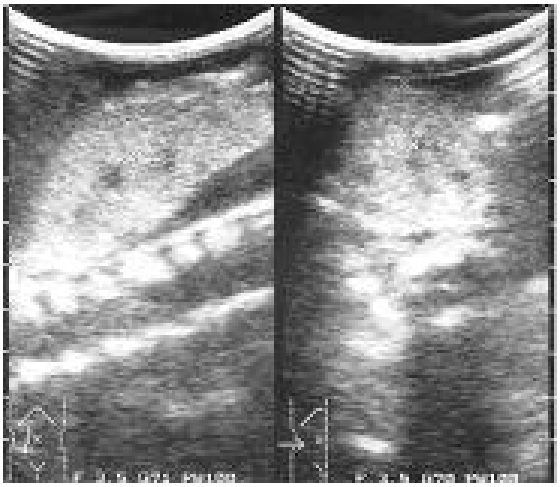

Figure 1. Abdominal ultrasound.

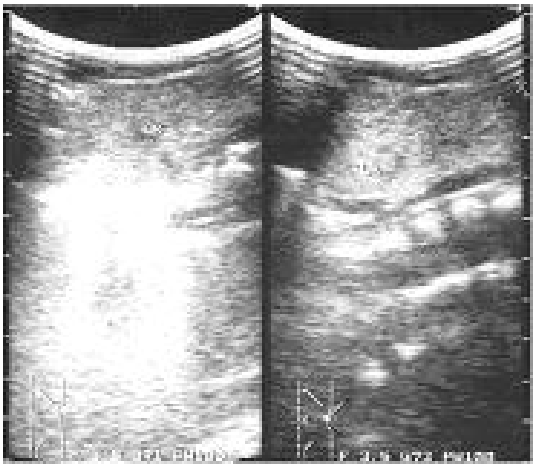

Figure 2. Abdominal ultrasound.

enlarged kidneys can be found in any proliferative disorder, abnormal deposition of proteins such as amyloidosis and multiple myeloma, tumoral cell proliferation such as lymphoma and leukemia, glycogen storage disease, acute tubular necrosis, late phase of acute cortical necrosis, acute interstitial nephritis, glomerulocystic kidney, homozygote sickle cell anemia, liver cirrhosis, Beckwith Wiedemann syndrome, Bartter syndrome, Fabry disease, total parenteral nutrition, lasix and vasodilators prescription, hemophilia, and paroxysmal nocturnal hemoglobinuria [5]. None of the above was consistent with history, laboratory findings and radiologic exams in this case. Bilateral hyperechogenic kidneys are also seen in autosomal recessive polycystic kidney (ARPCK) and sometimes in autosomal dominant polycystic kidney (ADPCK) [5].

In 1960, Berg described renal agenesis, hypoplasia and horseshoe kidney in Down Syndrome [6]. In a study of 124 autopsy cases with DS, Arial described anomalies such as renal hypoplasia, tubular dilation, glomerular microcysts, simple cysts, immature glomeruli in deep cortex, obstructive uropathies such as ureterovesical junction obstruction, ureteral stenosis, and bilateral cystic dysplastic kidneys. He suggested chromosomal analysis in any case with prenatal or neonatal obstructive renal lesions [7].

Kupferrman noticed an increased risk of obstructive uropathies in these patients and suggested early screening with ultrasound for kidney and urinary tract abnormalities as part of standard clinical care in these children, and if abnormal, a voiding cystourethrography should be performed [6]. Other urologic problems such as: ureteropelvic junction obstruction [1], posterior urethral valve [8], ectopic kidney [9], mild fetal pyelectasis [10], reflux nephropathy, voiding dysfunction [1] Hinman syndrome [11], and renal pathologies such as focal segmental glomerular sclerosis, acute crescentic glomerulonephritis, minimal change glomerular lesions, membrane glomerulopathy, deep cortical immature glomeruli, cytomegalovirus infection in renal medulla [3], acute tubulointerstitial nephritis [12], renal tubular dysgenesis as insufficient proximal tubules [13], nephrogenic diabetes mellitus with mutation in V2 receptor [14], and IgG-associated mesengial glomerulonephritis [15] have been reported in this anomaly.

Also, some reports of intestinal absorptive hypercalciuria [16], cystinuria [4], uricosuria [1], hemolytic uremic syndrome [17], membrane glomerulonephritis [4] and chronic glomerulonephritis [18] have been published in these patients.

The child presented in this study is a case of PCKD with DS that seems to be the first report of this association in our literature review. In ARPCKD, kidneys are large and hyperechoic without definite corticomedullary differentia-

tion (CMD). Diffuse echogenic loci are common in end-stage renal failure. Ultrasonographic findings in ADPCK consist of renal cysts and normal to hyperechogenic enlarged kidneys without CMD. These features could be present even in fetal and neonatal life in ADPCK with severe presentation such as ARPCK, and differential diagnosis needs renal biopsy [19,20]. The gene of ARPCK has been localized to the chromosomal region 6p21-cen [21]. Also, the most common cause of DS is trisomy of chromosome 21. The occurrence of DS and PCKD in this patient could be a coincidental finding, but the common involvement of chromosome 21 in these two diseases is an important finding, which remains to be substantiated by further reports.

References

1. Malaga S, Pardo R, Malaga I, Orejas G, Fernandez-Toral J. **Renal involvement in Down syndrome**. *Pediatr Nephrol* 2005; 20(5):614-617.
2. Mercer ES, Broecker B, Smith EA, Kirsch AJ, Scherz HC, Massad A. **Urological manifestations of Down syndrome**. *J Urol* 2004; 171(3)1250-1253.
3. Lo A, Brown HG, Fivush BA, Neu AM, Racusen LC. **Renal disease in Down syndrome: autopsy study with emphasis on glomerular lesions**. *Am J Kidney Dis* 1998; 31(2):329-335.
4. Gupta SK, Venkataseshan VS, Churg J. **Mesangiocapillary glomerulonephritis in Down's syndrome**. *Am J Nephrol* 1991; 11(2):112-117.
5. Davidson AJ, Hartman DS. Radiologic set: Large, smooth, bilateral. In: Davidson AJ, editor. Davidson's Radiology of the Kidney and Genitourinary Tract. Philadelphia: WB Saunders Company, 1994: 203-241.
6. Kupferman JC, Stewart CL, Kaskel FJ, Fine RN. **Posterior urethral valves in patients with Down syndrome**. *Pediatr Nephrol* 1996; 10(2):143-146.
7. Ariel I, Wells TR, Landing BH, Singer DB. **The urinary system in Down syndrome: a study of 1 ٢٤autopsy cases**. *Pediatr Pathol* 1991; 11(6):879-888.
8. Culty T, Barry-Delonchamps N, Dominique S, Servin F, Ravery V, Boccon-Gibod L. **Posterior urethral valves in adult with Down syndrome**. *Urology* 2006; 67(2):424.
9. Stein JP, Kurzrock EA, Freeman JA, Esrig D, Ginsberg DA, Grossfeld GD et al. **Right intrathoracic renal ectopia: a case report and review of the literature**. *Tech Urol* 1999; 5(3):166-168.
10. Seeds JW. **Borderline genitourinary tract abnormalities**. *Semin Ultrasound CT MR* 1998; 19(4):347-354.
11. Handel LN, Barqawi A, Checa G, Furness PD, III, Koyle MA. **Males with Down's syndrome and nonneurogenic neurogenic bladder**. *J Urol* 2003; 169(2):646-649.
12. Al Hermi BE, Thorner PS, Arbus GS. **Acute plasmacytic interstitial nephritis in a child with Down syndrome**. *Pediatr Nephrol* 1999; 13(4):333-335.
13. Jain V, Beneck D. **Renal tubular dysgenesis in an hydropic fetus with trisomy 21: a case report with literature review**. *Pediatr Dev Pathol* 2003; 6(6):568-572.
14. Fujisawa Y, Miyamoto T, Furuhashi K, Sano S, Nakagawa Y, Ohzeki T. **A novel mutation in the renal V2 receptor gene in a boy with trisomy 21**. *Pediatr Nephrol* 2004; 19(6):609-611.
15. Assadi FK. **IgG-associated mesangial glomerulonephritis in a patient with Down syndrome**. *Med Sci Monit* 2004; 10(9):CS54-CS56.
16. Filler G, Kotecha S, Milanska J, Lawson ML. **Trisomy 21 with hypercalcemia, hypercalciuria, medullary calcinosis and renal failure--a syndrome?** *Pediatr Nephrol* 2001; 16(1):99-100.
17. Kupferman JC, Stewart CL, Kaskel FJ, Katz SP, Fine RN. **Chronic peritoneal dialysis in a child with Down syndrome**. *Pediatr Nephrol* 1994; 8(5):644-645.
18. Baqi N, Tejani A, Sullivan EK. **Renal transplantation in Down syndrome: a report of the North American Pediatric Renal Transplant Cooperative Study**. *Pediatr Transplant* 1998; 2(3):211-215.
19. Avni FE, Guissard G, Hall M, Janssen F, DeMaertelaer V, Rypens F. **Hereditary polycystic kidney diseases in children: changing sonographic patterns through childhood**. *Pediatr Radiol* 2002; 32(3):169-174.
20. Bisceglia M, Galliani CA, Senger C, Stallone C, Sessa A. **Renal cystic diseases: a review**. *Adv Anat Pathol* 2006; 13(1):26-56.
21. Dell KM, McDonald RA, Watkins S, Avner ED. Polycystic kidney disease. In: Avner EA, Harmon WE, Niaudet P, editors. Pediatric Nephrology**.** Philadelphia: Lippincott Williams and Wilkins, 5th edition. 2004: 675-701.