Kidney Size- What is Normal?

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Renal size is an important parameter in the assessment of a child with renal disease. The kidney continues to grow in size after birth and reaches the near adult size of 10 cm by 12 years of age [1]. Decrease or increase in kidney size is an important sign of renal disease. Thus while evaluating a child presenting for the first time with a sudden deterioration of renal functions; it is the kidney size which helps differentiate acute kidney injury where the size maybe normal or large, from an acute exacerbation of chronic kidney disease (CKD) where the kidney size is invariably small. Shrunken kidney size can also be a decisive factor for avoiding a renal biopsy or immunosuppressive therapy in certain disorders.

The clinical value of measuring the size of the two kidneys has now received general acknowledgement. Among other things it has provided a means of studying the natural history of certain renal diseases in a manner not possible before. Bilateral enlargement of the kidneys may be noted in polycystic disease and some of the lipid storage disorders. Unilateral disease in the child will result in a shrunken kidney on the ipsilateral side with contralateral hypertrophy.

Renal size can be estimated by measuring renal length, renal volume and cortical volume or thickness. Renal volume is the most accurate measurement of kidney size because it is correlated with the subject's height, weight and total body area; however, measurement of renal volume is not a precise method due to high inter-observer variation. Renal length as measured by ultrasonography is a simple, practical and reproducible measurement and widely accepted to monitor renal size and growth. With a little training and practice this can be performed as a bedside investigation by the clinician [2]. Even more important are serial measurements of renal length over time. A growing kidney in a child is a healthy kidney, whereas a kidney static in size over time may be an early indicator of CKD. More recent literature suggests that renal cortical thickness measured on ultrasonography is a better indicator of renal function in chronic kidney disease than length and is more closely related to eGFR [3]. These measurements remain subjective without the use of appropriate standards for interpretation. What is an appropriate standard is the important question.

Age related nomograms are most commonly used to interpret normal renal length [4]. However these nomograms are based on a healthy western population. The question is whether these can be extrapolated to Indian children. Since the change in renal length may be an evidence of disease, it is important that we have normal reference values in children in relation to their age, gender, height, weight, body mass index, body surface area and ethnicity.

Malnourished children have significantly lower kidney length and renal volume, with body height being the main determinant [5]. In a study from India the mean kidney length best correlated with height, followed by upper thigh (femur) length and chest circumference [6].

Hence it would be useful to develop our own nomograms for Indian children using an adequate sample size and compare these with the currently used standards.

REFERENCES

1. Davis ID, Abner ED. Glomerular disease. *In*: Kliegman RF, Behrman RE, Jenson HB, Stanton BF *eds*. Nelson Textbook of Pediatrics. 18th edition. Philadelphia: Saunders; 2007.p.2163.
2. Carnell J, Fischer J, Nagdev A. Ultrasound detection of obstructive pyelonephritis due to urolithiasis in the ED. Am J Emerg Med. 2011;29:843.
3. Beland MD, Walle NL, Machan JT, Cronan JJ. Renal cortical thickness measured at ultrasound: is it better than renal length as an indicator of renal function in chronic kidney disease? AJR Am J Roentgenol 2010;195:W146-9.
4. Srivastava RN, Bagga A. Pediatric Nephrology. 5th edition. New Delhi: Jaypee Brothers;2011.p.547.
5. Ece A, Gözü A, Bükte Y, Tutanç M, Kocamaz H. The effect of malnutrition on kidney size in children. Pediatr Nephrol. 2007;22:857-63.
6. Ganesh R, Vasanthi T, Lalitha J, Rajkumar J, Muralinath S. Correlation of renal length with somatic variables in Indian children. Indian J Pediatr. 2010;77:326-8.