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Solitary kidney: The human model of hyperfiltration injury

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Background: Serious concerns have risen during the last decades regarding the potential role of solitary kidney (SK) in promoting systemic hypertension, proteinuria and glomerulosclerosis, as late consequences of the subsequent hyperfiltration injury. However, published reports focusing on this issue remain scarce, especially in children, and results are somewhat controversial. To address this matter, we conducted a retrospective chart review of children with radiologically normal SK in order to assess their mid- and long-term outcome.

Methods: From 127 children with a single functioning kidney referred for renal work-up during a study period of 17 years, only 97 (43 females) with a mean age of 10.3±4.3 years (median: 10 years, range: 2.9-25.5) were enrolled in the study. The others were excluded because of evidence of structural and/or parenchymal abnormalities in the remnant kidney. Forty four children of 97 had a congenital SK with no prior history of urinary tract infection (21 unilateral renal agenesis and 23 multicystic dysplastic kidney) and 53 had undergone unilateral nephrectomy for renal tumor (n=41) or complicated urological structural abnormality (n=12). All children had undergone a full renal assessment including blood pressure (BP), glomerular filtration rate (GFR) determined by inulin clearance, and microalbuminuria measured as albumin-to-creatinine ratio (alb/crea). The data were collected from medical records at last functional assessment.

Results: After a mean follow-up time with SK (years-at-risk) of 8.7±3.9 years (median: 8.1 years, range: 1.5-21.2), only 2 children (2%) were found to have systemic hypertension confirmed by 24-h ambulatory BP monitoring. The mean alb/crea ratio was 2.3±4.6 mg/mmol (median: 1.2 mg/mmol, range: 0.1-27.7). Seventeen patients (17.5%) had a significant microalbuminuria above the threshold of 2 mg/mmol urine creatinine. Seven children (7.2 %) had a GFR <80 mL/min/1.73 m2, all had been nephrectomized in early childhood. The overall mean GFR was 100.6±15 mL/min/1.73 m2 and was found to be inversely correlated with age and follow-up time (years-at-risk), suggesting a gradual decline in renal function over time. This inverse relationship kept true even after excluding children having received nephrotoxic antimitotic agents with or without radiation therapy.

Conclusions: In the light of these results, it appears that renal function in children with normal SK is well preserved on the short- and medium-term, but it seems to decline gradually with longer periods of follow-up. Thus, careful monitoring should be proposed throughout childhood to detect early signs of glomerular hyperfiltration and prevent its progression to more serious complications.

Biography

Pauline Abou-Jaoudé graduated in 2003 and received her MD in Pediatrics in 2007 from the Saint-Joseph University Medical School, Beirut, Lebanon. Between November 2006 and October 2008, she completed her fellowship in Pediatric Nephrology at "Centre de Référence des Maladies Rénales Rares", Hospices Civils de Lyon, under the patronage of Pr. Pierre Cochat. In 2010, she worked as an attending physician in the Pediatric Nephrology Division of the "Femme - Mère - Enfant" University hospital in Bron, France. Since 2012, she works as a Senior Consultant in Pediatric Nephrology at the University Medical Center - Rizk Hospital, and in several other hospitals in Beirut, Lebanon. She is also an Assistant Professor of Pediatrics at the Lebanese American University. She has several publications in international peer reviewed journals and textbooks. She is a member of the French (SNP), the European (ESPN) and the International (IPNA) Societies of Pediatric Nephrology.

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