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Quantitative assessment of renal heterogeneity and echogenicity in healthy pediatric patients using a novel protocol

Significant differences exist in renal heterogeneity in patients with congenital ureteropelvic obstruction who underwent pyeloplasty compared to the unaffected contralateral kidney. As a validation, we sought to determine normal heterogeneity as measured by heterogeneity index (HI) in normal kidneys of children. This novel evaluation may elucidate the subtle changes in echogenicity seen in children over the first year of life. We reviewed kidney images in children performed with non-nephrologic, non-urologic disease. Each image was evaluated by a novel program which converts pixels in a gray-scale US to a binary map to produce HI values. We performed univariate analysis comparing HI in 2 groups: left versus right kidney (against spleen and liver), and patients aged <1 year old versus greater or equal to 1 year old. 122 sonograms were available for analysis. The average age was 4.7 and standard deviation (SD) 5.4 years old. Overall, the average HI was 1.17. The average HI of the right kidney was 1.19 (n=37, SD 0.12) and the left kidney was 1.167 (n=37, SD 0.10) with no statistically significant difference between sides (p = 0.2). Mean HI in those <1 years was 1.15 (n=36, SD 0.09) and 1.17 (n=36, SD 0.12) in those greater or equal to 1 year old. No difference was observed between the groups on univariate analysis (p = 0.4). While renal echogenicity is enhanced in patients less than 1 year old, the change to normal echogenicity appears to be homogenous as there is no change in overall HI between patients greater or less than 1 year old.

Biography

Dr. Ghorayeb has completed his PhD jointly between Iowa State University and the University of Iowa. He is Professor of Radiology and Molecular Medicine, and Professor of Biomedical and Electrical Engineering at Hofstra University. He has published over 100 papers in reputable journals, conferences, and invited presentations and has been serving as primary reviewer at NIH, and as an editorial board member of AIUM, JTU, and IEEE.

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