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Compensatory Glomerular Hypertrophy is not a Cause of Supranormal Renographic Differential Renal Function in Patients with Ureteropelvic Junction Obstruction

연세대학교 의과대학 비뇨기과학교실, 병리학교실[1]

함원식, 정현주[1], 한상원

Purpose: Increasing clinical importance is being placed on the role of differential renal function (DRF) for the management of congenital ureteropelvic junction obstructions. Supranormal DRF of a hydronephrotic kidney, on a renal scan, is hypothesized to be due to an increase in single nephron filtration or nephron volume. However, the etiology of this paradoxical phenomenon still remains to be elucidated. We studied the histopathological changes of hydronephrotic kidneys with a supranormal DRF.

Materials and Methods: 35 children with unilateral congenital hydronephrosis and supranormal DRF (>55%), on preoperative renal scans (mercaptoacetyltriglycine, diethylenetriaminepentaacetic acid, and/or dimercapto-succinic acid renal scan), who had undergone pyeloplasty from 1995 to 2001, were retrospectively evaluated. There were 3 female and 32 male patients. The mean age at the time of the operation was 12.6 months, ranging from 0.1 to 144 months. Needle biopsies from 3 different sites at the lower pole of the kidney were performed during surgery. To evaluate the presence of glomerular hypertrophy, the maximal planar area of the glomeruli was measured under light microscopy. Tissue samples were obtained in same manner from kidneys with no history of urinary tract disease on autopsy, and used as controls. The mean glomerular areas of the patients and control groups were plotted according to the patient's age.

Results: The mean glomerular area in the patient group was smaller than in the control group, with the exception of 4 patients. According to the logistic regression, the probability of larger renal glomeruli increased with decreasing DRF (p=0.1155).

Conclusions: The glomerular area of a hydronephrotic kidney, with a supranormal renal function on a renal scan, was not significantly larger than the normal controls. Therefore, we believe that the theory of increased nephron volume as a cause of a supranormal DRF can be excluded.