Comparison of Ultrasonographic Indices to Reflect Renal Functional Impairment in Diabetic Nephropathy Patients

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Abstract

Objectives: The aim of this study was to evaluate renal functional impairment in diabetic nephropathy using ultrasonographic indices of the kidney.

Subjects and Methods: We enrolled 57 patients (mean age 60±17 years, 65% male) who were clinically diagnosed with type 2 diabetes and underwent abdominal ultrasonography at our hospital. Patients were classified based on the Classification of Diabetic Nephropathy as revised in December 2013. Out of the total 57 patients, 23 were stage 1, 16 patients were stage 2, 8 patients were stage 3, and 10 patients were stage 4. We evaluated kidney size, renal peripheral vascular resistance index (RI), and renal cortical brightness using a Logiq 7 Ultrasound device (GE health care Japan). Renal cortex brightness was quantitatively evaluated using iPlaque® developed at our hospital.

Result and Discussions: There was no significant difference in kidney size between any groups. The RI was significantly different between stage 1 and 3, stage 1 and 4, and stage 2 and 4 ($p<0.05$); a weak correlation was found between the stages and RI ($\rho=0.472$, $p<0.05$). The renal cortical brightness was significantly different between all groups ($p<0.05$), and stages ($\rho=0.736$, $p<0.05$). Urinary albumin was significantly correlated with RI and renal cortical brightness; among them, renal cortical brightness was the most correlated ($r=0.57$, $p<0.001$). eGFR was significantly correlated with all of the indices, and renal cortical brightness showed the best correlation ($r=-0.59$, $p<0.001$). Consequently, we determined that renal cortical brightness is a useful parameter for evaluating diabetic nephropathy because it increased from the early stage and correlated with stage progression.

Conclusions: In diabetic nephropathy, renal cortical brightness is the most useful index to reflect the disease stage.

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