The effect of hyperfiltration on kidney function in living donor kidney transplantation: A prospective cohort study

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Abstrak

Background: living kidney donation is a safe medical procedure. Kidney function after donation is crucial for donors' health and quality of life. Kidney hyperfiltration is a compensatory mechanism, which will preserve kidney function after unilateral nephrectomy. The number of studies regarding hyperfiltration in living kidney donors is limited. Our study aimed to explain kidney hyperfiltration mechanism and evaluate its effect on the kidney function within 30 days after surgery. Methods: our study was a prospective cohort study with 46 living-kidney donors participating in the study between April and December 2019. We evaluated main outcomes, the 30-day post-surgery kidney function, which was evaluated by calculating estimated glomerular filtration rate (eGFR) and Urinary Albumin to Creatinine Ratio (ACR). The subjects were categorized into two groups based on their 30-day outcomes, which were the adaptive (eGFR > 60 mL/min/1.73 m2 and/or ACR > 30 mg/g) and maladaptive (eGFR < 60 mL/min/1.73 m2 and/or ACR > 30 mg/g) groups. A series of evaluation including calculating the renal arterial resistive index (RI) and measuring urinary vascular endothelial growth factor (VEGF), neutrophil gelatinase-associated lipocalin (NGAL), and heparan sulfate (HS) levels were performed before surgery and serially until 30 days after surgery. Multivariate analysis with adjustments for confounding factors was done. Results: forty donors were included and mostly were female (67.5%). The average age and body mass index (BMI) were 45.85 (SD 9.74) years old and 24.36 (SD 3.73) kg/m2 , respectively. Nineteen donors (47.5%) had maladaptive hyperfiltration outcomes. The hyperfiltration process was demonstrated by significant changes in renal arterial RI, urinary VEGF, NGAL, and HS levels ($p<0.005$). There was no significant difference regarding RI, urinary VEGF, NGAL, and HS levels between both groups. Several confounding factors (BMI over 25 kg/m2 , familial relationship, age over 40 years old, and arterial stiffness) were significantly influenced by kidney hyperfiltration and outcomes ($p<0.05$). Conclusion: the hyperfiltration process does not affect the 30-day post-nephrectomy kidney function of the donors. Several other factors may influence the hyperfiltration process and kidney function. Further study is necessary to evaluate kidney function and its other related variables with a longer period of time study duration.