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Comparison of characteristics of high Qa/CO in hemodialysis patients

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Objectives: An adequate arteriovenous (AV) access blood flow (Qa) is essential for HD treatment. However, when Qa of 20% of the cardiac output (Qa/CO), the risk of developing high-flow related CVD increases. Although high Qa/CO is involved in the complication of cardiopulmonary system, the clinical implication for high Qa/CO is not well known in patient with hemodialysis (HD). The purpose of this study was to analyze the characteristics and risk factors of patients with high Qa/CO.

Methods: We performed an observational study of prevelant HD patients. Patients were divided into two groups according to Qa/CO. We measured CO, Qa and brachial artery flow, and volume status using echocardiography, transonic and ultrasound, and bioimpedance spectroscopy, respectively.

Results: We enrolled a total of 106 adult patients (mean age 65.4±12.9 years, male 65.7%. AV fistula 71.7%). The mean values of CO, Qa and brachial artery flow, and overhydration were 5.6±1.6, 1.1±0.5, 1.1±0.4 L/min, and 2.6±2.1L respectively. CO had a significant positive correlation with overhydration ($r = 0.402$, $p < 0.001$), but no correlation with Qa ($p=0.094$) and brachial artery flow ($p= 0.299$). Diastolic blood pressure (DBP) (65.8±14.1 vs. 72.0±11.2 mmHg, $p = 0.038$), peak systolic velocity (PSV) of brachial artery (183.6±60.9 vs. 242.0±67.6 cm/s, $p<0.001$) were significantly higher, but CO (6.1±1.8 vs. 4.9±1.1 L/min, $p <0.001$) was statistically lower in the high Qa/CO group. There was no statistical difference in Qa/CO according to access type and ejection fraction (EF).In the multivariate analysis, DBP (odds ratio [OR], 1.082; 95% confidence interval [CI] 1.031−1.136), PSV (OR, 1.025; 95% CI, 1.013−1.036), and CO (OR, 0.331; 95% CI, 0.192−0.568) were independent risk factors for high Qa/CO.

Conclusions: Patients with high Qa/CO had higher DBP and PSV, and lower CO, irrespective of access type and EF, significantly. In order to maintain adequate CO, it is necessary to adjust a suitable volume status.