S-A15

혈액투석환자에서 초음파 희석법으로 측정한 혈관 접근로 혈류량의 측정 시간에 따른 변이성

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Variation of Intra-Access Flow Measured by Ultrasound Dilution in Hemodialysis Patients

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Background: Prospective intra-access blood flow (Qac) measurement is known to be the most reliable surveillance for vascular access in hemodialysis (HD) patients. K/DOQI guidelines recommend that the assessment of flow should be performed during the first 1.5 hours of the treatment to eliminate error caused by decreases in cardiac output related to ultrafiltration. We studied the risk factors for the variation of Qac measured by ultrasound dilution in HD patients.

Methods: Thirty patients were prospectively evaluated for variation in Qac at 30 min, 120 min and 240 min from starting HD. Three consecutive measures of Qac were performed for each patient by ultrasound dilution (Transonic HD03 hemodialysis monitor; Transonic Systems, Inc., Ithaca, NY). Session time was 4 hours. Button-hole needles were inserted to the all fistulae. We studied the effect of clinical parameters, including blood pressure and ultrafiltration volume, on the intra-access flow.

Results: Nineteen patients were male, mean age 62 years old, 11 (36.7%) diabetics, 16 fistulae, 14 grafts, and 15 (50%) accesses were on the forearm. The mean Qac of whole 89 measurements was decreased with time on HD (1268±567 ml/min at 30 min, 1260±599 ml/min at 120 min, and 1197±576 ml/min at 240 min). We categorized the measurements according to the change of mean arterial pressure (MAP) as decreased (MAP decreased by more than 5% at 240 min vs. MAP at 30 min), unchanged, and increased (MAP increased by more than 5% at 240 min vs. MAP at 30 min) groups. In the decreased group, Qac was significantly decreased with time, but in the rest groups, Qac didn't change with time. In the patients whose ultrafiltration volume (UV) was less than 2L, Qac didn't change with time, and in the patients whose UV was more than 2L, Qac was decreased with time. However, in the multiple regression analysis, MAP was an independent risk factor for the variation of Qac, and UV was not. There was no difference in Qac according to the presence of diabetes, location of access (forearm vs. upper arm), and type of access (fistula vs. graft).

Conclusion: In our study, the decrease in MAP was the only independent risk factor for the variation of intra-access flow measured by ultrasound dilution. We conclude that, in most patients whose blood pressures are stable during hemodialysis, the intra-access flow measurement by ultrasound dilution can be performed at any time during hemodialysis.

Key Words: 혈관접근로 혈류량, 변이성, 초음파 희석법
Intra-Access Flow, Variation, Ultrasound Dilution