

KSN 2017 Abstract

KSN-17-P285

High Recirculation Rates Indicate Vascular Stenosis in Hemodialysis Vascular Access

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Objectives : Guidelines recommend to measure access flow for vascular access surveillance, which needs special device. We evaluated whether recirculation rate or dialysis adequacy variables, which have been measured in clinical practice without special device, can be used for vascular access surveillance.

Methods : We simultaneously measured access flow (by ultrasound dilution), KT/Vurea, urea reduction rate (URR), and recirculation rate in a regular manner. Angiography was performed when the access flow has decreased by >25%. Significant stenosis was defined as decrease in vein diameter by >50%.

Results : Out of 121 cases of angiography, significant stenoses were found in 117 cases (97%). Mean decrease in access flow was 44.8%, when angiographies were performed. The access flows were fully recovered after PTA. Although dialysis adequacy variables such as KT/Vurea and URR, were marginally different between before and after PTA, the values were within acceptable ranges of adequate dialysis. In addition, KT/Vurea and URR were not correlated with access flow. Recirculation rate was negatively correlated with access flow, ($r = -0.374$; p -value, <0.001), KT/Vurea ($r = -0.220$; p -value, 0.040) and URR ($r = -0.249$; p -value, 0.020). Moreover, all cases of angiography with high recirculation rate (7%) revealed significant vascular stenosis. However, significant stenosis was found in cases with 0 recirculation rate.

Conclusions : High recirculation rates (7%) indicate vascular stenosis in HD vascular access with 100% positive predictive value. However, low recirculation rates cannot exclude vascular stenosis.

Keywords : access flow, recirculation, vascular stenosis