Publication Brief

Ultrasound Dilution Evaluation of Pediatric Hemodialysis Vascular Access

OBJECTIVE
To evaluate the accuracy of indicator dilution flow measurements in pediatric hemodialysis patients.

STUDY
• 13 pediatric HD patients with permanent vascular accesses (9 arteriovenous grafts and 4 arteriovenous fistulas), received a total of 73 indicator dilution access flow measurements over 3 months.
• All the patients had received hemodialysis for at least two months at Texas Children’s Hospital.
• Access flow measurements were corrected for body size by normalizing the measurement to mL/min/1.73m². This conversion factor equates the pediatric access flow with those of adults.

RESULTS
• Patients with AVG with corrected access flows less than 700 mL/min/1.73m² had severe stenosis demonstrated on venogram, whereas patients with corrected access flows of greater than 700 mL/min/1.73m² did not have severe stenosis.
• Accesses showing stenosis on venography, performed every six months on well-functioning accesses and every six to twelve weeks on problem accesses, had significantly reduced corrected access flows than those accesses without stenosis.
• There was no evidence of stenosis in the fistulas studied by venogram, due to the small number of patients with AV fistulas and the low rate of thrombosis in fistulas.
• Kt/V and delivered pump flow measurements did not vary with access flow during the study. Ultrasound indicator dilution and chemical recirculation techniques failed to show greater than five-percent recirculation in any access, therefore failing to indicate stenosis.

CONCLUSION
• Study supports monthly ultrasound dilution measurements to prevent access thrombosis in children receiving hemodialysis.
• Ultrasound indicator dilution (UD) is a valid indicator of access flow in children. “When the uncorrected flow value reported by UD is corrected for patient body surface area, UD is predictive for the presence or absence of severe AV graft stenosis, regardless of patient size.” There was no evidence of stenosis in the fistulas studied by venogram, due to the small number of patients with AV fistulas and the low rate of thrombosis in fistulas.
• Recirculation measurements and dialysis adequacy parameters are late indicators of stenosis in pediatric patients.
• Corrected access flow of less than 700 mL/min/1.73m² was highly predictive of stenosis in pediatric hemodialysis patients.

REFERENCE