A Primer on Hemodialysis From an Interventional Radiology Perspective.

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BACKGROUND
Interventional radiologists play a key role in the care of patients with end-stage renal disease who receive renal replacement therapy via hemodialysis. It is up to interventional radiologists to ensuring that a patient’s dialysis access remains robust for high-quality dialysis.

OBJECTIVE
To familiarize interventional radiologists with the mechanics of hemodialysis with an emphasis on the extracorporeal circuit “breaking points” that trigger a patient's referral to interventional radiology and to familiarize interventional radiologists with the current “pay for performance” landscape where dialysis quality is increasingly linked with dialysis reimbursements.

CONTENTS
• Brief history of hemodialysis in the US and the increasing numbers of end-stage-renal disease patients;
• Basics of the Hemodialysis Machine;
• Dialysis Dosing, Measurements of Efficacy, and 2017 Performance Metrics
  • $K_t/V$ (where $K$ is urea clearance rate, $t$ is the duration of dialysis and $v$ is the total water volume in a patient’s body): ($K_t/V > 1.2$ is necessary; average is 1.4); Blood flow ($Q$) must be $> 350$ for effective dialysis;
  • 8 Clinical Indicator Performance Metrics: 2 relate to vascular access (increasing fistula use, reducing catheter use); 3 relate to dialysis adequacy one relates to readmission rates. Centers can lose up to $2\%$ of their reimbursement if they do not meet performance criteria.
• Deciphering Causes of Dialysis Malfunction through;
  • Pressures: Rule of thumb: at flow of $200$ mL/min using a 16-gauge needle, a venous pressure of $> 100$ Hg indicates a venous outflow stenosis. “Static venous pressures are recommended by KDOQI for access surveillance.”
  • Intra-access Flow and Recirculation: How various methods (including conductivity dialysance) measure recirculation including “induced” recirculation by ultrasound dilution [the Krivitski Method] which they state is the gold standard.

CONCLUSIONS
An interventional radiologist needs to:
• Ensure that a patient receives high-quality dialysis;
• Ensure that the patient’s dialysis center meets its performance metrics.

TAKE HOME
• Valuable concise overview of important hemodialysis concepts;
• Ultrasound dilution acknowledged as the gold standard for measurement of intra-access flow.

Reference: