Publication Brief

Ultrasound Monitoring to Detect Access Stenosis In Hemodialysis Patients: A Systematic Review

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BACKGROUND
Premise: Observational studies indicate that routine measurements of access blood flow and use of Doppler ultrasound improve vascular access outcomes in hemodialysis patients, but randomized trials have reached conflicting conclusions.

STUDY
- A systematic review of access literature and meta-analysis of 12 randomized controlled trials (4 fistula studies) from a total of 1,613 identified citations and abstracts including 69 full articles using access flow ultrasound screening.
- 1,164 patients of various access types were analyzed

RESULTS
- Access type significantly associated with risk of thrombosis
- In fistula studies, access monitoring deceased risk of thrombosis, but not fistula loss.
- In graft studies, access monitoring did not reduce risk of thrombosis, or access loss.

STUDY’S CONCLUSION
An analysis of these 12 studies indicated no evidence that screening with access blood flow measurements is of benefit to patients with grafts. It does reduce thrombosis in fistula patients, but may not reduce fistula loss or extent of resource use (cost and hospitalizations).

TAKE HOME POINTS
1. The authors (vascular access screening proponents) state that the overall quality of the trials they analyzed was “poor to moderate.”
   - “As with all systematic reviews, the strength of the conclusion is influenced by the quality of the studies on which they were based.”
2. Study calls for properly conducted clinical studies to determine the optimal means for surveillance.
   - Advises that studies be separated by access type and would need a trial of 850 fistula patients (rather than the 141 total used in this study) for an adequate study.
3. Specific Points in Study
   a. “Access surveillance more beneficial in fistulas than grafts in preventing thrombosis.” Is this more a condemnation of grafts and support for Fistula First programs?
   b. “Access surveillance in fistulas rather than grafts significantly reduced the relative risk of thrombosis when compared with dynamic venous pressure screening.” Good ammunition to compete with dynamic venous pressure programs such as VascAlert.
   c. “Time to thrombosis (fistula patients) significantly longer in surveillance group than in control.”
      - It is expected that most fistulas will fail at some time or other.
      - An objective of surveillance is to prolong the time between failures.

Reference:
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FAQ:
WHY SHOULD WE BOTHER WITH SURVEILLANCE WHEN THIS REVIEW FROM A RESPECTED INTERVENTIONAL NEPHROLOGIST INDICATES THAT SURVEILLANCE DOESN’T PROLONG THE LIVES OF GRAFTS OR FISTULAS?

RESPONSE:
As with any meta-analysis, its quality is predicated on the quality of the 12 studies that are analyzed. Tonelli states that he would grade the studies as “poor to moderate” in quality because none of them really uses a large enough sample of patients to produce statistically rigorous analysis. In effect, Tonelli is placing a big question mark next to his review’s conclusions.

Tonelli suggests that to produce statistically sound conclusions a data base of close to 1,000 patients would be needed. We know that he is conducting, as we speak, a large-scale study to more definitely establish the value of surveillance combined with intervention. He has been a longtime proponent of surveillance and user of Transonic Hemodialysis systems in his Edmonton clinic.

Tonelli’s review should not be regarded as the definitive answer, but as part of the on-going conversation among dialysis care providers on the value of vascular access surveillance. Two other contributions to this dialogue are a recent appraisal of surveillance by Drs. Besarab, Asif, Roy-Chaudhury, Spergel and Ravani in the Journal of Nephrology and the Krivitski analysis of the current vascular access literature at EDTA in 2007.

Besarab et al state up front that “Adequate vascular access function is the most important determinant in the success or failure of hemodialytic therapy. Low blood flow rates and loss of patency limit dialysis delivery, extend treatment times and result in underdialysis leading to increased morbidity and mortality.” Citing 86 references in their critique, they unequivocally conclude: “MOST OF THE AVAILABLE EVIDENCE SUGGESTS THAT DETECTION OF STENOSIS AND PREVENTION OF THROMBOSIS IN AV FISTULAS IS VALUABLE.”

Krivitski’s review of 26 clinical trials presented in peer reviewed journals reveal that the main reasons for unsuccessful surveillance outcomes in some randomized trials were:
1) Failure to use two flow thresholds to predict hemodynamically significant stenoses; when only one static threshold is used a thrombosis event could be missed.
2) Failure of PTA intervention to improve access flow.

We would, therefore, suggest that the Tonelli review be considered as a worthwhile contribution to the ongoing discussion among practitioners on the value of vascular access surveillance.