Publication Brief

Clinical Performance Characteristics of Hemodialysis Graft Monitoring

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BACKGROUND
The authors attack using venous pressure monitoring and access flow measurements as a basis for identifying access failure and for clinical decision making.

STUDY
- 71 PTFE grafts from hemodialysis patients at 3 dialysis clinics
- Graft flow was averaged from two graft flow measurements.
- Venous pressures were measured at pump speeds of 0, 200, and 400 mL/min during the first hour of dialysis.
- Follow-up occurred over a one-year period after evaluation.
- Failure was defined as graft stenosis requiring angioplasty, surgical revision, or clotting. No specific protocol was in place for maintaining access patency. Clinical parameters indicating angioplasty included difficulty in cannulation, excessive bleeding after needle withdrawal, or clotting of the access.

RESULTS
- The average initial graft flow was 900 mL/min.
- 38 patients had 41 clots requiring intervention during the year.
- Graft flows differed significantly betw. failed and patent grafts.
- ROC curves data analysis (predicted graft failures and false positives plotted against threshold flows) showed that single graft flows were not useful in clinical decision making.

CONCLUSION/DISCUSSION
Venous pressures were not indicative of access failure. The National Kidney Foundation’s KDOQI Guidelines recommend monthly flow access surveillance. ROC curves from this study show higher correlation between flow measurement and graft failures in the first thirty days after the flow measurements, than for longer time periods.

Furthermore, KDOQI Guidelines suggest angiography for hemodialysis patients with access flows below 600 mL/min or access flows below 1000 mL/min that have decreased 25% within a four month period. The investigators tried to predict graft thrombosis for a twelve-month period based on one access flow measurement at the onset of the study. It is accepted that grafts without maintenance will generally clot within six to twelve months. Taking an access flow measurement prior to this period of observation, with no access patency protocol available, will obviously have little effect on the outcome of AV grafts without maintenance.

Reference:

Receiver Operator Characteristic (ROC) Curve
ROC curves express the relationship between the sensitivity (proportion of patients that have the disease that test positive for the disease) and the specificity (proportion of patients not having the disease that test negative for the disease). They are generally used to compare alternative tests for the same diagnosis. Tests that discriminate well crowd toward the upper left hand corner of the sensitivity versus specificity graph. A straight diagonal line would be the results of tests yielding no information.

For example, access flow tests to identify significant stenoses in vascular accesses, with a baseline threshold of 200 mL/min, would be highly sensitive for significant stenosis. Probably everyone with an access flow below 200 mL would have a significant stenosis, but several people with significant stenosis and an access flow above 200 mL/min would be missed. An access flow test with a baseline threshold of 1000 mL/min would be highly specific. Probably every patient with an access flow over a 1000 mL/min would not have a significant stenosis, but several people under 1000 mL/min would be treated for significant stenosis unnecessarily. It is necessary to balance the specificity and sensitivity of a test and set the cutoff point accordingly.

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