Publication Brief

Effect of Online Hemodialysis Vascular Access Flow Evaluation & Pre-emptive Intervention on the Frequency of Access Thrombosis

BACKGROUND
The effect of online surveillance combined with pre-emptive intervention on thrombosis frequency is examined through a systemic review of the literature.

STUDY:
• 524 articles were identified; 34 were read and eight were selected for final review.
• 26 articles were excluded for various reasons.

RESULTS:
• A significant overall (AVG and AVF) decline in thrombosis was reported in four of the eight articles.
• Five reported a reduction in thrombosis in AVF of which two were significant.
• Thrombosis decline in AVG was reported four times with three significant.
• One (Ram) reported an increase in thrombosis in AVG.
• All reported an increase in radiological procedures.
• Two (McCarley, Wijnen) reported a cost reduction during online Qa surveillance compared to control group.
• All trials used saline dilution as reference technique to measure Qa.

CONCLUSIONS
• Review of eight trials identified that there is no convincing evidence that online Qa surveillance, when combined with pre-emptive intervention, has significant effect on the rate of thrombosis. Future large-scale studies (> 200) with adequate design, surveillance and intervention protocols and possibly better pre-emptive intervention alternatives are necessary.
• Authors recommend that angiographic evaluation of access inflow should be performed if patients are referred based on Qa monitoring.

TAKE HOME POINTS
1. An important advantage of Qa monitoring is the ability to screen the whole vascular access circuit and not just the outflow. The occurrence of arterial inflow stenosis is under-recognized and may be the primary problem of 20-30% of dysfunctional grafts.
2. European Best Practices Guidelines call for Qa surveillance because Qa surveillance with online Qa measurements, has been shown to be more accurate in identifying significant stenosis even before clinical symptoms appear.
3. Static venous pressure only registers outflow stenosis and has less sensitivity compared to access flow.

REFERENCE

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Reference</th>
<th>Title</th>
<th>Study Design</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoeben H et al</td>
<td>Am J Nephrol 2003; 23: 403–408,</td>
<td>Vascular access surveillance: evaluation of combining dynamic venous pressure and vascular access blood flow measurements.</td>
<td>Perspective observational</td>
<td>Combined monitoring for surveillance of AVFs improved sensitivity but had little benefit in AVGs over VABF monitoring alone. Raising VABF cutoff levels might increase and improve identification of vascular access risk for thrombosis, but at the expense of lower specificity.</td>
</tr>
<tr>
<td>Lok C et al</td>
<td>Nephrol Dial Transplant 2003; 18: 1174–1180</td>
<td>Reducing vascular access morbidity: a comparative trial of two vascular access monitoring strategies.</td>
<td>Perspective sequential observational</td>
<td>Low flow rates detected using Transonic monitoring were associated with increased thrombosis, while stenosis detected using Duplex ultrasonography was not a strong predictor of incipient thrombosis; however, these different access characteristics were compared using monitoring techniques that may be ideal in different clinical situations.</td>
</tr>
<tr>
<td>McCarley et al</td>
<td>Kidney Int 2001; 60: 1164–1172</td>
<td>Vascular access blood flow monitoring reduces access morbidity and costs.</td>
<td>Perspective sequential observation</td>
<td>VABFM for early detection of vascular access malfunction coupled with preventive intervention reduces thrombosis rates in both polytetrafluoroethylene (PTFE) grafts and native AVFs. While there was a significant increase in the number of angioplasties done during the flow monitoring phase, the comprehensive cost is markedly reduced due to the decreased number of hospitalizations, catheters placed, missed treatments, and surgical interventions. Vascular access blood flow monitoring along with preventive interventions should be the standard of care in chronic hemodialysis patients.</td>
</tr>
<tr>
<td>Ram SJ et al</td>
<td>Kidney Int 2003; 64: 272–280.</td>
<td>A randomized controlled trial of blood flow and stenosis surveillance of hemodialysis grafts.</td>
<td>Randomized controlled</td>
<td>Qa and stenosis surveillance were not associated with improved graft survival, although thrombosis was reduced in the stenosis group. The most important factors in this result may be that monthly Qa and quarterly stenosis measurements were not accurate or timely indicators of risk of thrombosis or progressive stenosis. This study does not support the concept that Qa or stenosis surveillance are superior to aggressive clinical monitoring.</td>
</tr>
<tr>
<td>Sands J et al</td>
<td>ASAIO J 1999; 45: 147–150</td>
<td>Intervention based on monthly monitoring decreases hemodialysis access thrombosis.</td>
<td>Randomized controlled</td>
<td>In conclusion, intervention based on monthly access flow measurement or static venous pressure decreased hemodialysis access thrombosis. Measurement of access flow tended to result in lower thrombosis rates than after static venous pressure. We believe that monthly access flow measurement will ensure the lowest incidence of thrombosis and decrease the cost of access maintenance.</td>
</tr>
<tr>
<td>Schwab et al</td>
<td>Kidney Int 2001; 59: 358–362</td>
<td>Hemodialysis arteriovenous access: detection of stenosis and response to treatment by vascular access blood flow.</td>
<td>Perspective observational, historic control</td>
<td>Sequential measurement of AV access flow is an acceptable means of both monitoring for the development of access stenoses and assessing response to therapy. PTAs of AVF are more durable than PTAs of AV grafts.</td>
</tr>
<tr>
<td>Shahin MI et al</td>
<td>Kidney Int 2005; 68: 2352–236</td>
<td>Monthly access flow monitoring with increased prophylactic angioplasty did not improve fistula patency.</td>
<td>Perspective observational, historic control</td>
<td>UDT monitoring increased the rate of angioplasty procedures and thereby shortened primary unassisted patency, but did not decrease the thrombosis rate or improve cumulative fistula patency.</td>
</tr>
<tr>
<td>Wijnen et al</td>
<td>Nephrol Dial Transplant 2004; 21: 3514–2519</td>
<td>Impact of a quality improvement programme based on vascular access flow monitoring on costs, access occlusion and access failure.</td>
<td>Retrospective</td>
<td>A quality improvement programme based on periodical access flow measurement reduced the number of acute vascular access failures due to thrombotic events and also significantly reduced health care costs in patients with AVG, but not in patients with AVF. The quality improvement programme had no effect on access survival.</td>
</tr>
</tbody>
</table>