

Publication Brief

A meta-analysis of randomized clinical trials assessing hemodialysis access thrombosis based on access flow monitoring: where do we stand?

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BACKGROUND

Access thrombosis accounts for approximately 80% of access loss in hemodialysis patients. Stenosis in the access is often the cause of thrombosis. The National Kidney Foundation Kidney Disease Outcomes Quality Initiative (KDOQI) recommends routine use of hemodialysis arteriovenous (AV) access surveillance to detect hemodynamically significant stenoses and appropriately correct them to reduce the incidence of thrombosis and to improve accesses patency rates.

- Access blood flow monitoring is considered as one of the preferred surveillance method for both AV fistulas (AVF) and AV grafts (AVG);
- Published studies have reported conflicting results of its utility that led healthcare professionals to doubt the benefits of this surveillance method.

HYPOTHESIS

Access blood flow surveillance lowers the risk of AV access thrombosis. Outcomes differ between AVFs & AVGs.

META-ANALYSIS

A meta-analysis of published randomized controlled trials (RCTs) of AV access surveillance using access blood flow monitoring was performed. The outcome of interest was thrombosis. All combined number of all seven studies was 727 patients (AVFs, 395; AVGs, 332).

RESULTS

- The estimated overall pooled risk ratio (RR) of thrombosis was 0.87 favoring VA blood flow surveillance.
- Overall, five studies showed the benefits of access blood flow surveillance against control;
- The pooled RR of thrombosis were 0.64 for AVFs and 1.06 for AVGs.

CONCLUSIONS

Results added to the uncertainty of access blood flow monitoring as a surveillance method of hemodialysis accesses. The authors call for well-powered multi-center randomized trials that compare the different methods of surveillance to lower the risk of vascular access stenosis and thrombosis to prevent hemodialysis access loss.

TAKE HOME

This is review of seven vascular access surveillance RCTS that casts doubt on the benefit of surveillance.

Reference:

Muchayi T1, Salman L, Tamariz LJ, Asif A, Rizvi A, Lenz O, Vazquez-Padron RI, Tabbara M, Contreras G, "A meta-analysis of randomized clinical trials assessing hemodialysis access thrombosis based on access flow monitoring: where do we stand?," *Semin Dial.* 2015 Mar-Apr;28(2):E23-9. https://www.ncbi.nlm.nih.gov/pubmed/?OPEN_ACCESS (Transonic Reference # HD11493R)

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A meta-analysis of randomized clinical trials assessing hemodialysis access thrombosis based on access flow monitoring: where do we stand? cont.

7 -Randomized Controlled Trials (RCTs)				
Author(s)	Reference	Title	Method	Conclusion
Smits JH <i>et al</i> , (Netherlands)	Kidney Int. 2001; 59:1551–1558.,	Graft surveillance: venous pressure, access flow, or the combination?.	Ultrasound dilution	Data demonstrate that standardized monitoring of either venous pressure or access flow or the combination of both and subsequent corrective intervention can reduce thrombosis rate in grafts to below the recommended quality of care standard (that is, 0.5 per patient-year, NKF-DOQI). These surveillance strategies are equally effective in reducing thrombosis rates...
McCarley <i>et al</i> , (USA)	Kidney Int 2001; 60: 1164–1172	Vascular access blood flow monitoring reduces access morbidity and costs.	Ultrasound dilution	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..
Ram SJ <i>et al</i> , (USA)	Kidney Int 2003; 64: 272–280.	A randomized controlled trial of blood flow and stenosis surveillance of hemodialysis grafts.	Ultrasound dilution	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.
Sands J <i>et al</i> , (USA)	ASAIO J 1999; 45: 147–150	Intervention based on monthly monitoring decreases hemodialysis access thrombosis.	Ultrasound dilution	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.
Tessitore <i>et al</i> , (Italy)	Nephrol Dial Transplant. 2004 Sep;19(9):2325-33.	Can blood flow surveillance and pre-emptive repair of subclinical stenosis prolong the useful life of arteriovenous fistulae? A randomized controlled study	Ultrasound dilution	Evidence that active blood flow surveillance and pre-emptive repair of subclinical stenosis reduce the thrombosis rate and prolong the functional life of mature forearm AVFs. Qa is a crucial indicator of access patency and a Qa >350 ml/min portends a superior outcome with pre-emptive action in AVFs.
Polkinghorne KR <i>et al</i> , (Australia)	Nephrol Dial Transplant. 2006 Sep;21(9):2498-506.	Does monthly native arteriovenous fistula blood-flow surveillance detect significant stenosis-a randomized controlled trial.	Ultrasound dilution	Addition of AVF Qa monitoring to clinical screening for AVF stenosis resulted in a non-significant doubling in the detection of angiographically significant AVF stenosis; Large multi-centre randomized trials are necessary to confirm whether Qa surveillance and the correction of detected AVF stenosis will lead to a reduction in AVF thrombosis and increased AVF survival.
Scaffaro LA <i>et al</i> , (Brazil)	J Ultrasound Med. 2009 Sep;28(9):1159-65.	Maintenance of hemodialysis arteriovenous fistulas by an interventional strategy: clinical and duplex ultrasonographic surveillance followed by transluminal angioplasty..	Duplex ultrasound	Study indicates the benefit of a surveillance program for maintenance of NAFs based on clinical and DUS surveillance followed by PTA of major stenosis..