

Identification of a dysfunctional dialysis access through a thermodilution surveillance programme

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Introduction

Vascular access (VA) patency and function are essential for optimal management of HD patients. Low VA flow and loss of patency limit HD delivery, extend treatment times, and result in under-dialysis that leads to increased morbidity and mortality.^{1,2} Given the different types of VA and the various problems that can occur in each, a structured approach should be taken in the pre-procedure evaluation of patients referred for VA intervention.^{3,4} The VA monitoring and surveillance concept is that stenosis develop over variable intervals in most VA and, if detected and corrected, under-dialysis can be minimised or avoided and the rate of thrombosis can be reduced.^{1,2,3,4} Surveillance is the periodic examination and evaluation of the VA by using diagnostic tests that involve special instrumentation to diagnose VA dysfunction.¹ Vascular access flow (Qa) determination is considered the "gold standard" in VA surveillance.^{2,3} In our centre, we assess Qa by thermodilution, with an integrated device in the dialysis machine making the procedure easy, simple and non-invasive.^{5,6}

Objectives

To assess whether a surveillance programme by thermodilution can predict dysfunctional VA and timely referral for corrective intervention.

Methods

We conducted this quantitative, descriptive-correlational, and retrospective study from June 2011 to June 2015. With non-probabilistic sampling we assessed 127 VA of 108 patients of our centre, as part of our VA monitoring and surveillance programme, including vascular access flow calculation by thermodilution, who were at least once referred to VA percutaneous or surgical intervention, due to suspicion of VA dysfunction or thrombosis.

Results

We observed that VA percutaneous or surgical interventions were performed after a reduction of the Qa value in the period immediately before the intervention. The impact of VA percutaneous or surgical interventions showed an increase of Qa value after the intervention. On average, the Qa value increased after angioplasty by 639.05 mL/min ($\sigma=427.43$), surgical revision by 389.29 mL/min ($\sigma=411.96$), percutaneous thrombectomy by 385.56 mL/min ($\sigma=303.36$), and surgical thrombectomy by 70 mL/min ($\sigma=340.55$). The variation of the last two Qa measurements before a VA thrombosis event is on average 91%. The last mean Qa value of the fistulas (AVFs) before a thrombosis event is 706 mL/min (89% of the previous Qa measurement). The last mean Qa value of the grafts (AVGs) before a thrombosis event is 727 mL/min (91% of the previous Qa measurement).

Conclusion

Our analysis suggests that Qa surveillance by thermodilution is an effective screening method to identify dysfunctional VA. We believe that the implementation of a thermodilution VA surveillance programme helps to improve dialysis management and represents clinically relevant indications of failure before planning any percutaneous or surgical intervention.

References

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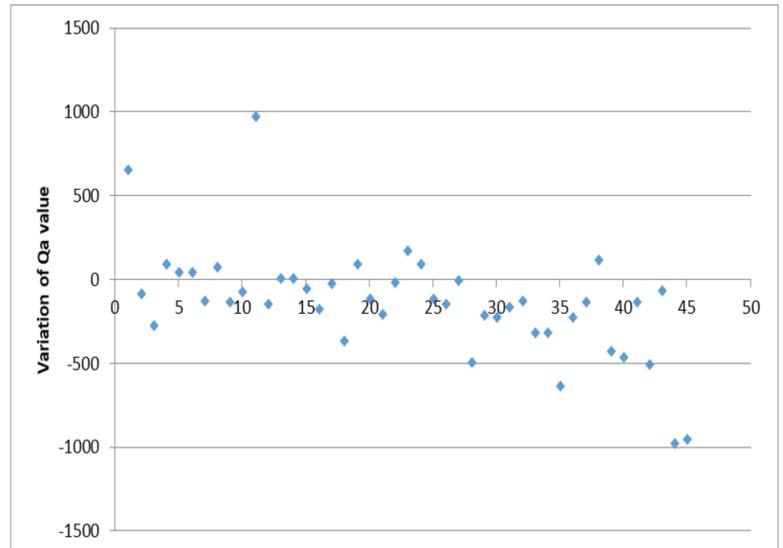


Fig. 1 - Variation of Qa value (mL/min) before percutaneous or surgical interventions in VA

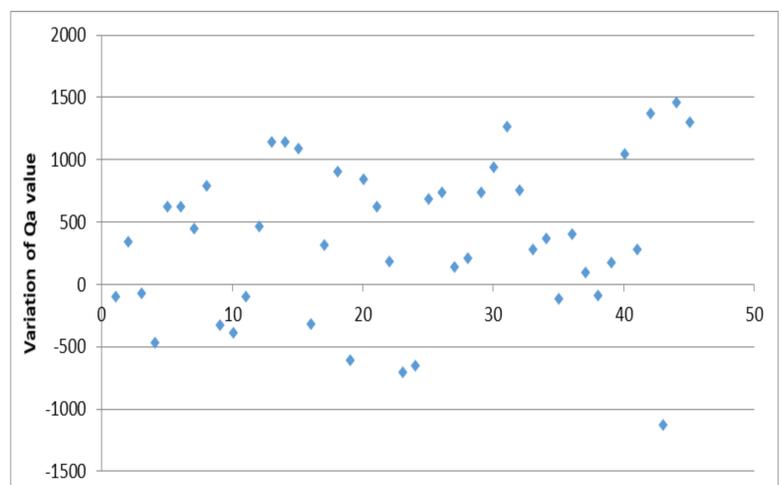


Fig. 2 - Variation of Qa value (mL/min) after percutaneous or surgical interventions in VA

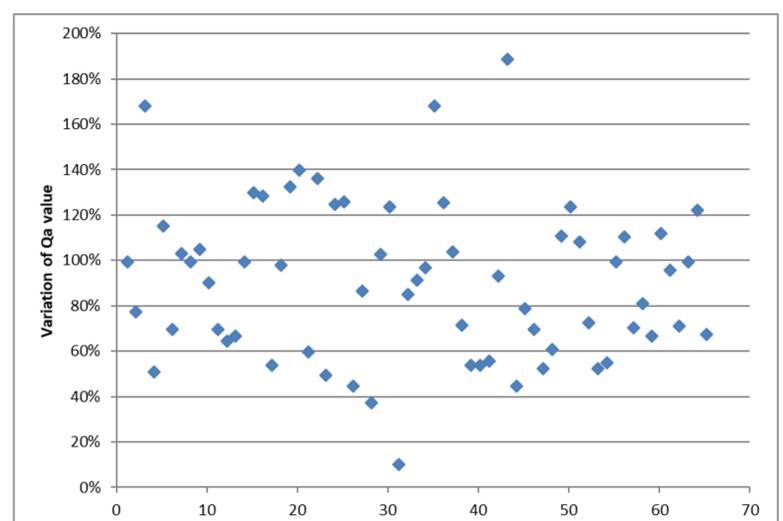


Fig. 3 - Variation in % of the last two Qa values before a VA thrombosis event