

Does Blood Flow Affect Vascular Access Survival?

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INTRODUCTION

- Adequacy of 4-hour, thrice weekly hemodialysis treatment is achieved thanks to substantial extracorporeal blood flow (Qb). This is especially true when dealing with high volume post-dilution hemodiafiltration, where high Qb is essential to reach high substitution volumes.¹
- The aim of this study is to investigate if high Qb has an impact on arteriovenous fistula (AVF) or graft function in the long term.

RESULTS

- 1,043 patients (69.3±13.5 years old, 39.1% females, 32.8% diabetics), 811 with AVF and 232 with grafts were studied. Table 1 shows the main characteristics by vascular access type at baseline.
- During the 18-21 months of follow-up, 337 patients lost functionality of their vascular access (25.3% of patients with AVF, 57.3% with graft).
- Stratifying Qa by quartile, Qa<701 ml/min for AVF was associated with a significantly lower Kaplan Meier cumulative survival (Figure 1).
- After stratification by quartile of Qa and analyzing AVF and graft survival separately, the level of recirculation was significantly associated with access survival only in the case of AVF (HR: 1.042, 95%CI: 1.026-1.058; ref: per % point).
- A 2-fold higher significant HR for AVF failure was detected for Qb<312 ml/min and for Qb>414 ml/min compared to a Qb in the 350-357 ml/min range (Figure 2). In the case of grafts, different blood flow levels were not associated with a significantly different HR.

METHODS

- 19 Portuguese dialysis units that are part of the same network were involved in the study. Data were prospectively collected using the same database.²
- Vascular access flows (Qa) were evaluated between 1 April, 2011 and 30 June, 2011 using the Fresenius Medical Care Blood Temperature Monitor (BTM) method at 300 ml/min Qb.³
- Cox Regression analysis was performed stratifying by vascular access type (i.e. fistula or graft) and by quartile of Qa, with access failure being defined as an event requiring surgical intervention.
- Censoring was for loss of follow-up or at the end of the study period (Jan 9, 2013).

Variable	AV-Fistula	Graft	p-value
Age (years)	68.4±14.0	72.6±11.4	<0.001
Female (%)	36.3	49.1	0.001
Diabetics (%)	31.9	35.8	NS
Vascular Access at the time of assessment (months: median, IQR)	37.9 (18.3-70.9)	18.9 (8.3-40.2)	<0.001
Qa (ml/min)	1147±566	1116±513	NS
Qb (ml/min)	363±41	368±46	NS
Recirculation (%) at Qb 300 ml/min	12.6±5.6	14.0±5.9	0.003
Arterial Pressure (mmHg)	-190±33	-175±40	<0.001

Table 1. Characteristics by vascular access type at baseline. IQR: Interquartile Range

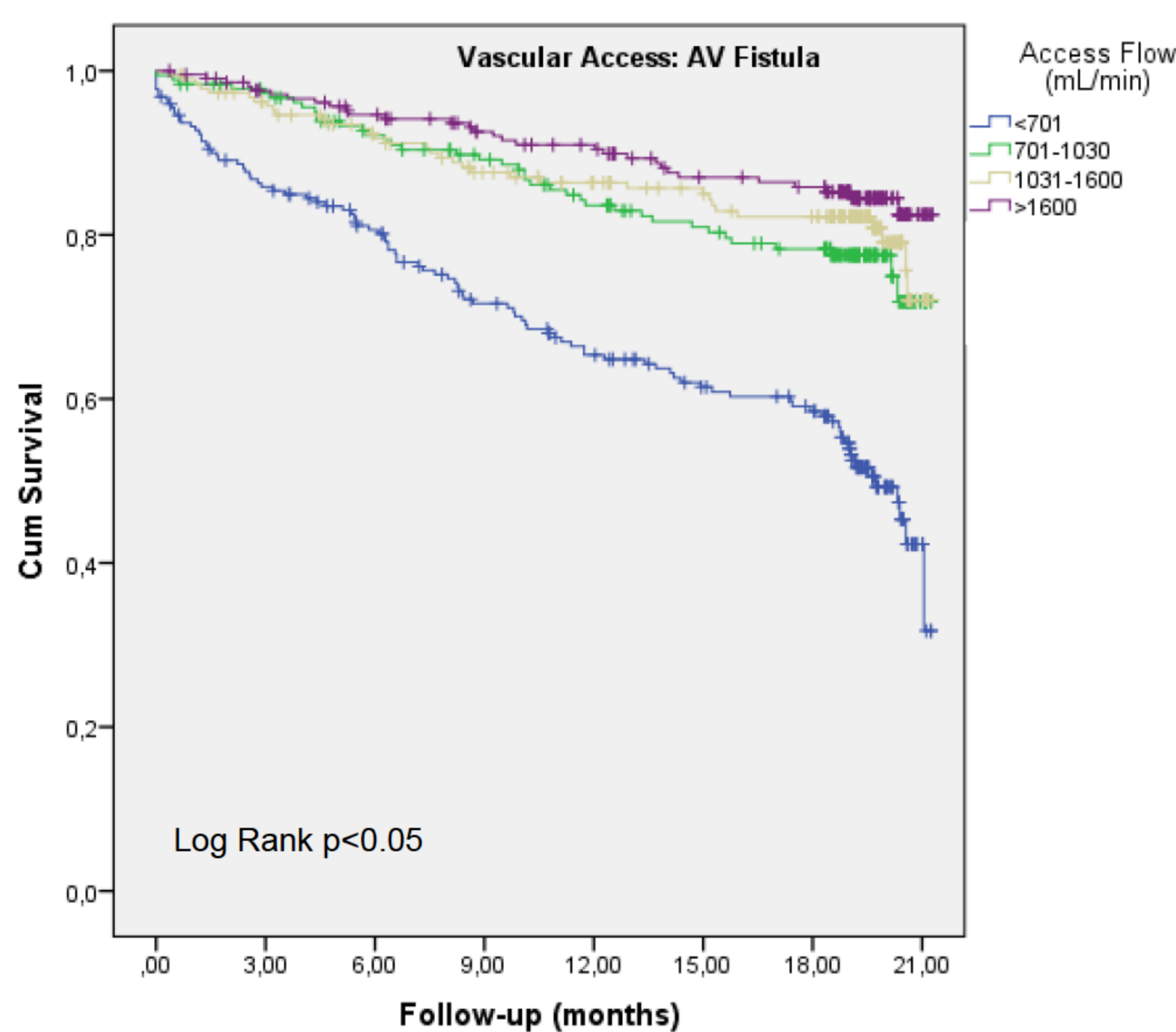


Figure 1. Kaplan Meier cumulative survival for AV Fistula

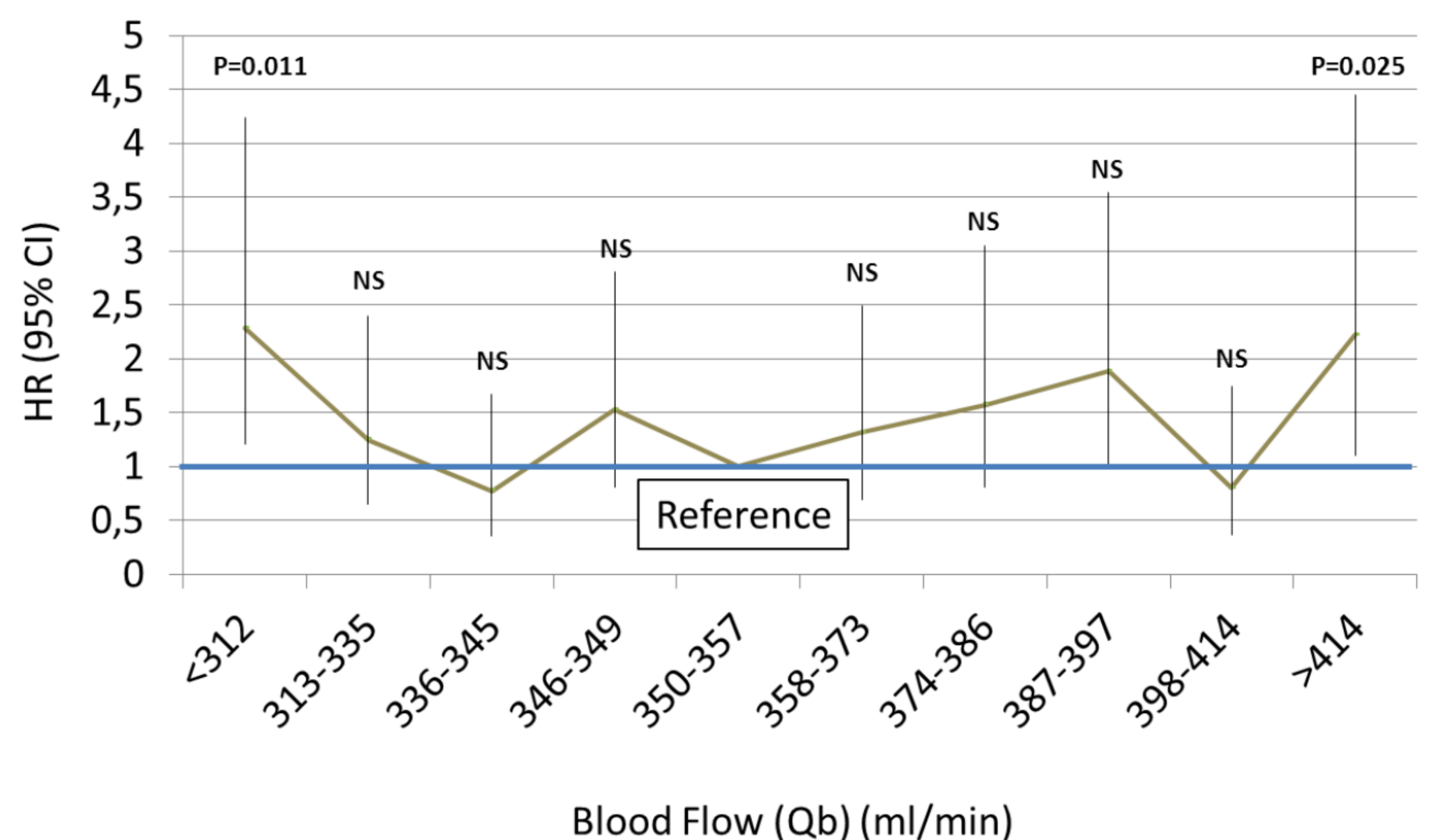


Figure 2. Cox Adjusted Hazard Ratios for AVF at different Qb

CONCLUSIONS

- As often in epidemiology, a U-shaped curve describes the pattern of risk between Qb levels and AVF failure.
- Lower Qb (<312 ml/min) is likely to be an indicator of vascular access problems, as supported also by a lower mean Qa (961±508 ml/min).
- However, the risk associated with Qb>414 ml/min (10% of the patients) needs to be further investigated.
- In conclusion, this study showed that Qb up to 414 ml/min, which is still optimal for efficient post-dilution on-line hemodiafiltration, is not associated with increased risk of AVF failure. In the case of grafts, the Qb range considered (IQR: 342-401 ml/min) was not associated with an increased risk of vascular access failure.

References

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2. Marcelli D. et al. Contrib Nephrol 2002; 293-299
3. Elout S. et al. Blood Purif 2010; 30:89-95

