

Does cannulation technique impact arteriovenous fistula and graft survival?

Maria Teresa Parisotto¹, Volker Schoder², Peter Kaufmann¹, Cristina Miriunis¹, Aileen Grassmann³, Laura Scatizzi³, Daniele Marcelli³

¹NephroCareCoordination, Fresenius Medical Care, Bad Homburg, Germany; ²Clinical Research, Fresenius Medical Care, Bad Homburg, Germany; ³EMEALA Medical Board, Fresenius Medical Care, Bad Homburg, Germany

INTRODUCTION

- There is a close link between the availability of a well-functioning vascular access and patient survival on haemodialysis.
- Every effort should be made to maintain the functionality of the vascular access for long-term use.
- Practices of access cannulation vary from clinic to clinic, mainly for historical reasons.
- The aim of this study was to investigate the impact of cannulation technique on the survival of the arteriovenous fistula (AVF) and grafts (AVG).

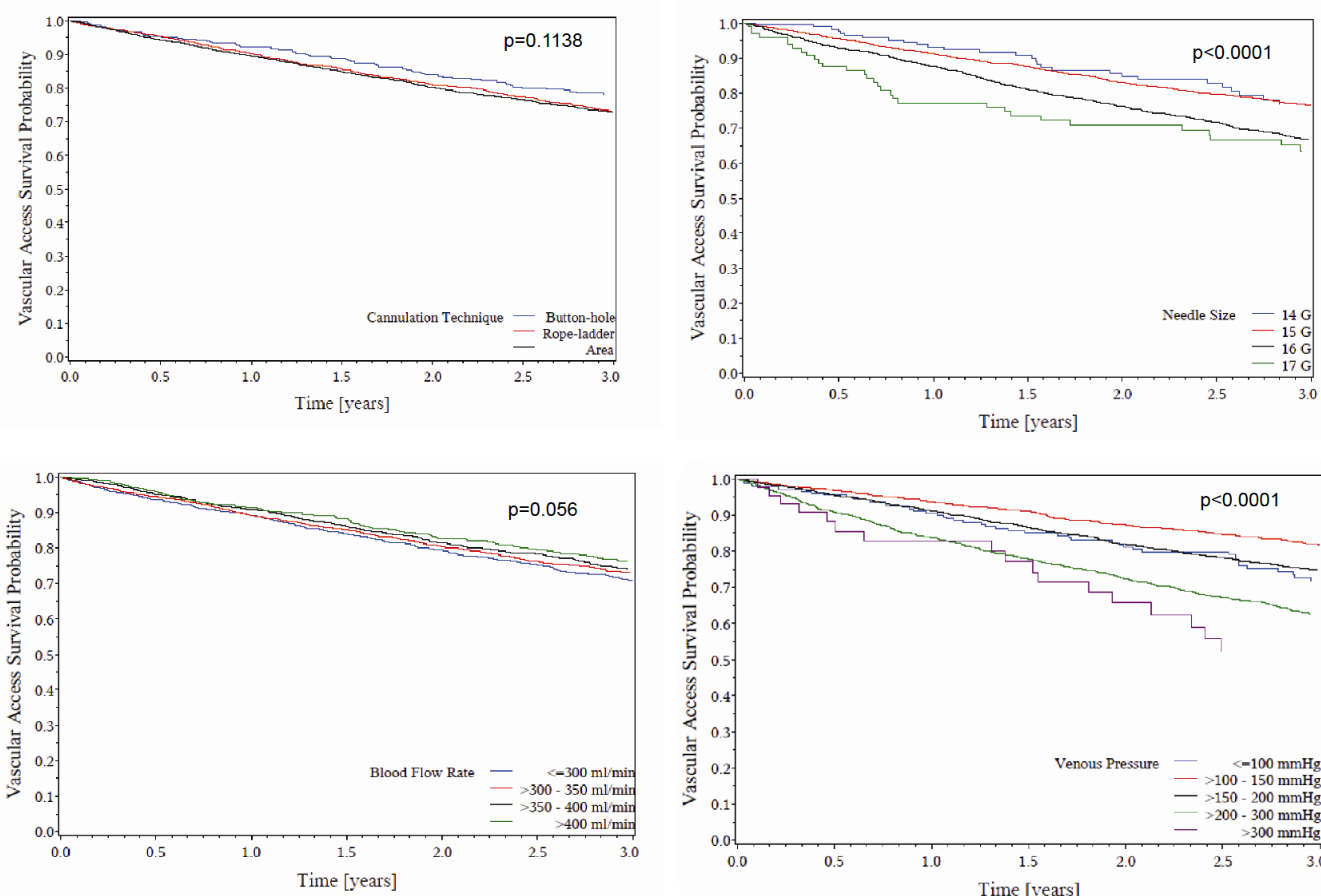
METHODS

- In April 2009, a cross sectional survey was conducted in 171 dialysis units located in Europe, Middle East and Africa to collect details on vascular access cannulation practices.
- On the basis of this survey¹, a cohort of patients was selected for follow-up, inclusion being dependent on the availability of corresponding access survival/intervention data in the clinical database.
- Access survival was analyzed using the Cox regression model (adjusted for within country effects) defining as events the need for first surgical access survival intervention.
- Patients were censored for transplantation, death, loss of follow-up, or end of the study period (March 31, 2012). Results were adjusted for age, gender and diabetes mellitus.

CONCLUSIONS

- The practice of “area” cannulation technique is associated with a higher hazard ratio (HR) than “button-hole” or “rope-ladder”.
- The retrograde direction of the arterial needle puncture together with bevel down is also associated with a high HR.
- The higher HR associated with a venous pressure of 150-200 mmHg should open a discussion on currently accepted limits.

Figure 1. Kaplan Meier access survival curves according to cannulation technique, needle size, blood flow rate and venous pressure



RESULTS

- Out of the 10,807 patients enrolled for the original survey, access survival data was available for 7,058 (65%). These resided in Portugal, UK, Italy, Turkey, Romania, Slovenia, Poland and Spain.
- Mean age was 63.5±15.0 years; 38.5% were female; 27.1% were diabetics; 90.6% had a native fistula and 9.4% had a graft. Access location was distal for 51.2% of patients. During the follow-up, 51.1% were treated with antiaggregants and 2.8% with anti-coagulants.
- Prevalent needle sizes were 15 G and 16 G for 63.7% and 32.2% of the patients, respectively (14 G: 2.7%, 17 G: 1.4%). Cannulation technique was area for 65.8% and rope-ladder for 28.2%, and the direction of puncture was antegrade for 57.3%. Median blood flow was 350-400 ml/min.
- Results of the Kaplan Mayer access survival are reported in Figure 1.
- Results of the Cox model are reported in Table 1.

Parameter	Category	Reference	HR	95% CI	p-value	
Age	18-50 yrs	50-60 yrs	1.00	0.85	1.17	<0.0001
	65-76 yrs		1.03	0.90	1.19	
	>75 yrs		1.47	1.28	1.69	
Gender	Male	Female	0.94	0.84	1.04	0.23
Diabetes	Yes	No	1.14	1.02	1.28	0.03
Platelet Anti-Aggregation	Yes	No	1.11	1.00	1.23	0.06
Fistula Type	Graft	Fistula	1.74	1.49	2.03	<0.0001
AV-Fistula Location	Right	Left	1.12	1.01	1.26	0.045
Av-Fistula Location	Proximal	Distal	1.50	1.34	1.68	<0.0001
Needle Size	14 G	15 G	1.23	0.83	1.81	0.006
	16 G		1.22	1.08	1.38	
	17 G		1.48	1.01	2.16	
Cannulation Technique	Buttonhole	Area	0.78	0.61	0.99	0.03
	Rope-Ladder		0.88	0.78	1.00	
Bevel and Needle Direction	Antegrade + Bevel Down	Antegrade + Bevel Up	0.98	0.84	1.16	0.02
	Retrograde + Bevel Up		0.94	0.82	1.08	
	Retrograde + Bevel Down		1.19	1.03	1.39	
Blood Flow	<300 ml/min	300-350 ml/min	1.18	1.02	1.37	0.02
	350-400 ml/min		0.90	0.79	1.03	
	>400 ml/min		0.92	0.75	1.13	
Venous Pressure	<100 mmHg	100-150 mmHg	1.49	1.09	2.03	<0.0001
	150-200 mmHg		1.42	1.22	1.66	
	200-300 mmHg		1.89	1.57	2.27	
	>300 mmHg		2.07	1.24	3.47	
Arm Compression at Time of Cannulation	Patient Assistance	None	0.80	0.67	0.96	0.02
	Tourniquet		1.05	0.92	1.20	

Table 1. Results of the Cox Model with primary outcome vascular survival, defined as time to first surgical vascular access survival intervention

References

1. Gauly et al, J Vasc Access 2011; 12(4): 358-64

