

SURVIVAL OF TOTAL VASCULAR ACCESSSES AND OF PREOPERATIVE ULTRASOUND MAPPED VASCULAR ACCESSSES IN HEMODIALYSIS PATIENTS

K. Trigka, A. Kazantzi
Kyanus Stayros, Patras, Greece

Introduction and aims:

Vascular access is considered the thread of life for hemodialysis (HD) patients. Current DOQI guidelines encourage placing arteriovenous fistulas (AVFs) in Hemodialysis patients (HD). However many new fistulas fail to mature sufficiently. Vascular access related complications are considered among the causes of morbidity in hemodialysis patients (HD). Preoperative vascular mapping prior to creation of vascular access to hemodialysis patients is proposed in order to improve vascular access outcome. The present study compared survival of AVF, AVG and central lines in a cohort of 92 HD patients. Preoperative mapping and survival was also studied for AVFs and AVGs.

Diabetes, age and smoking criteria as predictors of vascular access patency remain controversial and pose a challenge for the treatment of hemodialysis (HD) patients. The survival of different vascular access and possible correlations with advanced age (over 70 years old), smoking and diabetes were dealt in this study.

Methods:

This is a retrospective observational study using data ranging from January 2008 - September 2013. It comprised of a cohort of 118 vascular accesses in 92 hemodialysis patients treated in a single HD Unit in Greece. All types of vascular access AVFs, AVGs and CLs were studied.

Survival rates of AVFs, AVGs and central lines were calculated as the difference between vascular access placement and its removal or substitution using the Kaplan Mayer analysis and statistical significance using the Chi square test. The percentage of thrombosed and non thrombosed AVFs, AVGs and CLS was calculated.

Furthermore, the percentage of preoperative mapping with Doppler ultrasound of AVF and AVGs was calculated. Survival rates for mapped to non mapped AVFs and AVGs were plotted. The criteria for a successful vascular access AVF were: Venous component: Luminal diameter 2.5mm or greater, patent, straight, superficial <5mm of depth, continuity with central veins. Arterial component: Arterial lumen>2mm, patent palmar arch and differential pressure <20mm.

Patients were categorized according to 1) age in two groups : <70 years old and > 70 years old 2) smokers/ non smokers and 3) diabetics and non diabetics We conducted a survival analysis of the different vascular accesses and different age groups, smoking habits and diabetes status.

Results:

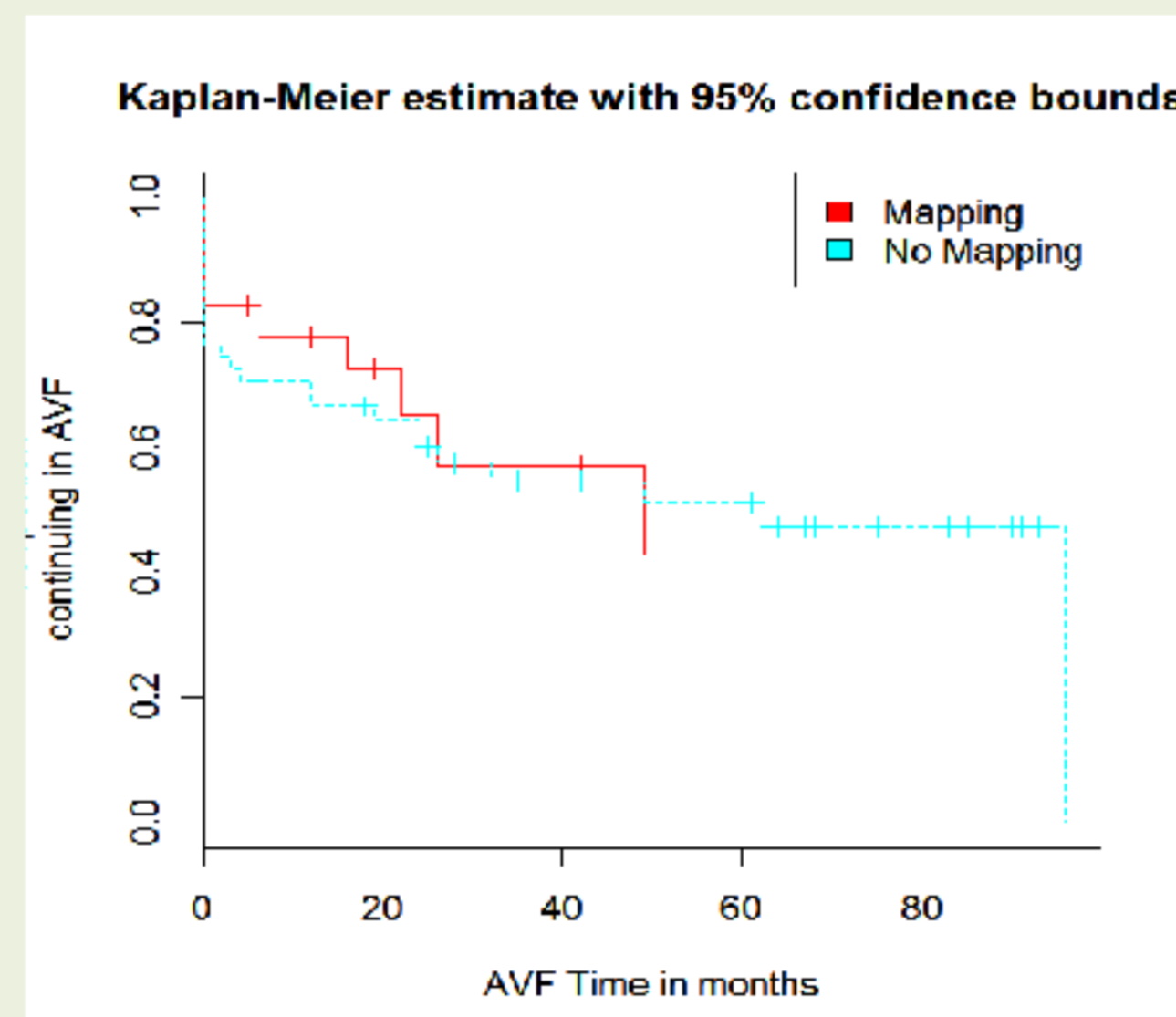
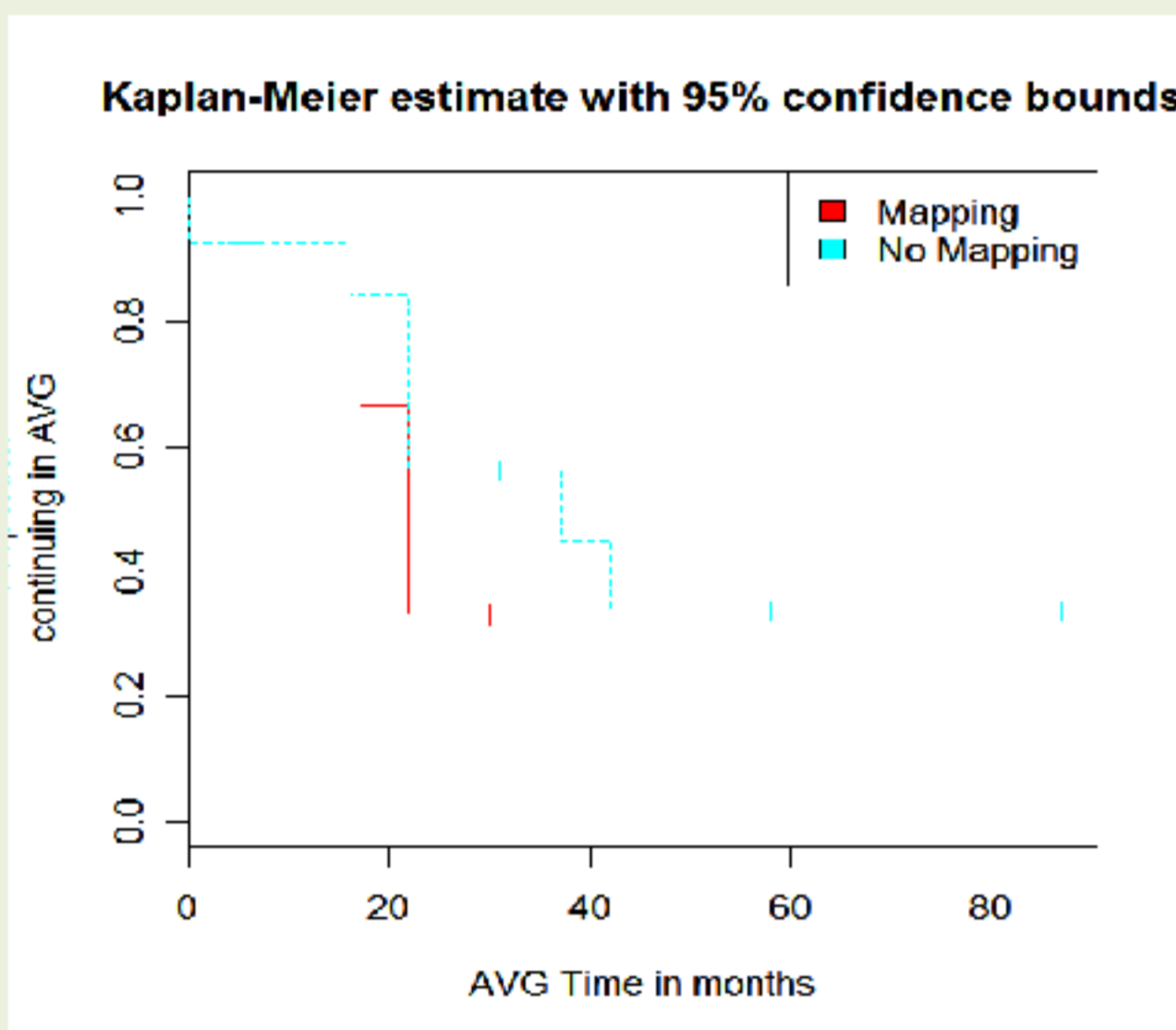
- >92 patients with mean age 72.2 12.2 were studied, 62.5% were males and 31.8% diabetics.
- >Mean number of accesses per patient 1.2 (61.1% AVF, 14.4% AVG and 31.3% catheters-CL).
- >Total mean survival rate was 28 29 mo for AVFs, 30 25 for AVGs and 15 14 for CLs. Occluding rate was 44.8% for AVFs, 52.9% AVGs and 16.2% for CLs.
- > Concerning access mapping prior to access creation, we report 27.1% mapped vs. 72.8% of non- mapped. Total median survival was 21 19 and 31 30mo. respectively. 27.2% AVFs and 52.9% AVGs were mapped. Median survival of mapped AVFs was 23 20 mo vs. 31 32 of non mapped. Median survival of mapped AVGs was 23 20 mo vs. 32 27 of non mapped.
- > Both venous and arterial ultrasound criteria were met in 86.3% proximal and in 45.4% distal forearm. In one case an anatomical variation was observed in forearm venous vasculature.

AVF	N (%)	Survival months mapped (Mean value sd)	Survival months non-mapped (Mean value sd)
Upper (Brachiocephalic)	59,1	23 20	39 39
Radiocephalic (forearm)	40,9	19 18	39 42

AVF	Mapped	Non-mapped
Survival months (Mean value sd)	23 20	31 32

Vascular accesses	N (%)
AVFs/AVGs	
Mapped	22 (27,2%)
Non-mapped	59 (72,8%)
Total	81 (100%)

Out of 22 mapped accesses, brachial artery was visualized in all examined limbs. Mean internal BA diameter (ID) was 5.1mm. Proximal radial artery was visualized in 19/22 cases of examined limbs and PRA ID was 2.3mm. Proximal cephalic vein (CV) was visualized in 19/22 of the examined limbs and the CV diameter >2.5mm was found in 20/22 limbs. In proximal forearm both ultrasound criteria were met in 19/22(%) of limbs. Radial artery in distal forearm was visualized in 12/19 of the examined limbs and CV diameter of >2.5 mm was found in 17/22. In one case an anatomical variation was observed in forearm venous vasculature. In distal forearm both ultrasound criteria were met in 10/22 limbs.



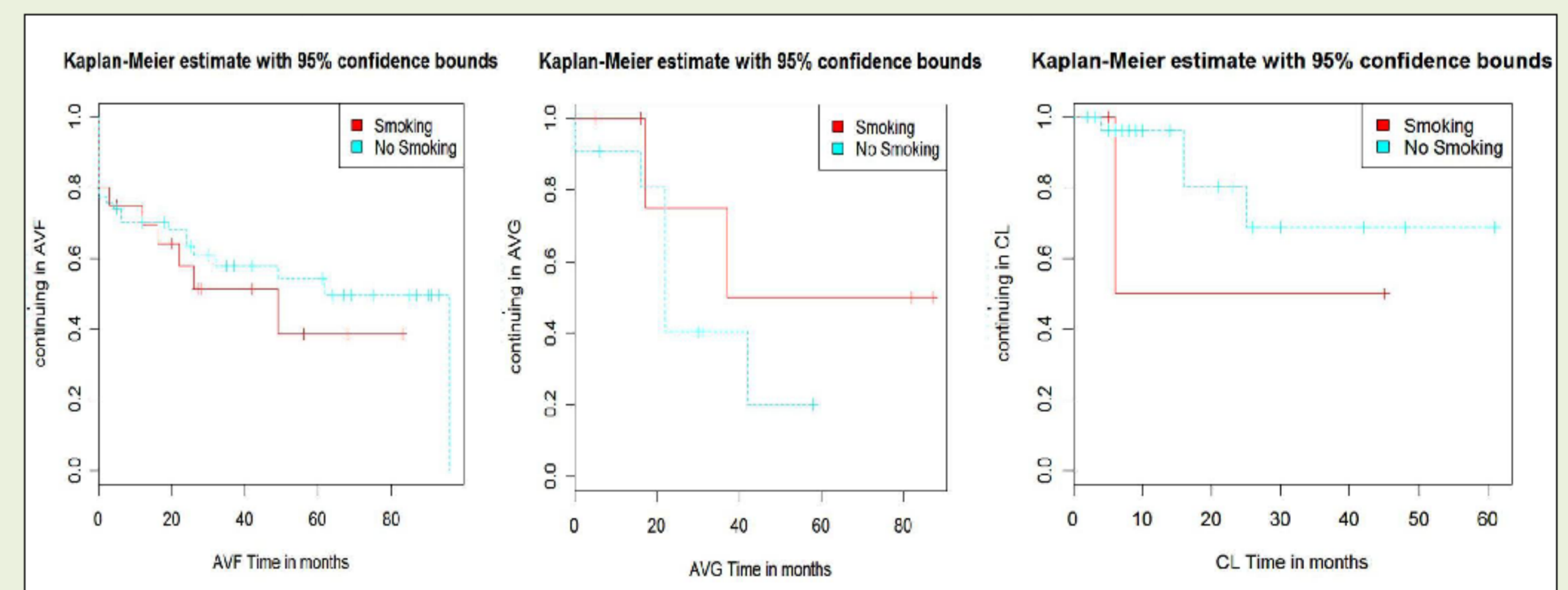
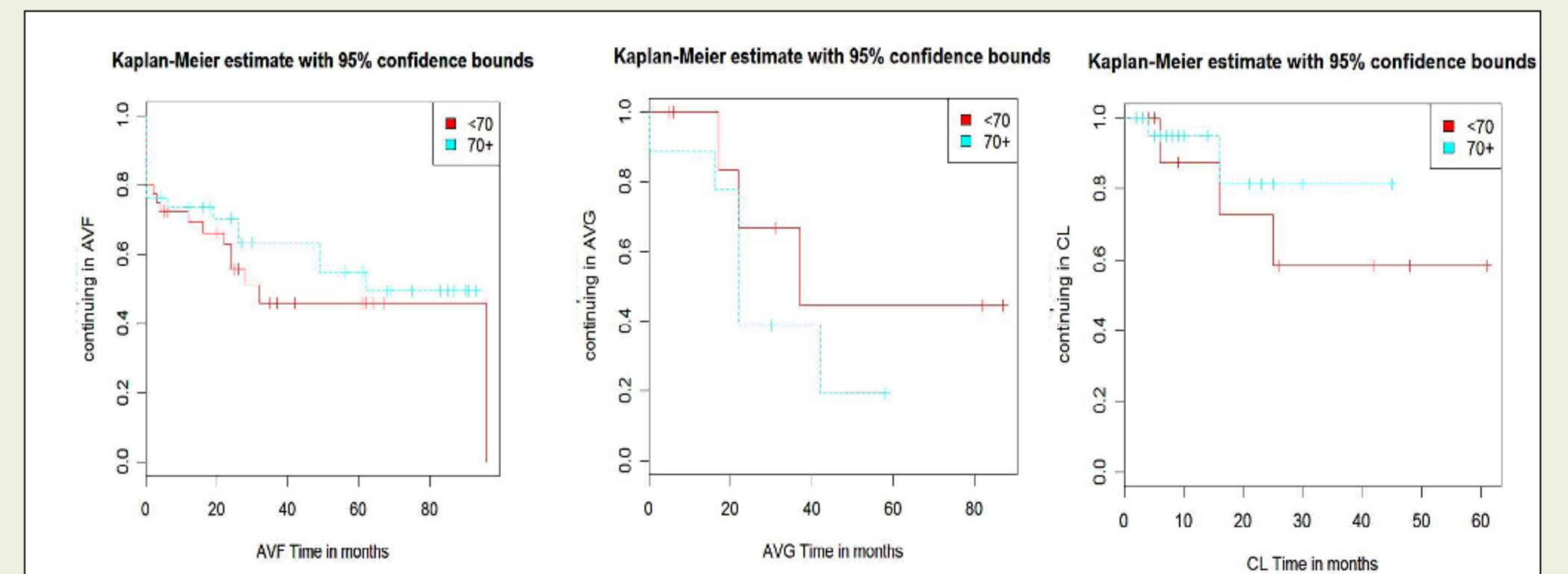
Branchial artery	Radial artery	Ulnar artery
Visible(N)	Visible(N)	Visible(N)
22	19	18
Diameter (mm)	Diameter (mm)	Diameter (mm)
5,1	2,3	2,0

Cephalic vein	Basilic Vein	Middle Vein
Visible (N)	Visible(N)	Visible(N)
19	21	17
Diameter (mm)	Diameter (mm)	Diameter (mm)
Upper arm 4,0	Fore arm 3,0	5,0
		3,3

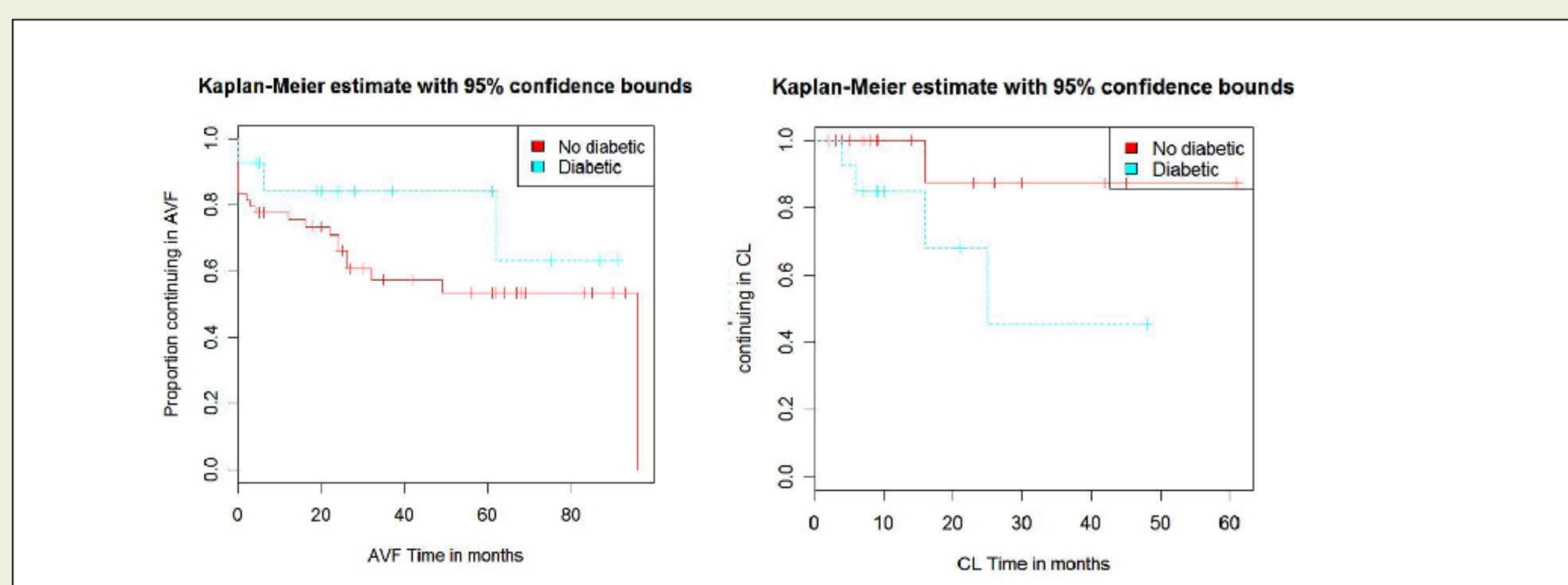
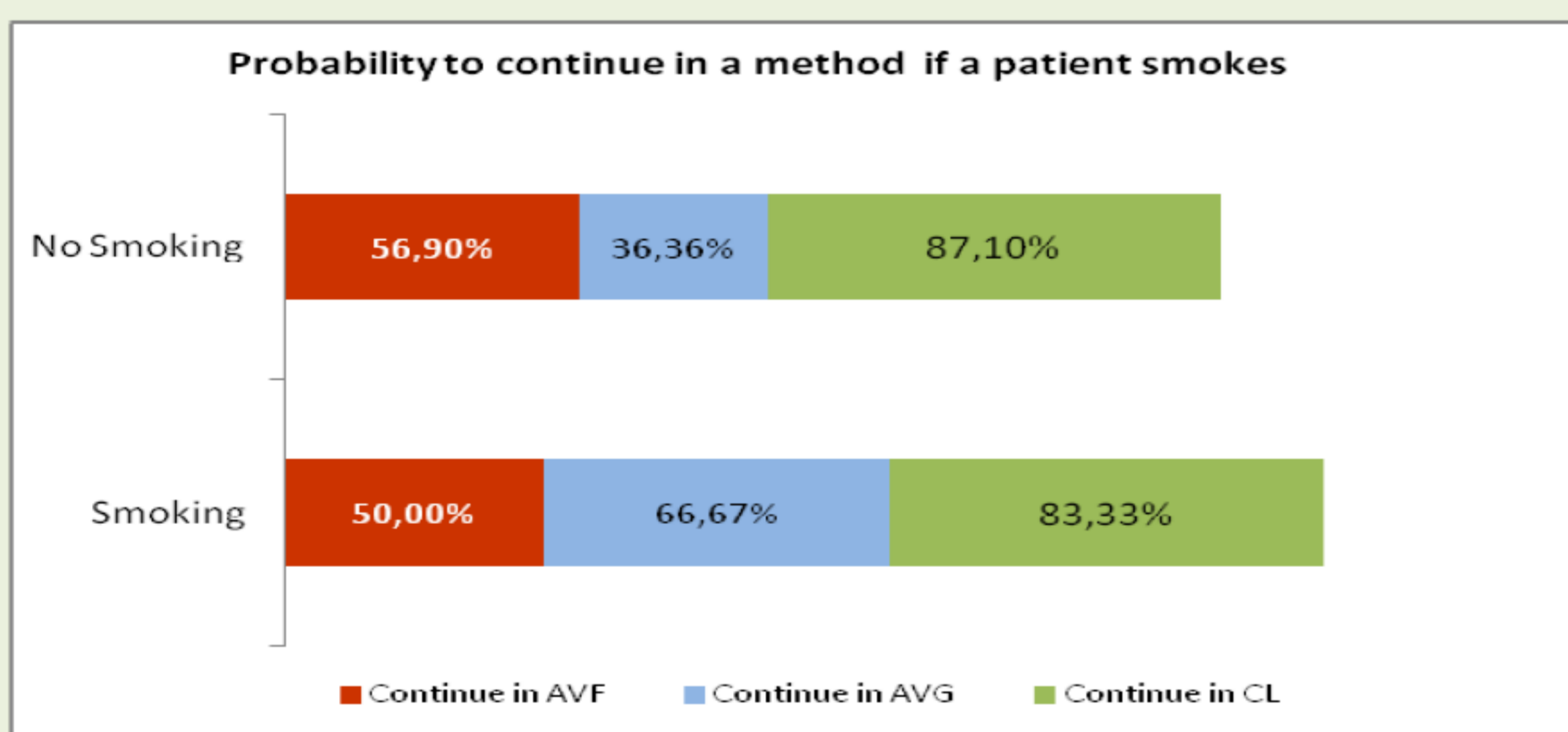
- > Survival rates for AVFs was 22 23 mo for 70 years old. Survival rates for AVGs was 33 32 mo for 70 years old. As for CL, survival patency was 19 20 mo for 70 years old.
- > We report slightly better survival patency of non smokers (AVF survival 29 30 vs. 25 24, CL 15 14 vs. 11 17, AVG 41 36 vs. 25 16 for non smokers vs. smokers).
- > Survival curves for AVFs, were better in diabetics (38 12 vs. 33 11 mo), while catheters survival-patency curves were better for non diabetics (16 6 vs. 14 2mo).

Survival months (Mean value sd)	AVF	AVG	CL
<70	22 23	33 32	19 20
>70	35 33	25 17	12 11

Survival months (Mean value sd)	AVF	AVG	CL
Smoking	25 24	41 36	11 17
Non smoking	29 30	25 16	15 14



Our results show a probability of 56.9% of survival of AVF non smokers vs 50% of smokers, a probability of 36.36% of survival of AVG non smokers vs 66,67% of smokers and a probability of 87.10% of survival of CL non smokers vs 83.33% of smokers



Survival months (Mean value sd)	AVF	AVG	CL
Diabetics	38 40		14 12
Non diabetics	33 27	30 9	16 9

Conclusions:

- AVF was the first vascular access choice for the majority of patients. Similar total survival rates and functionality loss for AVFs and AVGs, but lesser for CLs was reported.
- Better survival patency curves were demonstrated in older HD patients for AVFs and CLs compared to AVGs. Higher survival rates were observed for AVFs and CLs regarding smoking. Diabetics displayed higher AVF survival rates.
- We report only 27.1% of preoperative mapping prior to access creation. Survival of mapped limbs was not superior to non- mapped. Nevertheless, we underline the importance of radiological mapping prior to access creation in a patient presenting anatomical vasculature variation. In some cases it enables useful insights that may help guide clinical decision making.
- Our study, also, shows a statistically significant better survival curve for the age group > 70 years old using as vascular access central lines compared to AVFs and AVGs. AVGs are not favored in age groups >70 years old, according to diagrams, while for AVFs no statistically significant difference is observed for the two age groups. For the age group of <70 years AVGs show a statistically better survival curve. Central lines are not favored, while AVFs are considered equally for both age groups.
- Concerning the survival of each vascular access for smokers and non smokers, no statistically significant difference is observed for survival of AVFs and central lines. However, regarding the AVGs statistically significant difference is observed in favour of non smokers. Results shows apx a double probability of survival of smokers for AVGs than non smokers, paradoxically.
- Finally, survival of vascular access of diabetics vs non diabetics does not differ significantly for AVFs or CLs. A small survival advantage of diabetics for AVFs is observed over CLs.

