

European Best Practice Guidelines Vascular Access



Jan Tordoir, Maastricht

RATING OF EVIDENCE LEVEL

(according to Cochrane)

I/II/III/IV

Evidence levels

Meta-analysis

level I

RCT (randomized controlled trial)

level II

CCT (controlled clinical trial)

level III

All other types of studies

level IV

(cohort; case report; cross-sectional)

European Best Practice Guidelines

Vascular Access

- 1. Patient referral**
- 2. Pre-operative evaluation**
- 3. Strategies for access creation**
- 4. Role of nurses and staff in access management**
- 5. Surveillance of vascular access**
- 6. Diagnosis of stenoses in AV fistulae and AV grafts**
- 7. Treatment of stenosis and thrombosis in AV fistulae and AV grafts**
- 8. Diagnosis and treatment of central venous obstruction**
- 9. Diagnosis and treatment of access-induced ischaemia**
- 10. Central venous access**
- 11. Management of central venous access complications**
- 12. Management of the infected vascular access**

Patient referral

Guideline 1

1.1 An early plan for venous preservation should be a substantial part of pre-dialysis care and education in any chronic kidney disease (CKD) patient regardless the choice of treatment modality. (*Evidence level IV*)

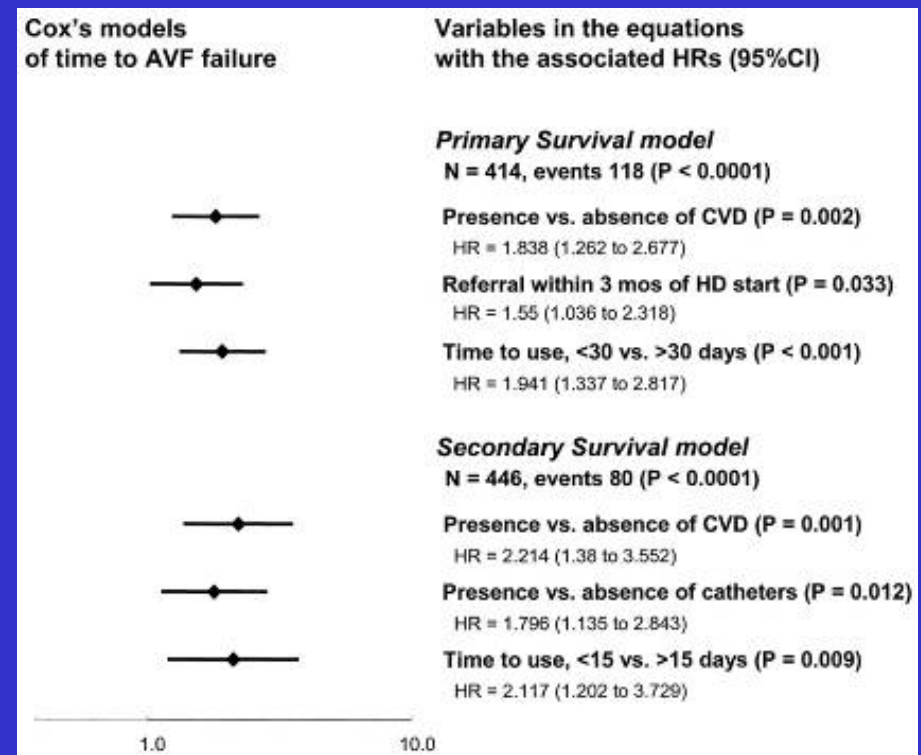
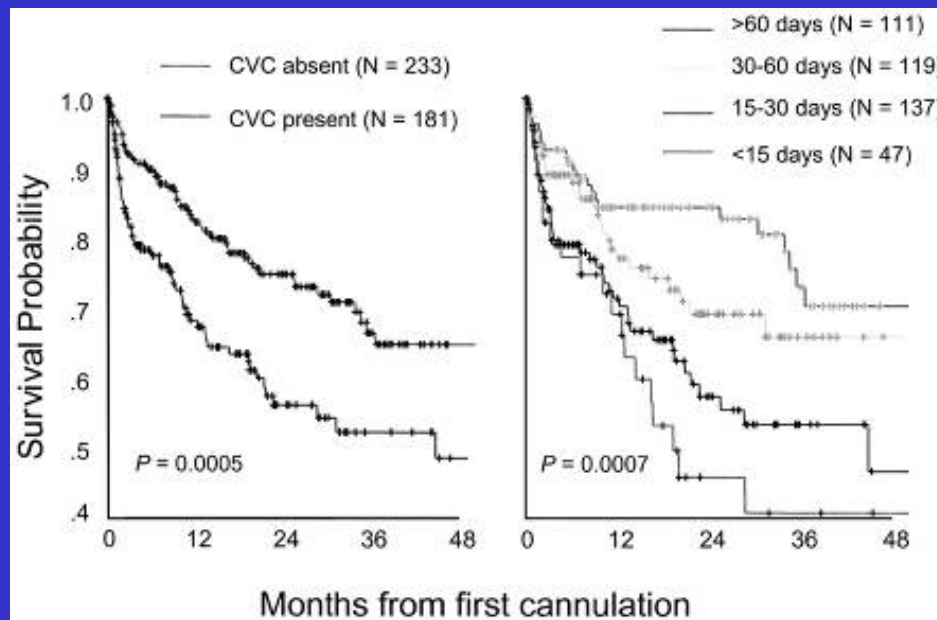
1.2. Every chronic renal failure patient should start dialysis with a functioning vascular access (*Evidence level III*)

1.3. Potential chronic haemodialysis (HD) patients should be ideally referred to the nephrologist and/or vascular surgeon for preparing vascular access when they reach the stage 4 of their CKD (Glomerular Filtration Rate <30ml/min/1.73m²) or earlier in case of rapidly progressive nephropathy or specific clinical conditions such as diabetes or severe peripheral vascular disease. (*Evidence level III*)

Patient referral

Guideline 1

1.3. Potential chronic haemodialysis (HD) patients should be ideally referred to the nephrologist and/or vascular surgeon for preparing vascular access when they reach the stage 4 of their CKD (Glomerular Filtration Rate <30ml/min/1.73m²) or earlier in case of rapidly progressive nephropathy or specific clinical conditions such as diabetes or severe peripheral vascular disease. (Evidence level III)



Preoperative evaluation

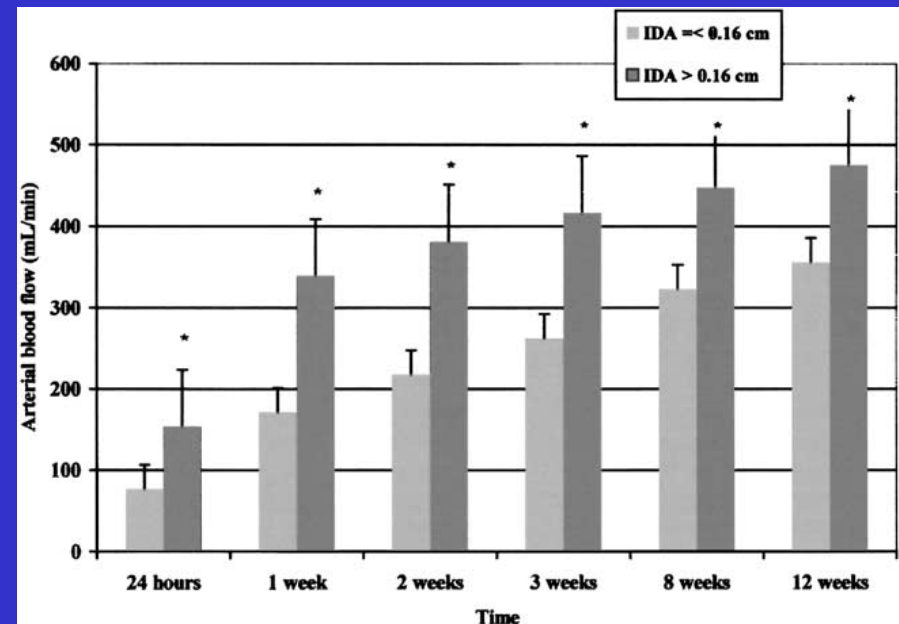
Guideline 2

2.1. Clinical evaluation and noninvasive ultrasonography of upper extremity arteries and veins should be performed before vascular access creation. (Evidence level II)

2.2. Central vein imaging is indicated in patients with a history of previous central vein catheters. (Evidence level III)

Vessel diameters for successful RCAVF creation

<u>Author</u>	<u>Radial artery Cephalic vein</u>	
Wong et al.	1.6	1.6
Malovrh	1.5	1.6
Silva et al.	2.0	2.5
Ascher et al.	—	2.5



Strategies for access creation

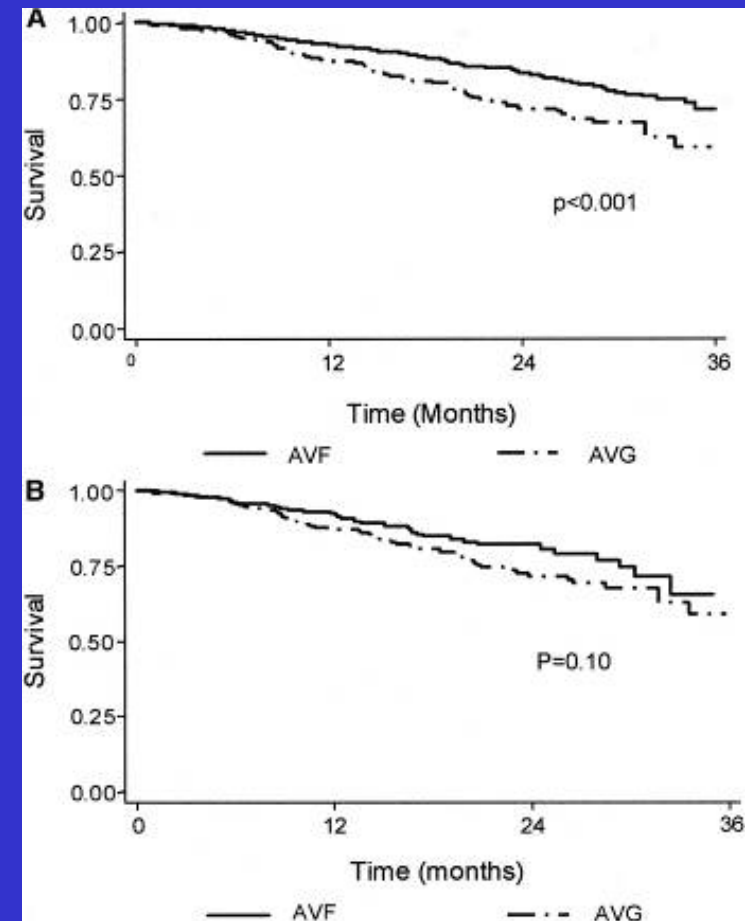
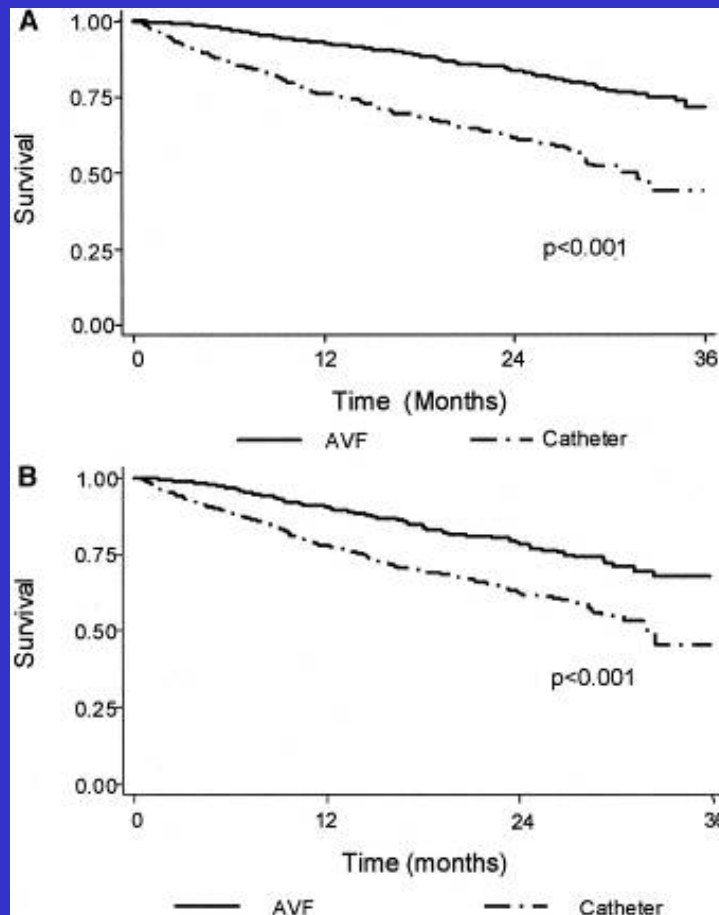
Guideline 3

- 3.1. Any access should provide a blood flow that allows to perform adequate haemodialysis therapy. (*Evidence level II*)**
- 3.2. Autogenous arteriovenous fistulae should be preferred to AV grafts and AV grafts should be preferred to catheters. (*Evidence level III*)**
- 3.3. The upper extremity arteriovenous fistula should be the preferred access and should be placed as distal as possible. (*Evidence level III*)**
- 3.4. Fistula maturation should be monitored to allow pre-emptive intervention if needed. (*Evidence level III*)**

Strategies for access creation

Guideline 3

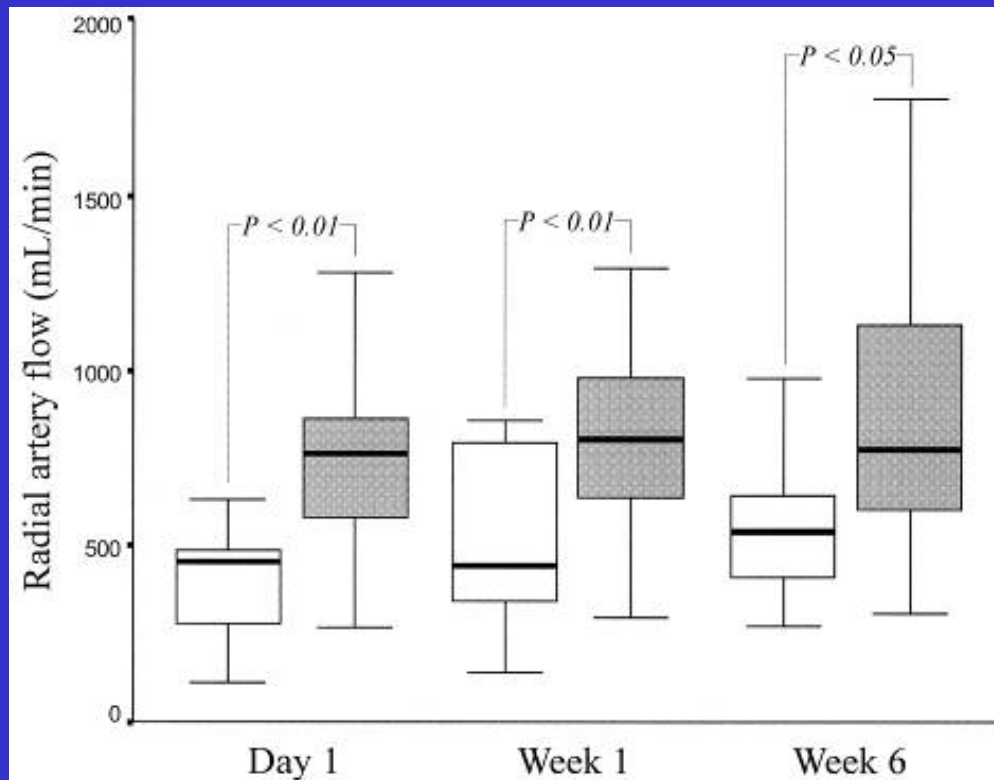
3.2. Autogenous arteriovenous fistulae should be preferred to AV grafts and AV grafts should be preferred to catheters. (Evidence level III)



Strategies for access creation

Guideline 3

3.4. Fistula maturation should be monitored to allow pre-emptive intervention if needed. (Evidence level III)



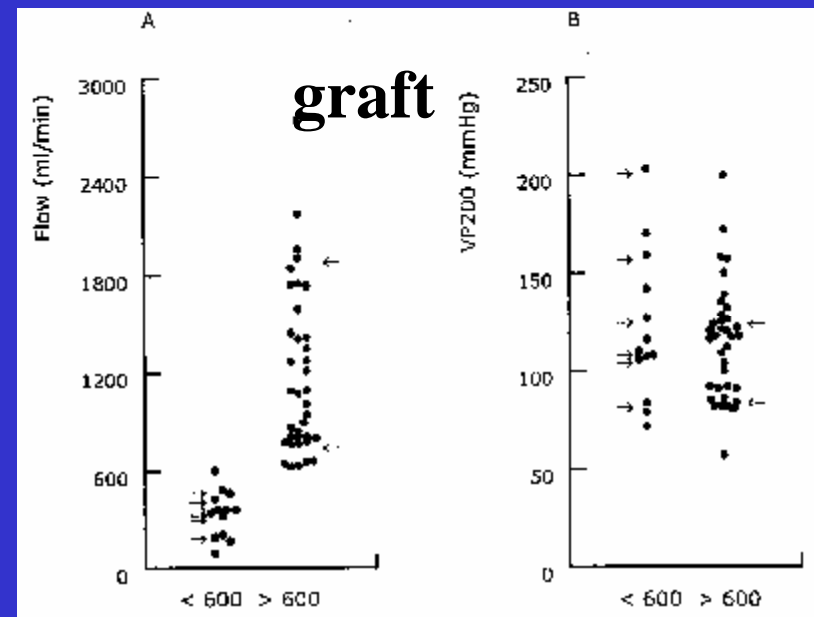
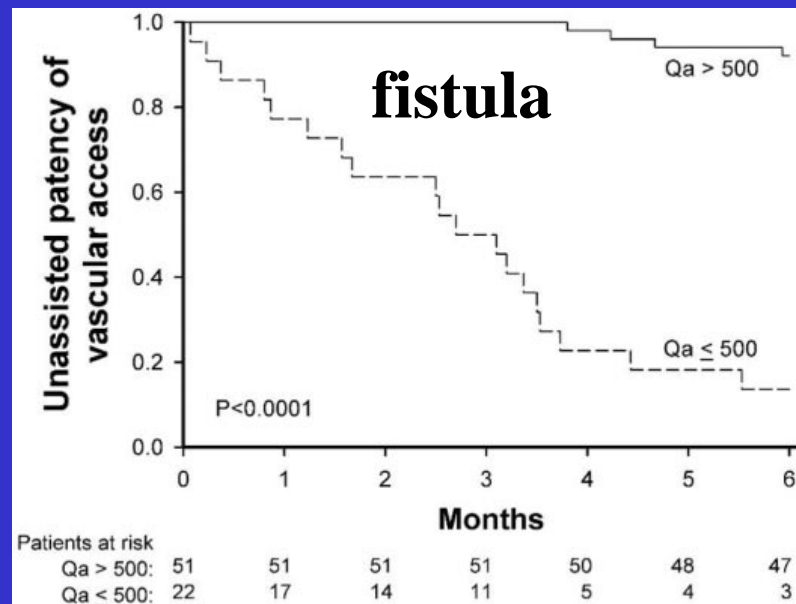
Postoperative radial artery blood flow (ml/min) in non-functioning RCAVF (white box) and functioning RCAVF (grey box)

Surveillance of vascular access

Guideline 5

5.1. Prior to any cannulation, autogenous arteriovenous fistulae and grafts should be assessed by physical examination. (Evidence level IV)

5.2. Objective monitoring of access function should be performed at a regular base by measuring access flow. (Evidence level II)



Bosman PJ, Boereboom FT, Smits HF, Eikelboom BC, Koomans HA, Blankestijn PJ. Kidney Int. 1997 ;52(4):1084-8.

Diagnosis of stenoses in av fistulae & AV grafts

Guideline 6

6.1. If a haemodynamically significant stenosis is suspected by physical examination and/or flow measurement, imaging should be performed as soon as possible. (*Evidence level III*)

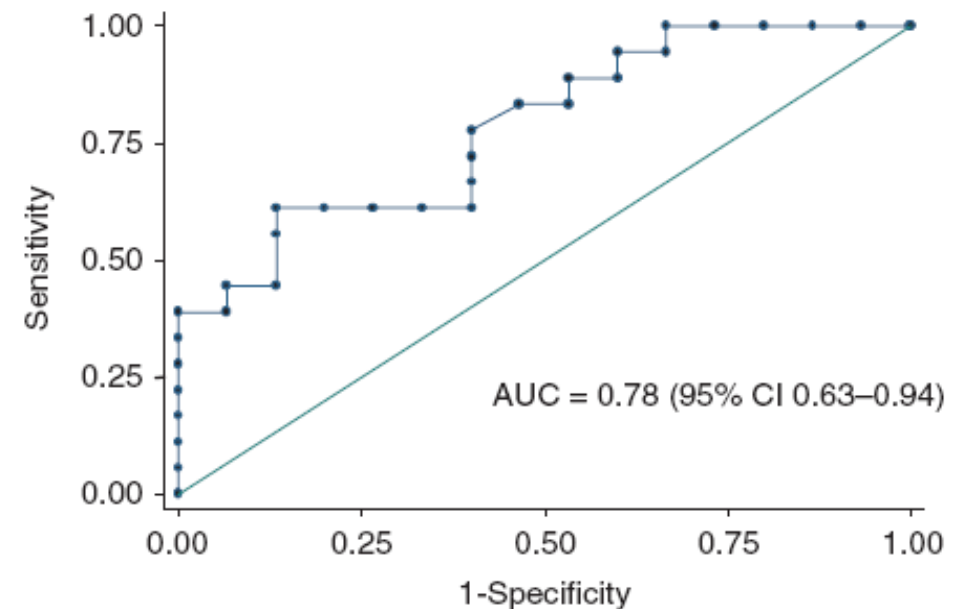
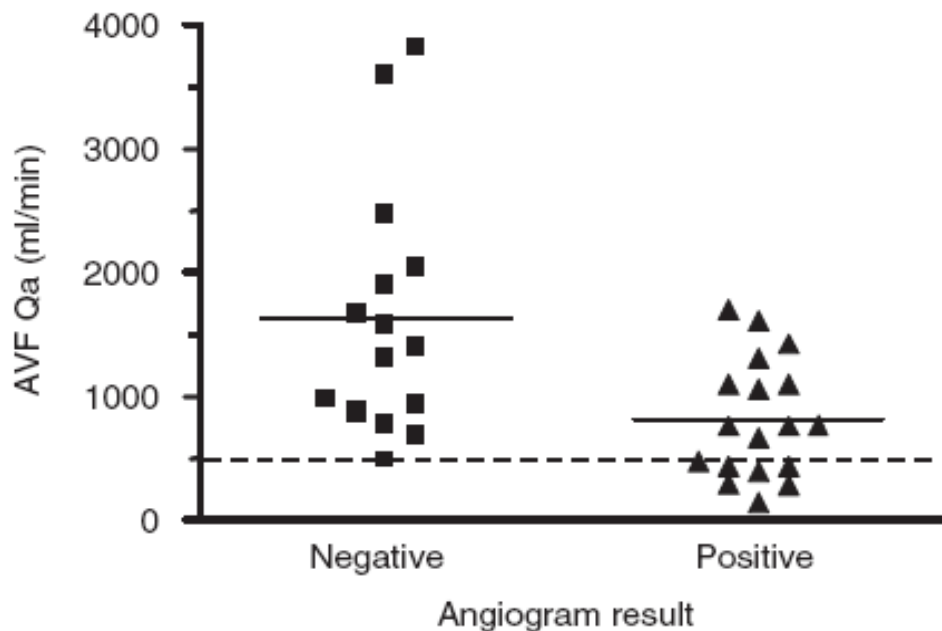
6.2.. Preemptive intervention should be performed percutaneously or surgically without further delay and imaging should be performed immediately before the intervention. (*Evidence level II*)

6.3. If the complete arterial inflow and venous outflow vessels need to be visualized, Magnetic Resonance Angiography (MRA) should be performed. (*Evidence level III*)

Diagnosis of stenoses in av fistulae & AV grafts

Guideline 6

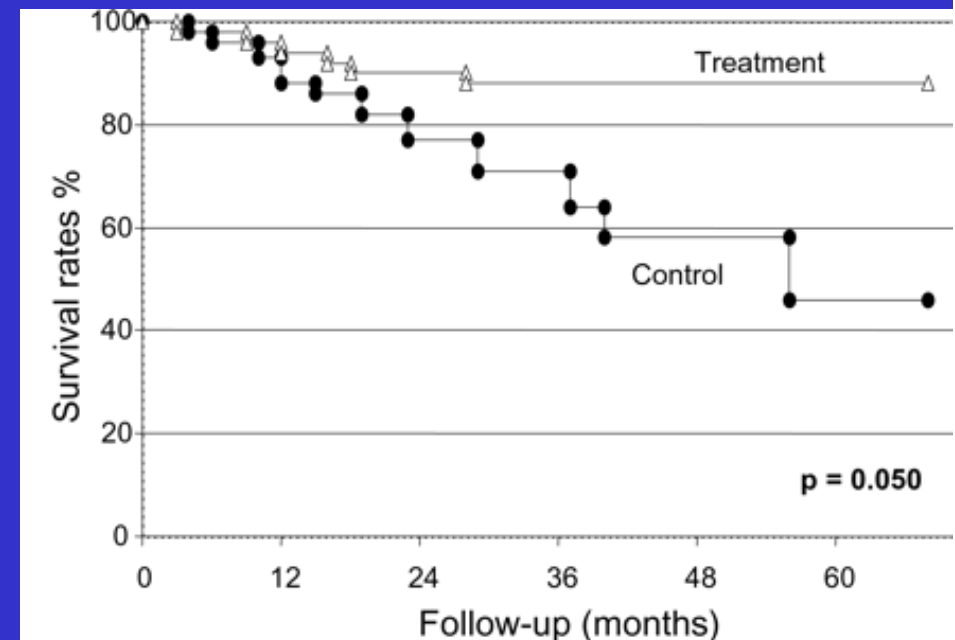
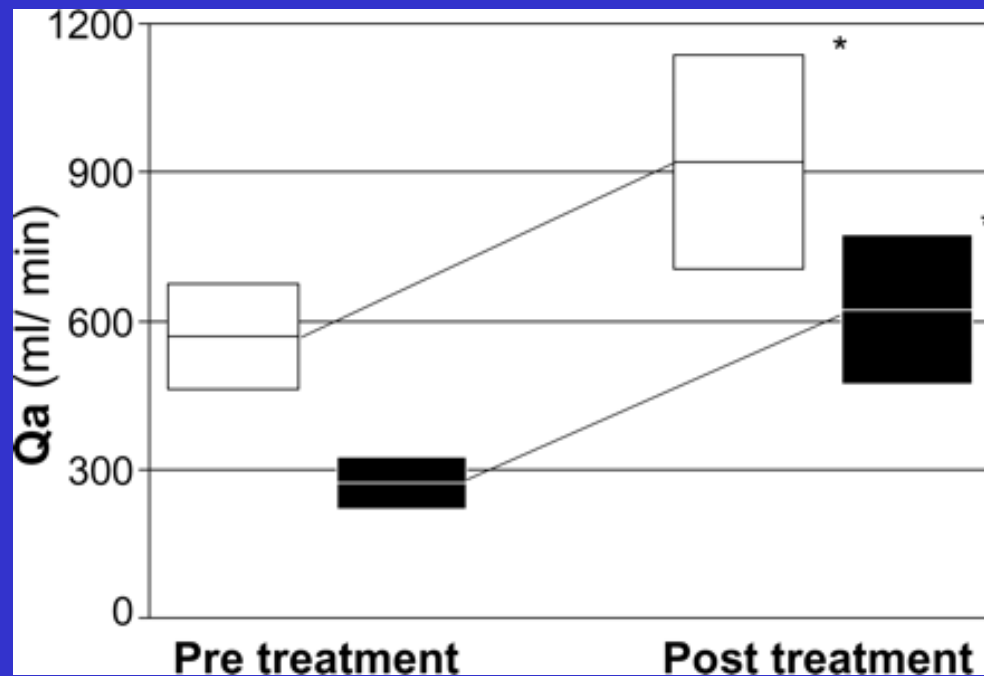
6.1. If a haemodynamically significant stenosis is suspected by physical examination and/or flow measurement, imaging should be performed as soon as possible. (Evidence level III)



Diagnosis of stenoses in av fistulae & AV grafts

Guideline 6

6.2.. Preemptive intervention should be performed percutaneously or surgically without further delay and imaging should be performed immediately before the intervention. (Evidence level II)



AVFs at risk :

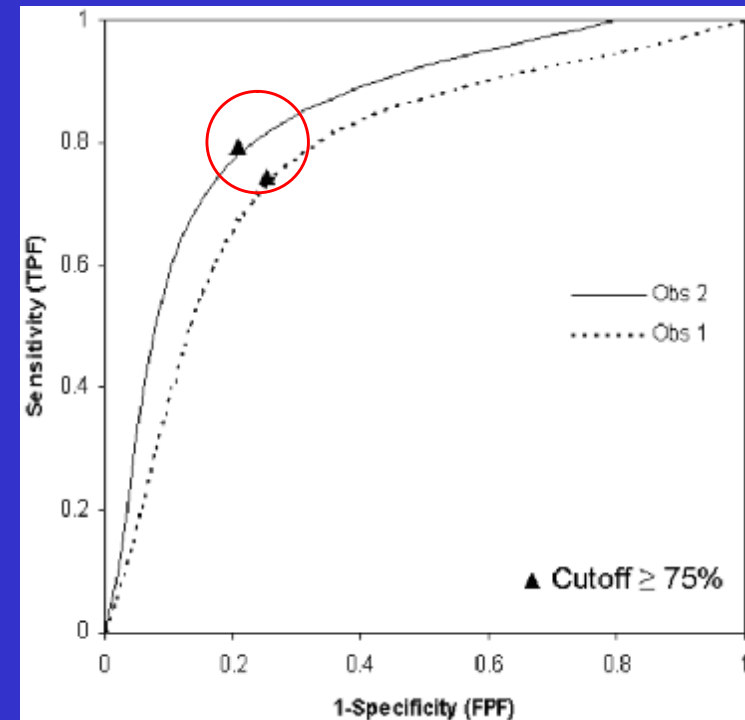
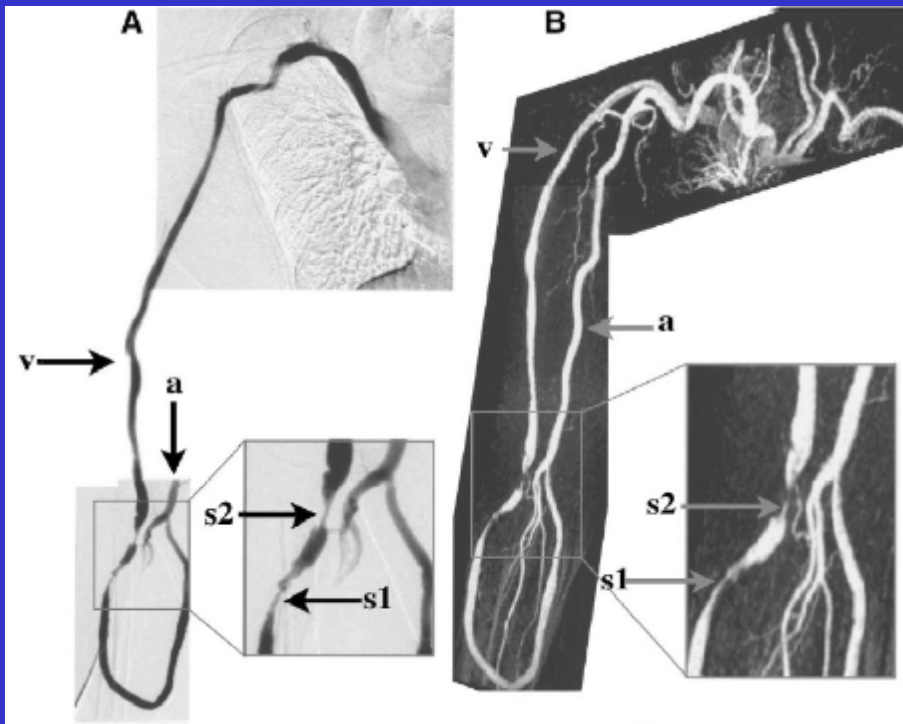
Treatment	43	35	25	20	16	12
Control	36	31	24	13	8	3

Tessitore N, Lipari G, Poli A, Bedogna V, Baggio E, Loschiavo C, Mansueto G, Lupo A. *Nephrol Dial Transplant.* 2004 ;19(9):2325-33.

Diagnosis of stenoses in av fistulae & AV grafts

Guideline 6

6.3. If the complete arterial inflow and venous outflow vessels need to be visualized, Magnetic Resonance Angiography (MRA) should be performed. (Evidence level III)



Froger CL, Duijm LE, Liem YS, Tielbeek AV, Donkers-van Rossum AB, Douwes-Draaijer P, Cuypers PW, Buth J, van den Bosch HC.. *Radiology*. 2005 Jan;234(1):284-91.

Planken RN, Tordoir JH, Dammers R, de Haan MW, Oei TK, van der Sande FM, van Engelshoven JM, Leiner T.. *J Magn Reson Imaging*. 2003 Jan;17(1):54-64.

Treatment of stenosis and thrombosis in AV Fistulae & AV grafts

Guideline 7

7.1. For venous outflow stenosis percutaneous transluminal angioplasty (PTA) is the first treatment option. (*Evidence level III*)

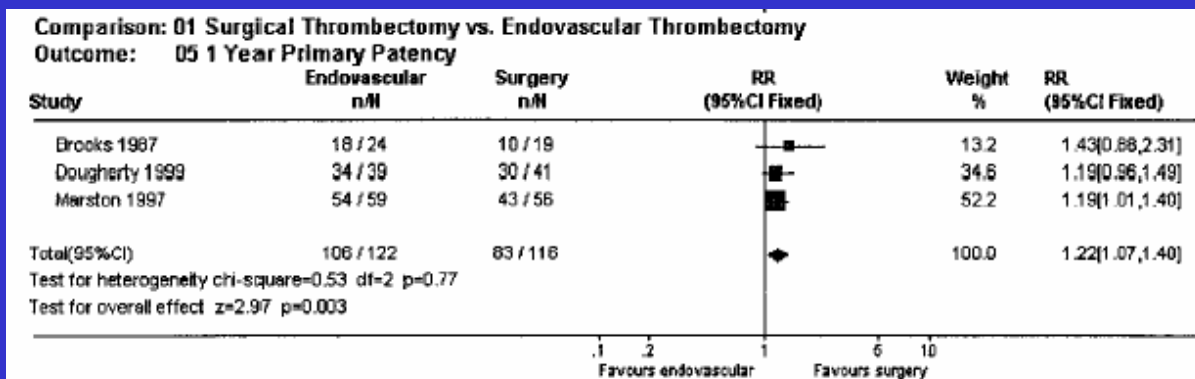
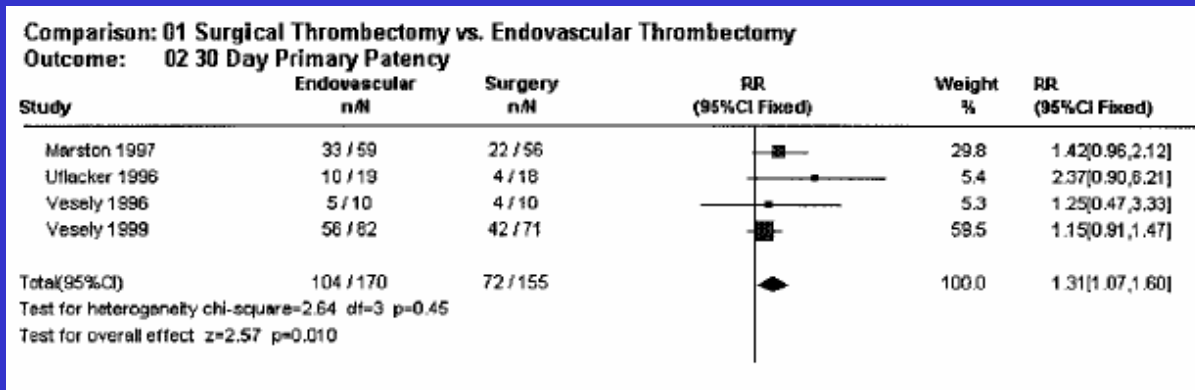
7.2. Thrombosed autogenous and graft fistulae should be treated either interventionally or surgically. Individual centers should review their results and select the modality that produces the best results for that center. In some centers this will be interventional radiology and in others surgery. (*Evidence level III*)

Treatment of stenosis and thrombosis in AV Fistulae & AV grafts

Guideline 7

7.2. Thrombosed autogenous and graft fistulae should be treated either interventionally or surgically. Individual centers should review their results and select the modality that produces the best results for that center. In some centers this will be interventional radiology and in others surgery.

(Evidence level III)



*Green LD, Lee DS, Kucey DS.
 J Vasc Surg. 2002 ;36(5):939-45.*

Diagnosis and treatment of central venous obstruction

Guideline 8

8.1. If symptomatic central venous obstruction is suspected, angiography of the access and complete venous outflow tract should be performed. (*Evidence level III*)

8.2. Treatment should be performed by percutaneous intervention. (*Evidence level III*)

	author, year	# pat	1 yr	2 yrs
PTA	Glanz, 1987	30	35%	10%
	Wisselink, 1993	15	36%	0%
	Quinn, 1995	10	12%	
	Money, 1995	26	7%	
PTA + Wallstent				
	Shoenfeld, 1994	19	68%	
	Money, 1995	13	71%	
	Vorwerk, 1995	27	60%	60%
	Haage, 1999	50	56%	28%
	Mickley, 2001	23	76%	61%
Surgery	Wisselink, 1993	13	86%	66%
	Money, 1995	13	80%	
	Mickley, 2001	6	83%	67%

Diagnosis and treatment of access-induced ischaemia

Guideline 9

9.1. Access-induced ischaemia should be detected by clinical investigation and the cause should be identified by non-invasive imaging methods and angiography.

(Evidence level III)

9.2. Enhancement of arterial inflow, access flow-reduction and /or distal revascularisation procedures are the therapeutic options. When the above methods fail, access ligation should be considered. *(Evidence level III)*

Diagnosis and treatment of access-induced ischaemia

Guideline 9

9.2. Enhancement of arterial inflow, access flow-reduction and /or distal revascularisation procedures are the therapeutic options. When the above methods fail, access ligation should be considered. (Evidence level III)

n=78	pre	post
Flow (cc/min)	1469	490
DBI	0.41	0.74
Ischemia relief	86% of patients	
Access patency	85% (12 mts)	73% (36 mts)

Access flow reduction by banding

<u><i>Author</i></u>	<u><i>no. patients</i></u>	<u><i>success in %</i></u>
Schanzer et.al.	14	93
Haimov et.al	23	96
Katz et.al.	6	83
Berman et.al.	21	100
Lazarides et.al.	7	94
Stierli et.al.	6	100
Knox et.al.	52	90
Diehl et.al.	12	100
Sessal et.al.	18	73

Distal Revascularisation/ Interval Ligation (DRIL)

Central venous access

Guideline 10

10.1. Central venous catheters should be inserted in patients without a permanent access and the need for acute haemodialysis. (*Evidence level III*)

10.2. The percutaneous route should be used for both acute and chronic catheter insertion. Insertion should be guided by ultrasound. (*Evidence level II*)

10.3. The internal jugular vein should be the preferred location for insertion. (*Evidence level III*)

10.4. Non-tunnelled catheters should only be used in emergency situations and should be exchanged as soon as possible for tunnelled catheters. (*Evidence level III*)

Central venous access

Guideline 10

10.2. The percutaneous route should be used for both acute and chronic catheter insertion. Insertion should be guided by ultrasound. (Evidence level II)

			Ultrasound		
			-	+	
			Group A (%)	Group B (%)	P value
1	No of attempts	One	17 (56.7%)	26(86.7%)	0.010
		More than one	13 (43.3%)	4(13.3%)	
2	Failed procedure		2 (6.7%)	0	
3	Complications	Carotid artery puncture	4 (13.3%)	0	0.010
		Hematoma formation	3 (10%)	0	0.076
		Others	Nil	Nil	
4	Occurrence of adverse outcome (failed procedure, carotid puncture, hematoma)		5(16.7%)	0	0.020
5	Blood loss mL (mean±SD)		4.0±2.54	3.16±0.73	0.089

Bansal R, Agarwal SK, Tiwari SC, Dash SC. A prospective randomized study to compare ultrasound-guided with nonultrasound-guided double lumen internal jugular catheter insertion as a temporary hemodialysis access. Ren Fail. 2005;27(5):561-4.

EBPG

Summary

- **Development of 12 best practice guidelines concerning strategy & management vascular access for hemodialysis**
- **The number of evidence level I & II publications however few**
- **Urgent need for European-wide RCT**