

Vascular Access for Hemodialysis

: 2018 Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS)

ONE Day in Vascular disease, 9 February 2019

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Vascular Access : 2018 Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS)

Guideline Comparison

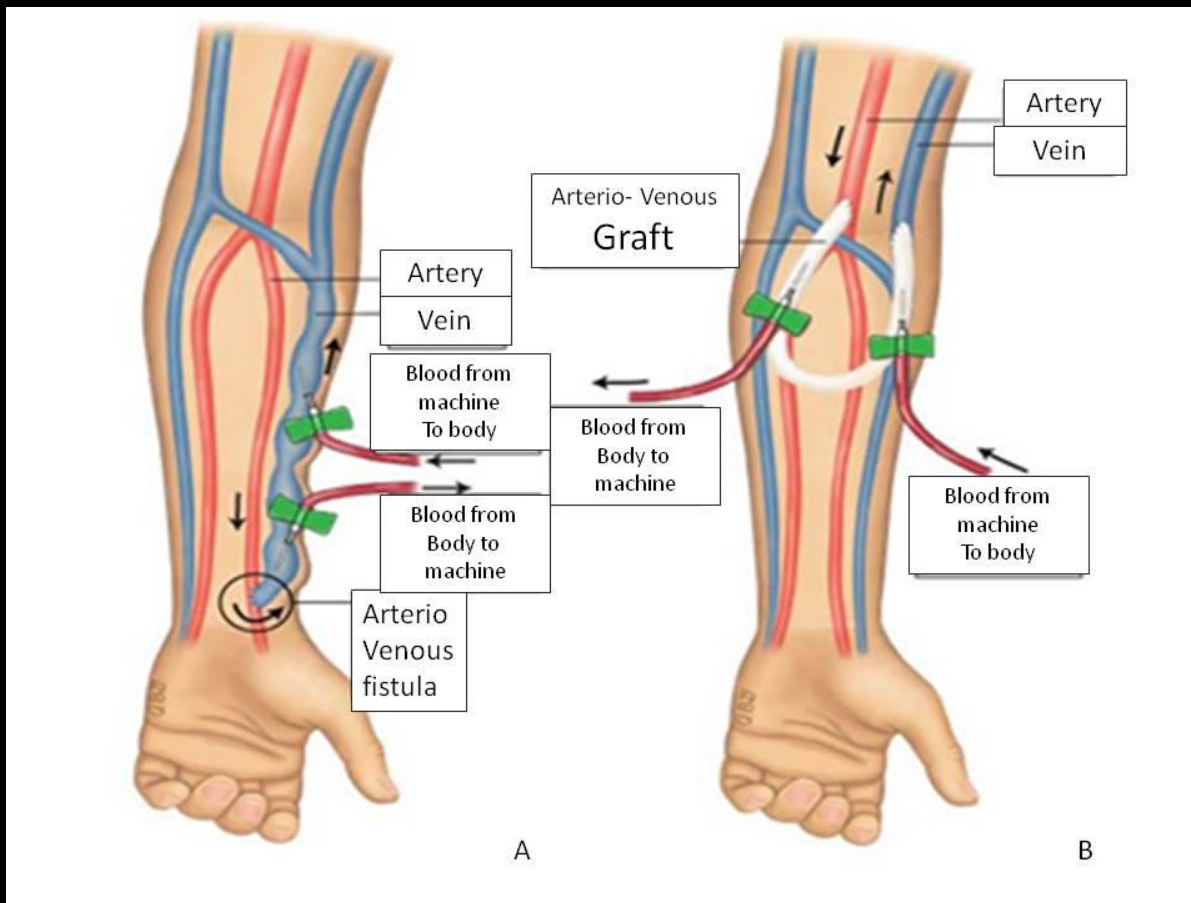
KDOQI 2006 & ESVS 2018

1 Access creation

2 Maturation & cannulation

3 Access surveillance

4 Access intervention



AV Fistula

Better patency

Lower complication

Surgeon prefer

AV Graft

Easier cannulate

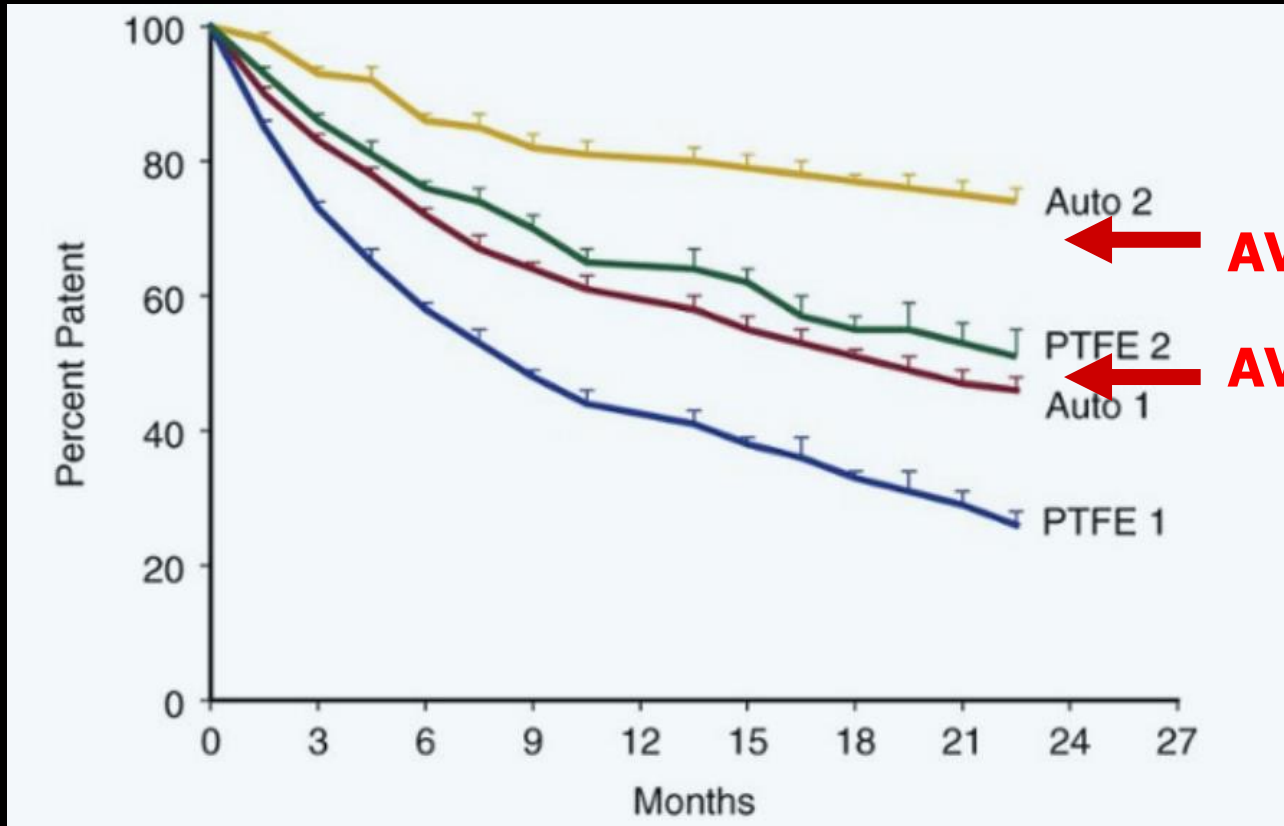
Dialysis nurse prefer

Shorter maturation (2-4 weeks)

Easier to revision (thrombosed)

Variety of length & configuration

Patency rates for AVF vs AVG (upper arm)



Auto 2



AV Fistula 80%

PTFE 2



AV Prosthesis 50%

Auto 1

PTFE 1

AV Access Creation

Time to start hemodialysis

GFR decline rate

Duration of vascular access maturation
6-12 week ± primary failure?

Complications of vascular access

AV Access Creation

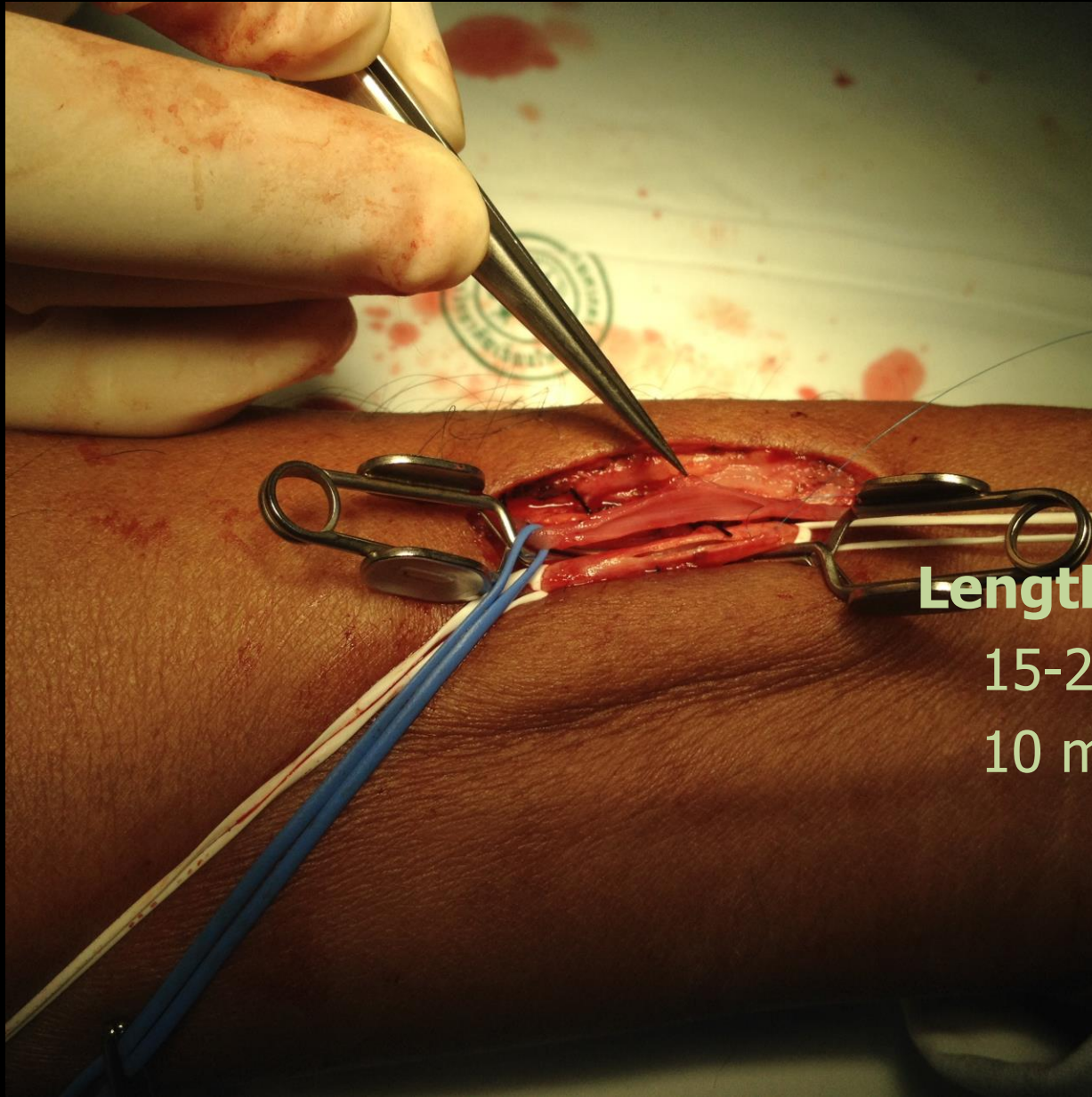
KDOQI 2006	ESVS 2018
<ul style="list-style-type: none">- Fistula placed at least 6 mo before anticipated HD- Graft 3 mo- PD 2 wk	Permanent VA should be created 3-6 mo before expected start of HD
Catheter reserve to only when other options not available (In summary : can be used in severe comorbid patient & very elderly)	Catheter when impossible to create VA or limited life expectancy

AV Access Creation

KDOQI 2006	ESVS 2018
Fistula before graft	Elderly patients may benefit from the use of AVG because high primary autogenous AVF failure rate in these patients
Vein diameter 2.5 Artery diameter 2 mm	RC : vein & artery 2.0 mm Brachial : Vein & artery 3.0 mm AVG : vein 4 mm (elbow)
Cuff or hood graft at outflow produce only marginal increase in patency	Primary patency of ePTFE with expansion at venous end is better than normal end

AV Access Creation

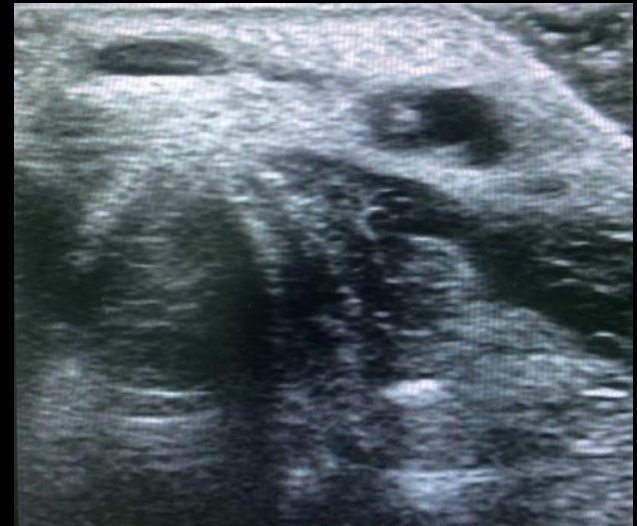
- Broad spectrum ABO with activity against staphylococci is recommended pre-operatively for all VA operation, esp. in DM or prosthetic graft used.
- No conclusive evidence for antiplatelet agent but advisable to give pre-op & continue post op in attempt to reduce VA thrombosis
- **Configuration** : prefer end to side



Length of Anastomosis

15-20 mm (wrist)

10 mm (upper arm)



52 year old male presenting with non-functioning wrist AVF,

BFR 100-150 ml/min

PE: Dilated forearm cephalic v. with poor AVF thrill



52 year old male presenting with non-functioning wrist AVF, BFR 100-150 ml/min

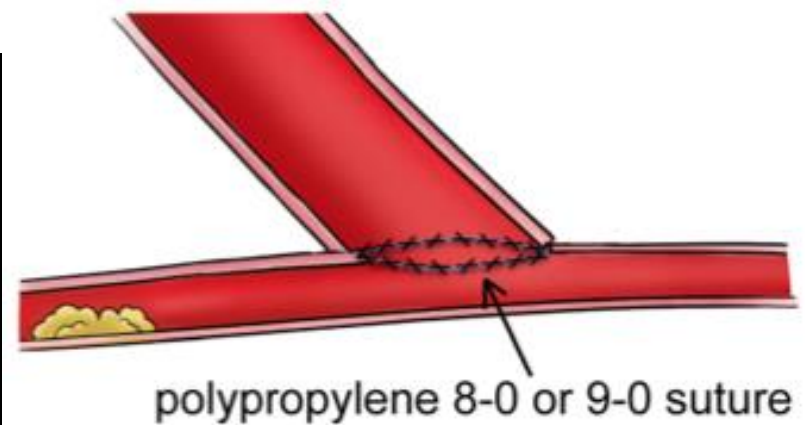
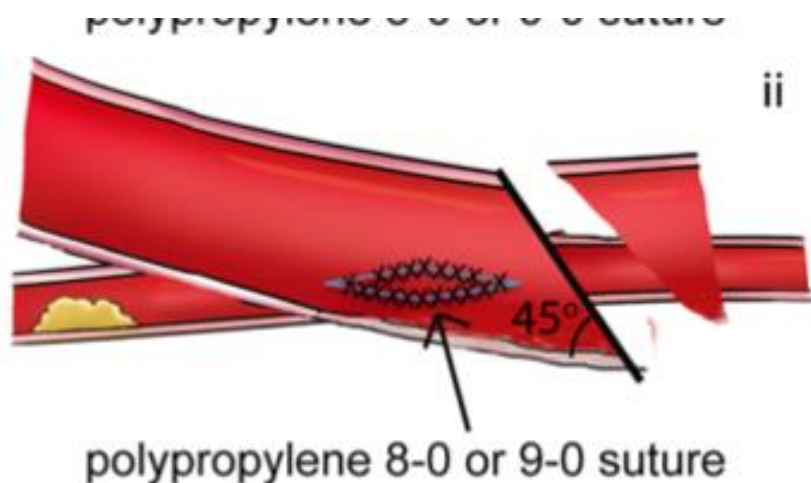
PE: Dilated forearm cephalic v. with poor AVF thrill

RESEARCH ARTICLE

Open Access

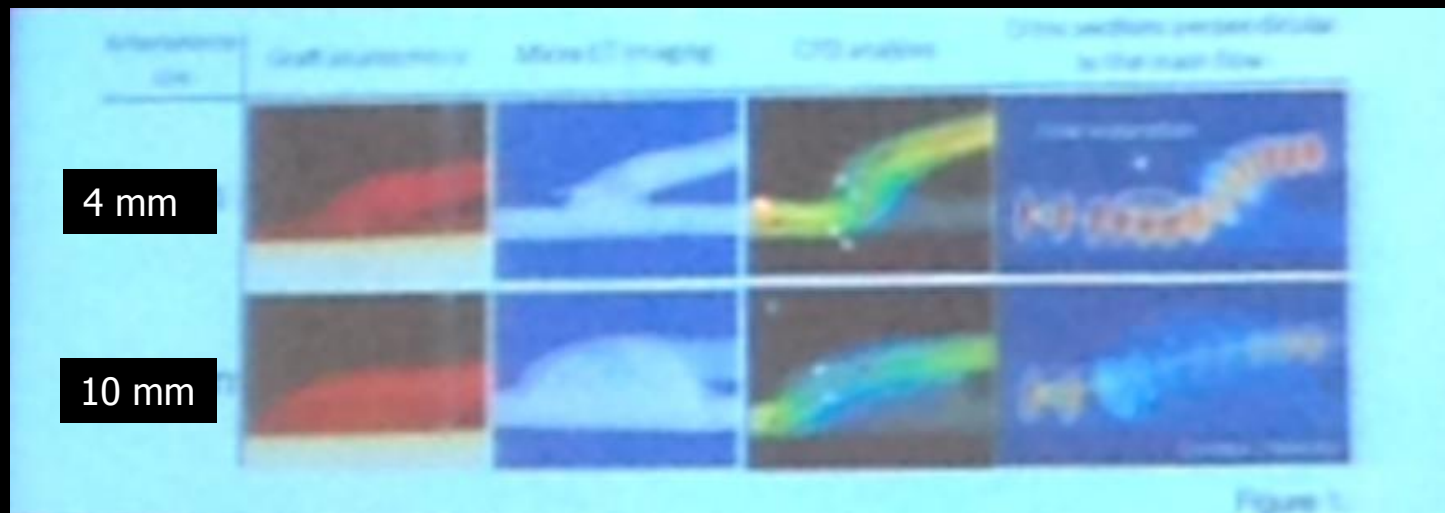
Distal end side-to-side anastomoses of sequential vein graft to small target coronary arteries improve intraoperative graft flow

Haitao Li^{1†}, Baodong Xie^{2†}, Chengxiong Gu¹, Mingxin Gao¹, Fan Zhang¹, Jiayang Wang¹, Longsheng Dai¹ and Yang Yu^{1*}



Longer coronary anastomosis provides better hemodynamic in CABG

Hiroyuki Tsukui Tokyo women's medical university, Tokyo, Japan



Anastomosis is more uniform in 10 mm model.

4 mm model : Sudden change of the blood flow direction at the junction and a flow separation causing congestion and risk of thrombosis

10 mm model : Provides a more streamlined blood flow and faster to recovery to normal in distal coronary artery.

Anastomosis is more uniform in 10 mm model

Maturation & Cannulation

KDOQI 2006	ESVS 2018
AVG cannulate at least 2 wk after create (but recommend at 3-6wk)	AVG cannulate 1-2 wk after create (Self sealing 1-2 days) <i>* In recommendation box : 2-4 wk*</i>
Rule of 6s for fistula maturity	Mature = appropriate to cannulation with minimal complication & adequate flow <ul style="list-style-type: none">- Cannulate successfully with 2 needles,- At least 6 HD session- During 30 day period,- Blood flow through HD 350ml/min
AVF cannulate 4 wk after creation	AVF cannulate 2-4 wk after creation may be considered in selected case

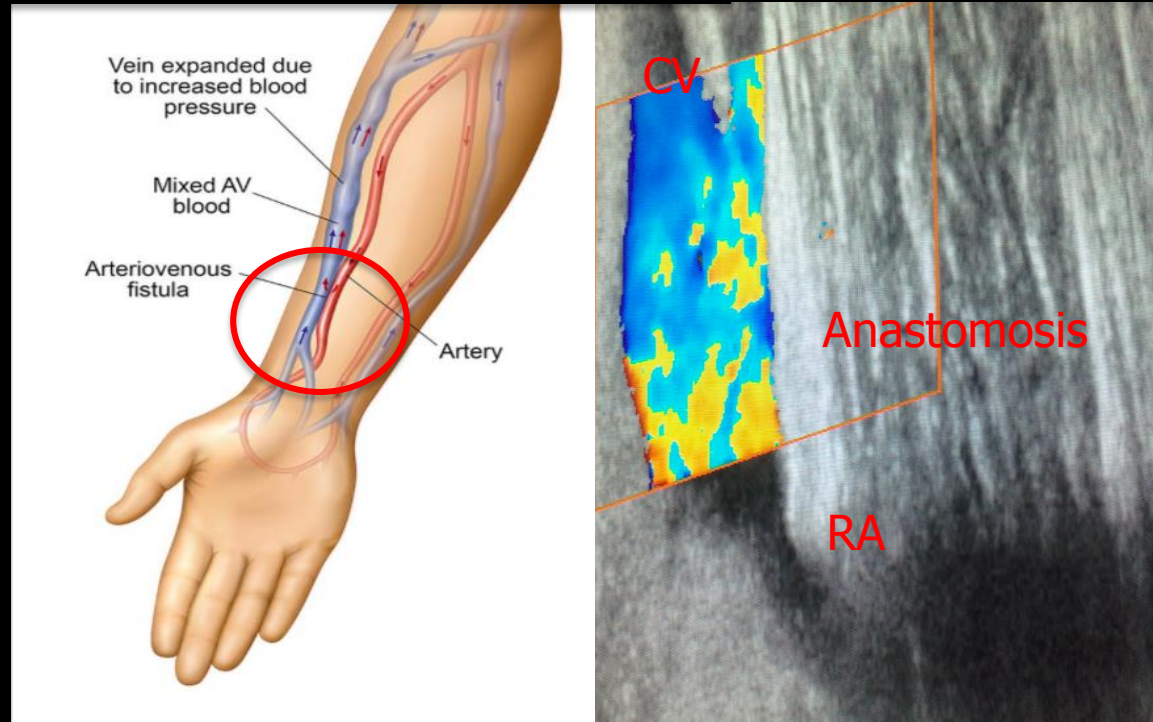
Arterial Physiology

: Vascular adaptation to high flow (AV access surgery)

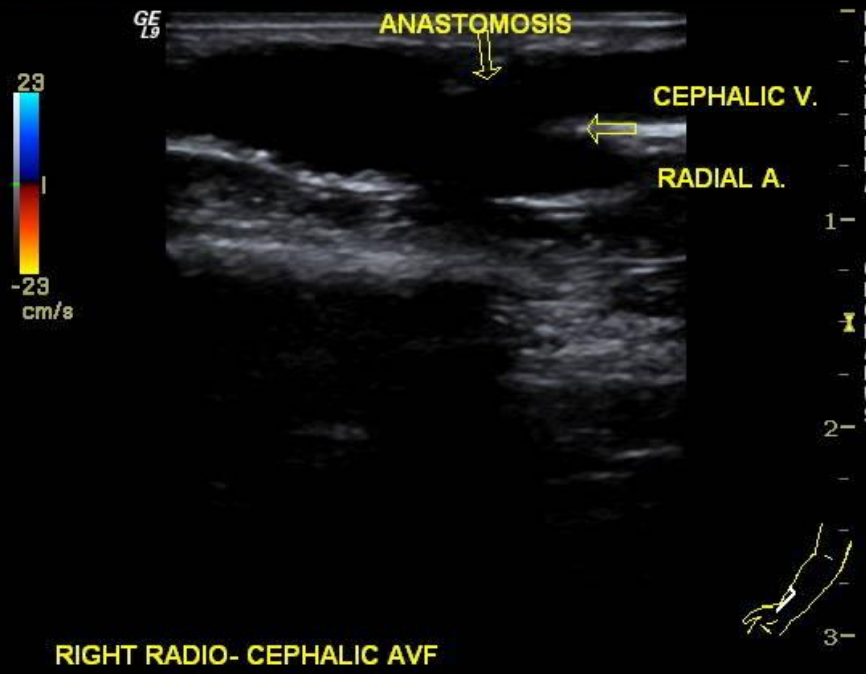
Blood flow rate in RA before and immediate after AVF surgery was increased from 20 ml/min to 200 ml/min.

In well-developed fistula, blood flow rate reach values of 600-1200 ml/min.

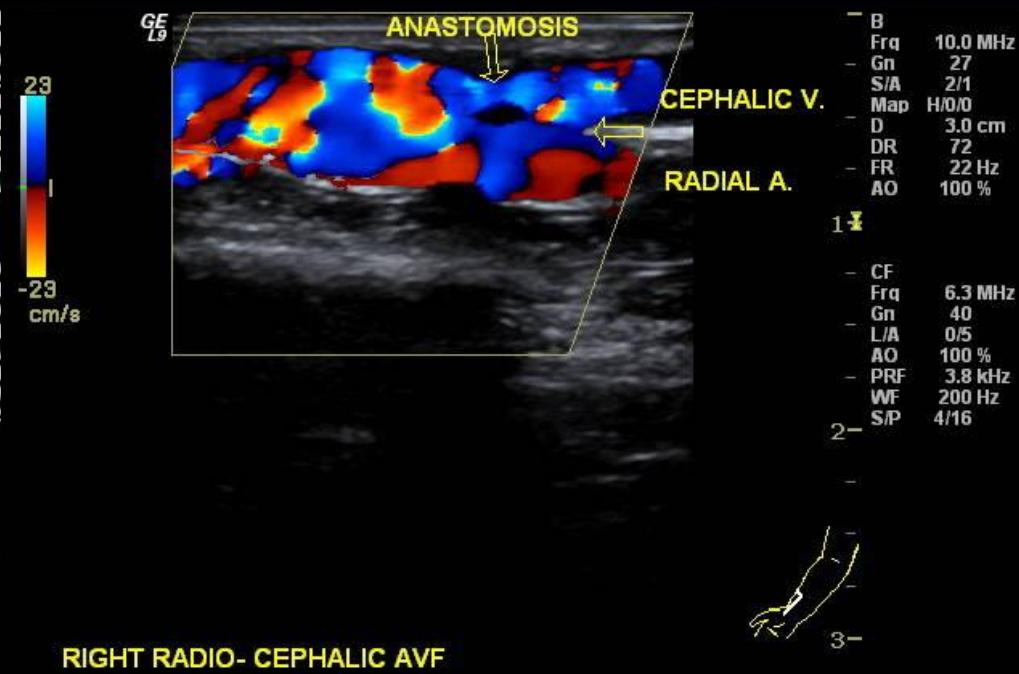
J Am Soc Nephrol 2003



Duplex Ultrasound : Graft Surveillance



RIGHT RADIO- CEPHALIC AVF



RIGHT RADIO- CEPHALIC AVF

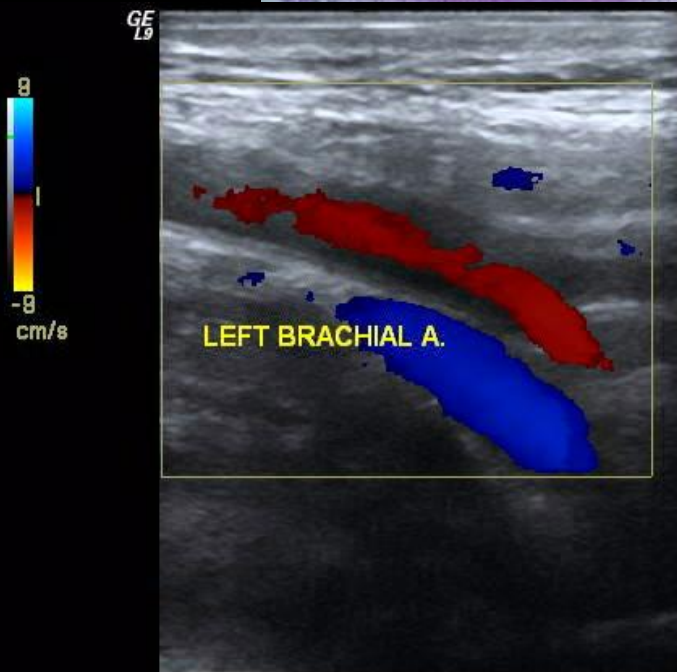
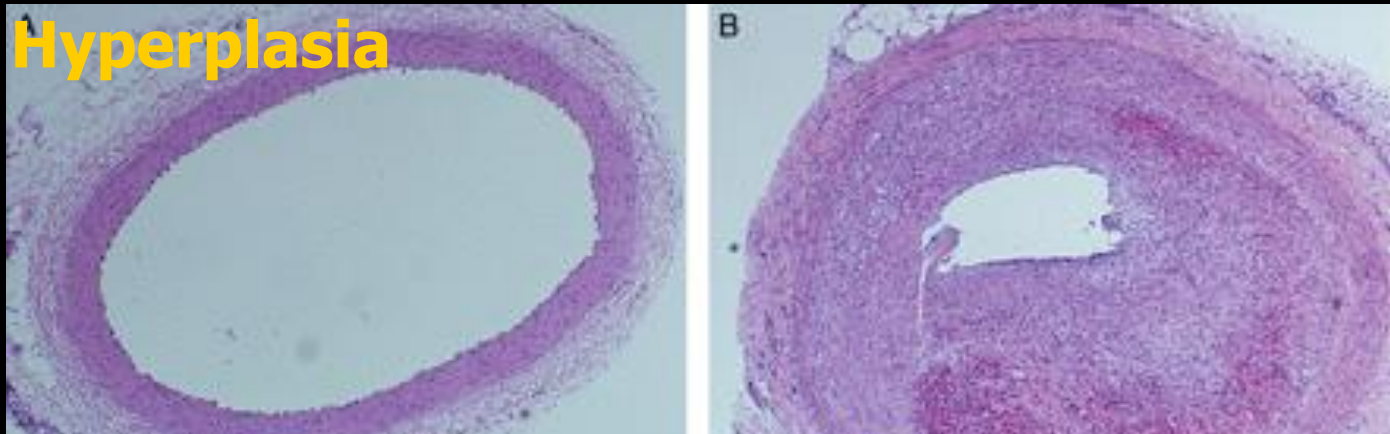
AV Access Monitoring

KDOQI 2006	ESVS 2018
Physical examination at least monthly	Regular physical examination (esp. in HD unit)
<ul style="list-style-type: none">- It is not clear that access flow measurements performed at a monthly frequency provide sufficient data stability to make decision- Performed monthly in AVF	Surveillance with flow measurement in AVF & AVG q 3 mo

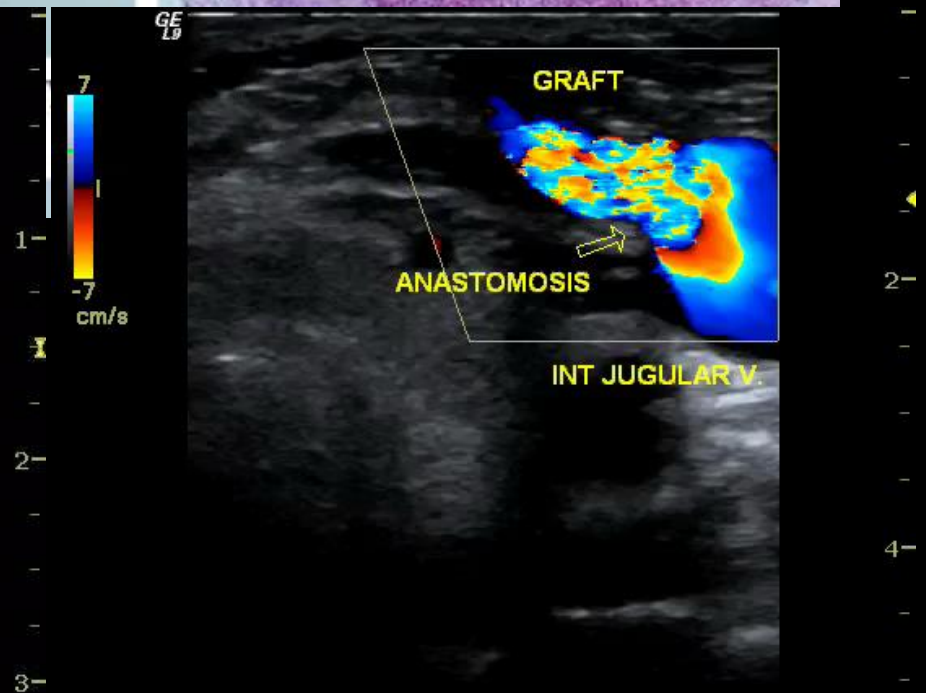
AV Access Monitoring

KDOQI 2006	ESVS 2018
<ul style="list-style-type: none">- Direct measurement of static pressure ration q 2 wk- Dynamic pressure with each dialysis treatment	Trend analysis (Not specify time) & in combine with Qa
<p>Evaluation when ;</p> <ul style="list-style-type: none">- AVF Qa flow <400-500 ml/min- AVG Qa flow < 600 ml/min	<p>Evaluation when;</p> <ul style="list-style-type: none">- AVF stenosis & flow Qa < 500 ml/min- AVG Qa <600ml/min (flow decrease >33%)

Intimal Hyperplasia



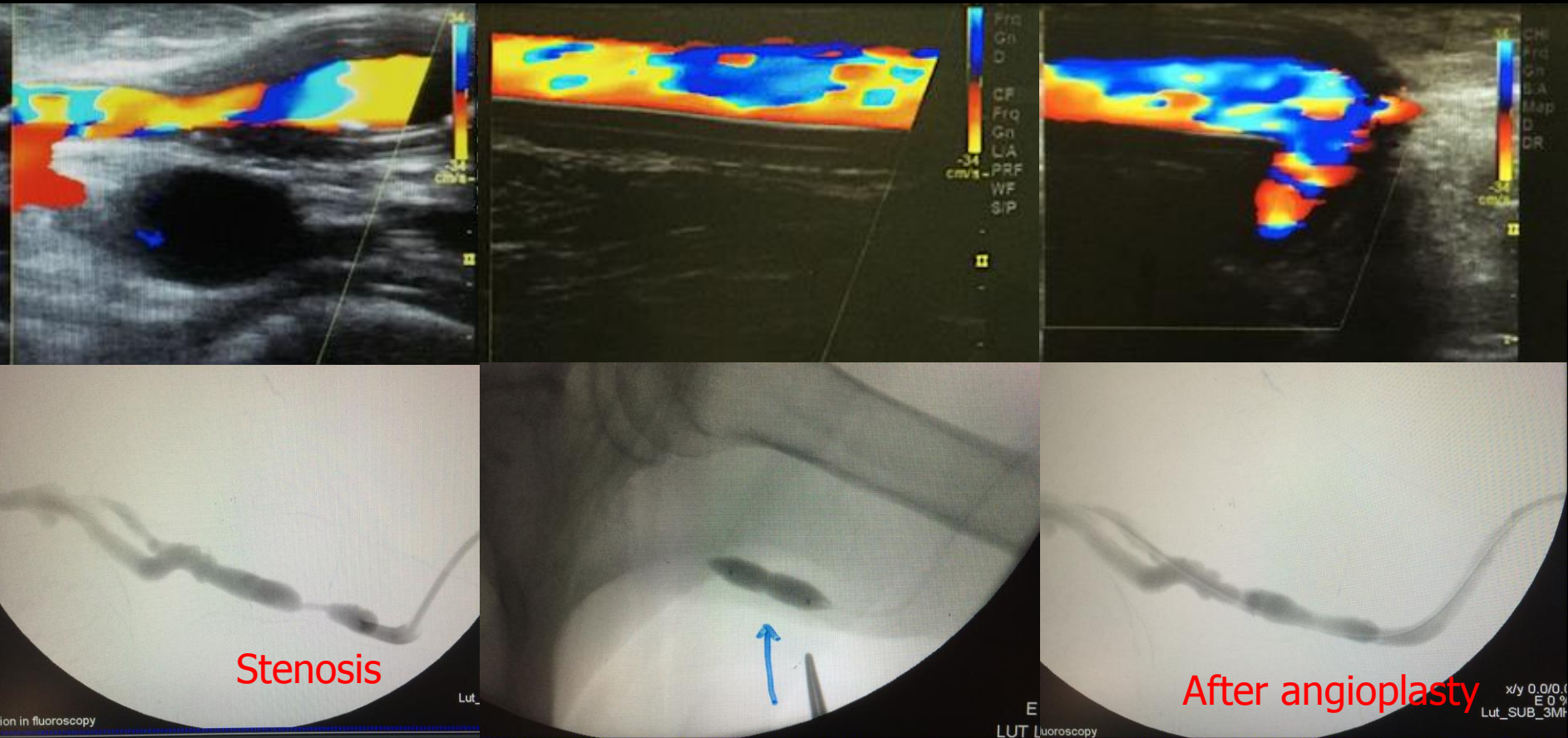
Physiological blood flow



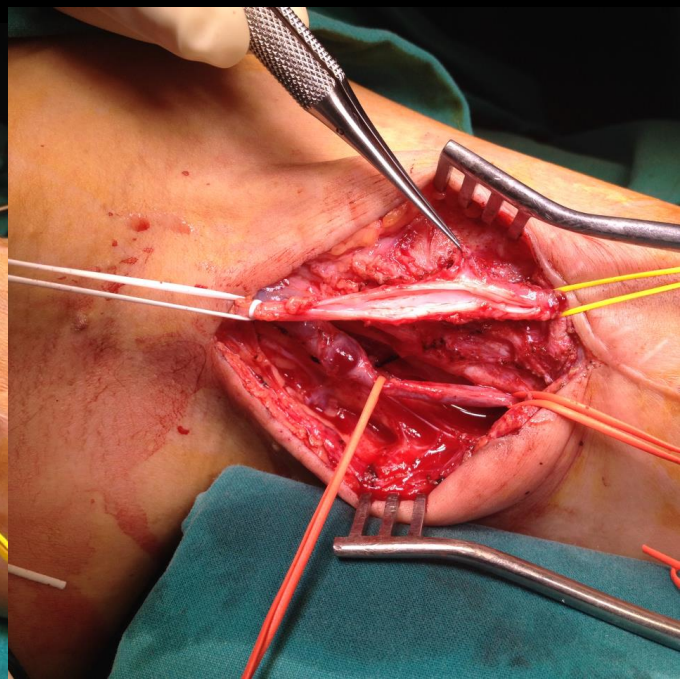
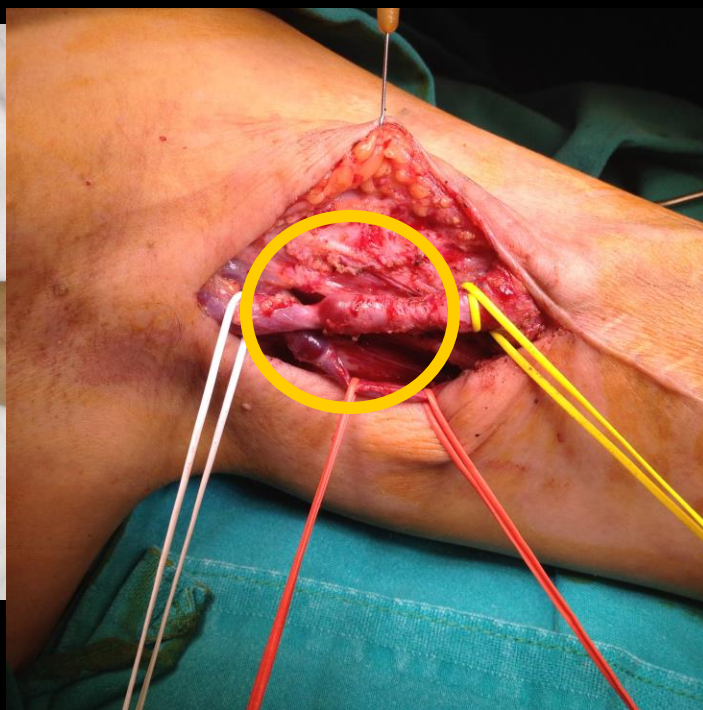
Blood flow in artificial conduit (Turbulent)

AV Access Intervention

KDOQI 2006	ESVS 2018
<p>Pre-emptive PTA in 50% stenosis + clinical suggest significant</p>	<p>Only stenosis that have haemodynamic effect ($\geq 70\%$ ↓ lumen area) & asso. with ↓ flow, ↑ VP or abnormal physical exam. should be Rx</p>
<ul style="list-style-type: none"> - Venous segment static pressure (mean pressure) ration > 0.5 in fistula & graft - Arterial segment static pressure ratio > 0.75 in graft 	<p>Venous pressure adjusted for MAP >0.50 (or derived static venous pressure adjusted for MAP >0.55) is not reliable indicator of stenosis and intervention based on this finding is not recommended.</p>
<p>Venous outflow stenosis PTA or surgical repair</p>	<p>Venous outflow stenosis</p> <ul style="list-style-type: none"> - Short lesion (<2cm) : PTA - Long lesion : controversial

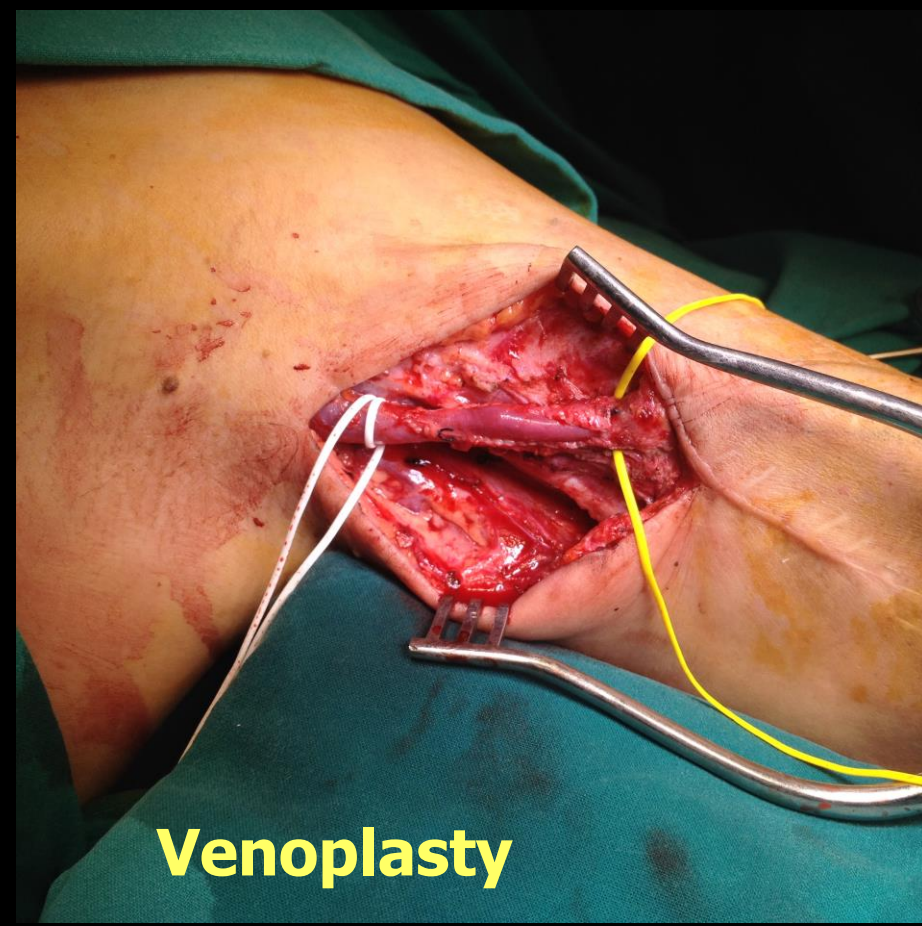
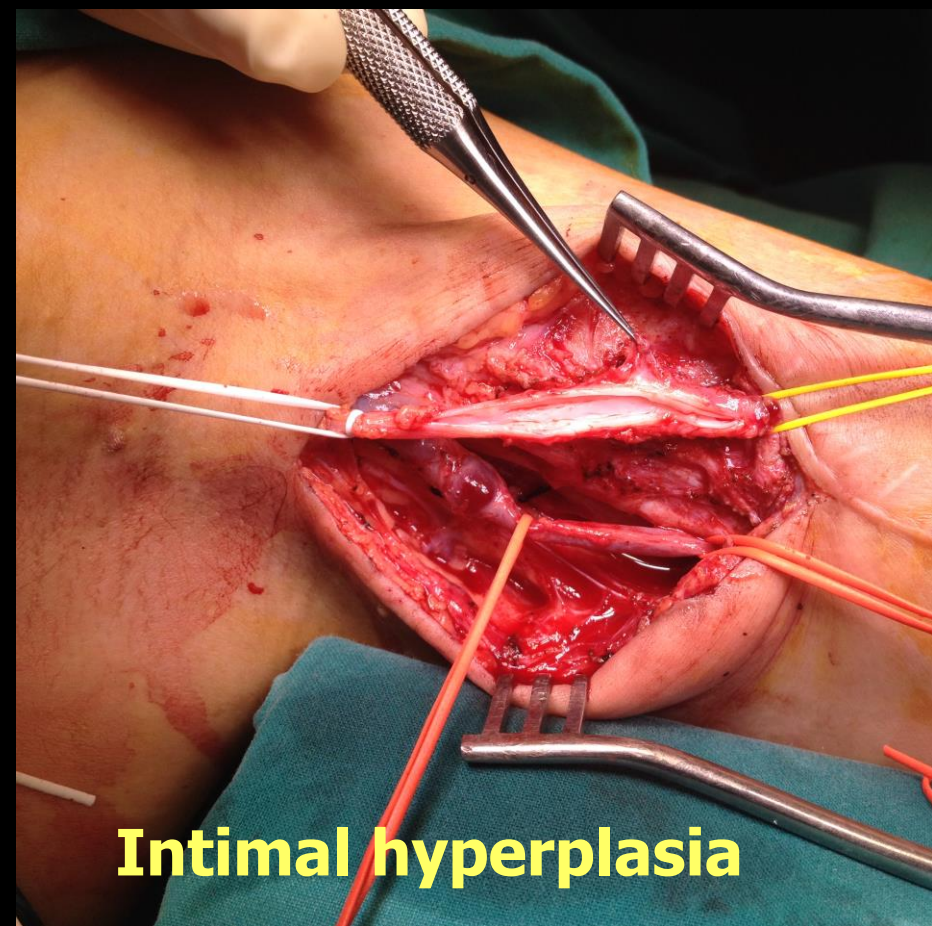


72 year old female, ESRD, S/P Upper arm loop AVG for 5 years
 The patient presented with non-functioning upper arm AVG,
 Puncture sites bleeding, VP > 200 mmHg PE: High pitch bruit at distal AVG



68 year old female presenting with non-functioning upper arm AVF

PE: Dilated upper arm cephalic v. with pulsation (no AVF thrill)



AV Access Intervention

- **Non-used vascular access**
 - Vascular access closure should be considered in patient with refractory heart failure after transplantation (CHF, VA complications, cosmetic concern)
- **Tertiary vascular access** should be considered in sequence;
 - **Group one** : Upper limb, chest wall and translocated autogenous vein from the lower limb
 - **Group two** : Lower limb
 - **Group three** : VA spanning the diaphragm, and other unusual VA procedures including upper and lower limb arterio-arterial loops.

Thank you for your attention 😊