Vascular access for difficulty situations and the role of the femoral vein transposition

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Disclosure: None to declare

Difficulty situation

- Stroke with hemiplegia
- Mastectomy
- Obese (BMI>30)
- Underweight (BMI<18)
- Shortage of venous real estate

AVF in patient with hemiplegia

Vascular access in a hemiplegic deformed arm

Omar MH. Nephrol dial transplant 2005;20:1989-1990

- Case report: 41 years male
- Spastic hemiplegia with flexion deformity due to traumatic spinal cord injury
- Basilic vein diameter-3.0mm, artery-2.5mm
- Brachiobasilic fistula is still dialyzing-successful up to 18 months

Limb immobilization and intimal hyperplasia-an echo-Doppler study in man

- 10 patients with C4 downward for 9-216 month
- Significant reduction of the width of the lumen of the arteries and veins and a reduced arterial blood flow
- The greater echogenicity and the abnormal Doppler waves of the affected vessels suggest an increased thickness and a hardened wall

Grand NR surg radiol anat 1999;21(1):23-8

Post mastectomy

- Can we perform an ipsilateral AVF?
- Will DXT affect our decision?

Ultrasonographic changes in axillary vein of patients with lymphedema after mastectony

- 80 patients with mastectomy and DXT
- 2 groups: with or without lymphedema

Lymphedema	Axillary vein thickening
+ve	55%
-ve	17.5%

Abreu juniors rev col bras cir 2015;42(2):81-92

Lymphedema post mastectomy

Rose DF ann surg 1999;230:194-201

200 patients after mastectomy with axillary dissection

Mean difference in arm size (cm): operated *versus* nonoperated side

Midbiceps	0.425 ± 1.4 (p<0.001*)
Antecubital crease	0.315 ± 1.3 (p<0.005*)
Midforearm	0.355 ± 1.5 (p<0.005*)
Wrist	0.055 ± 0.8 (p=n.S*)

*Paired t test.

Obesity and access

Nephrol Dial Transplant (2008) 23: 1318–1322
doi: 10.1093/ndt/gfm739
Advance Access publication 23 October 2007

Original Article

NDT
Nephrology Dialysis Transplantation

Obesity is not an obstacle for successful autogenous arteriovenous fistula creation in haemodialysis

Waclaw Weyde[1], Magdalena Krajewska[1], Waldemar Letachowicz[1], Tomasz Porazko[1], Ewa Wątorek[1], Mariusz Kusztal[1], Miroslaw Banasik[1], Tomasz Gołębiowski[1], Hanna Bartosik[1], Katarzyna Madziarska[1], Dariusz Janczak[2] and Marian Klinger[1]

[1]Department of Nephrology and Transplantation Medicine and [2]Department of Vascular, General and Transplantation Surgery, Wroclaw Medical University, Wroclaw, Poland

Abstract

Background. Obesity, which is often associated with diabetes, is increasingly encountered in the haemodialysed population, and this may produce difficulty in autogenous arteriovenous fistula creation. Prosthetic angioaccess or catheters, when used in place of autogenous fistulas, increase thrombotic and infectious complications in these already challenged patients.

Methods. This prospective study was undertaken to assess the feasibility of autogenous arteriovenous fistula creation in 71 obese patients (BMI 34.6 ± 7.8). We performed a two-stage procedure, in which radio-cephalic fistula formation was followed by subcutaneous transposition of the venous component for safe and easy puncture.

Results. Fistulas suitable for puncture, having blood flows

failure due to advanced arteriosclerosis and reduced accessibility of forearm vessels because of excessive fat tissue. Moreover, puncture of the deeply located fistula becomes difficult. Obese patients, as well as diabetics, females, elderly patients above 65 years and patients with vascular anomalies, usually require the creation of other than autogenous arteriovenous fistula access for haemodialysis [1]. PTFE grafts or central venous catheters, recommended by some authors, may result in additional morbidity and mortality in these patients.

The present study examined the feasibility of successful autogenous arteriovenous fistula creation in obese patients, performed in a two-stage procedure, in which fistula formation was followed by subcutaneous transposition of the venous component for safe and easy puncture.

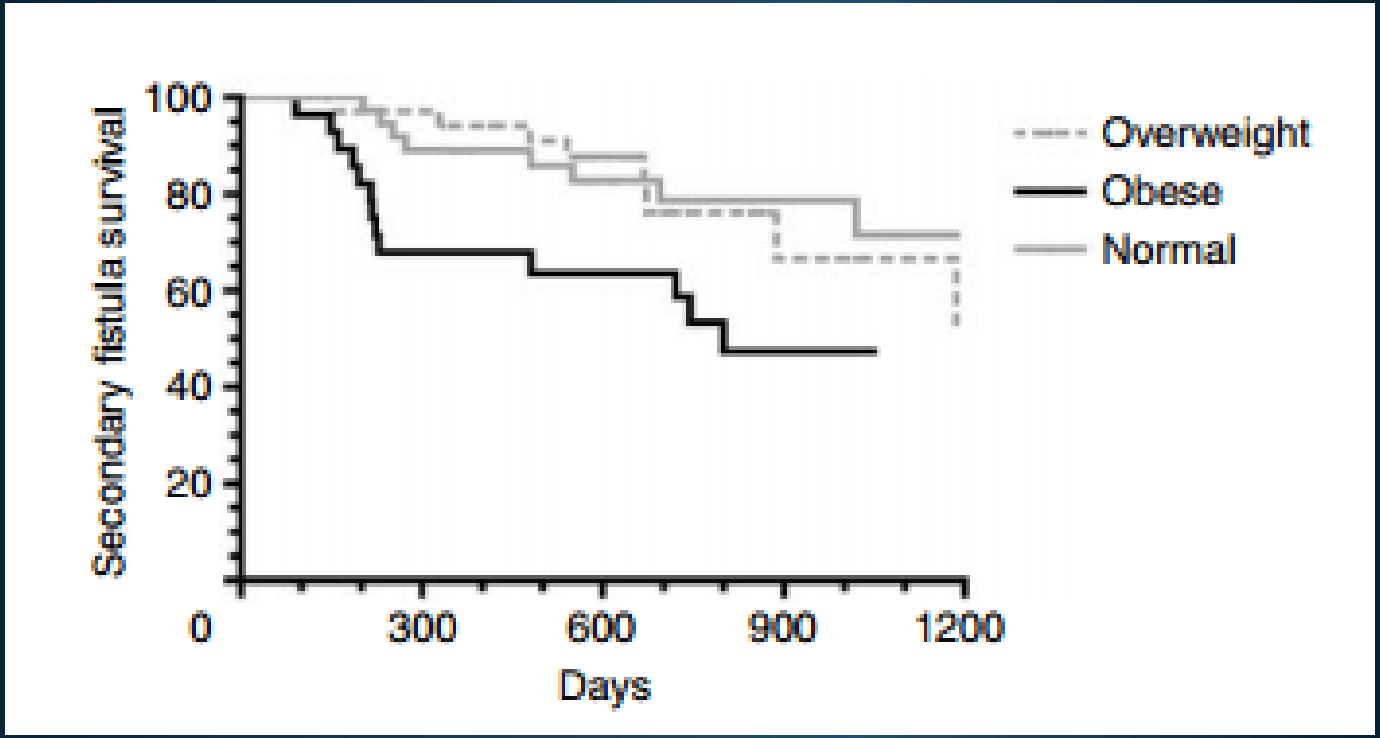
Obese versus non-obese- Kats et al

initial fistula outcomes

	Obese	Non-obese
Total number	54	129
Successful use for dialysis (≥1 month)	29 (54%)	76 (59%)
Primary failure	25 (46%)	53 (41%)
Technical failure	5 (9.3%)	7 (5.4%)
Early thrombosis	14 (25.9%)	20 (15.5%)
Failure to mature	6 (11.1%)	25 (19.4%)
Steal	0	1 (0.8%)

No difference in outcomes between groups,

Secondary fistula survival-Kats et al



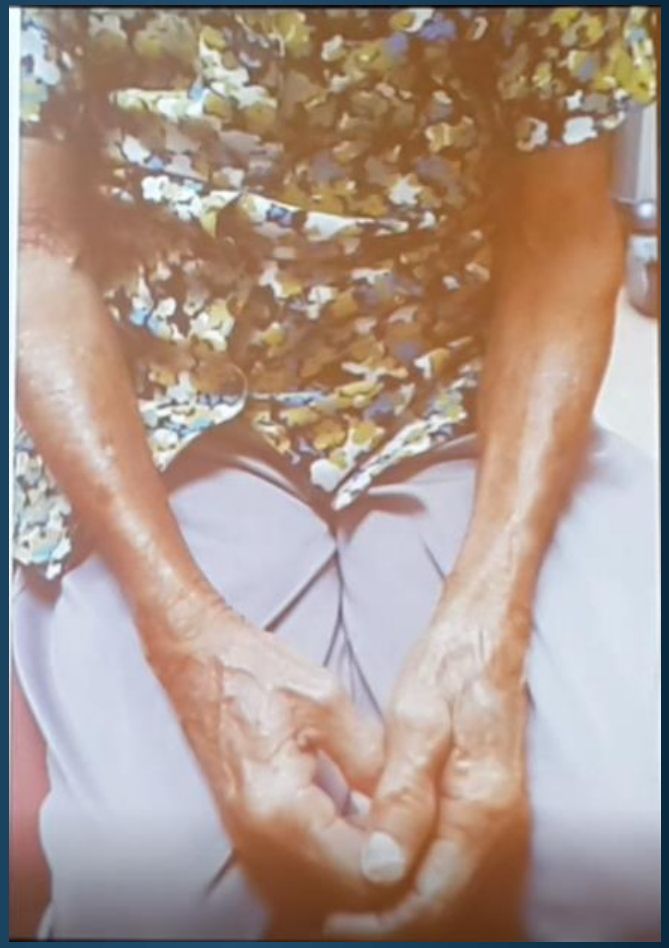
Why is secondary failure high in obese versus non-obese?

- Deeper vessels- difficult cannulation
- Vein transposition
- Hypercoagulable
- Intimal hyperplasia

Thin and access

BMI<18

Veins < 1.5 mm



Outcome with AVF in a pediatric population

Wartman SM et al. J vasc surg 2014;60 (1):170-4

- Retrospective
- 0-19 year-old (mean 14)
- 101 AVF
- Mean weight 51 kg

Year/patency	Primary	Secondary
2	83%	92%
4	65%	83%

Summary

	Issues	Recommendation on ipsilateral AVF
Stroke	Atrophied vessels	Precaution
Mastectomy	Lymphedema/radiation	No
Obese	Deep veins	Yes (forearm)
Underweight	deep veins	Yes

Difficulty situation

- Stroke with hemiplegia
- Mastectomy
- Obese (BMI>30)
- Underweight (BMI<18)
- Shortage of venous real estate

NKF KDOQI

- NKF-KDOQI guideline suggests native fistulae > graft but there is little consensus about the most appropriate access options in patients with repeated access failure and unsuitable vein.

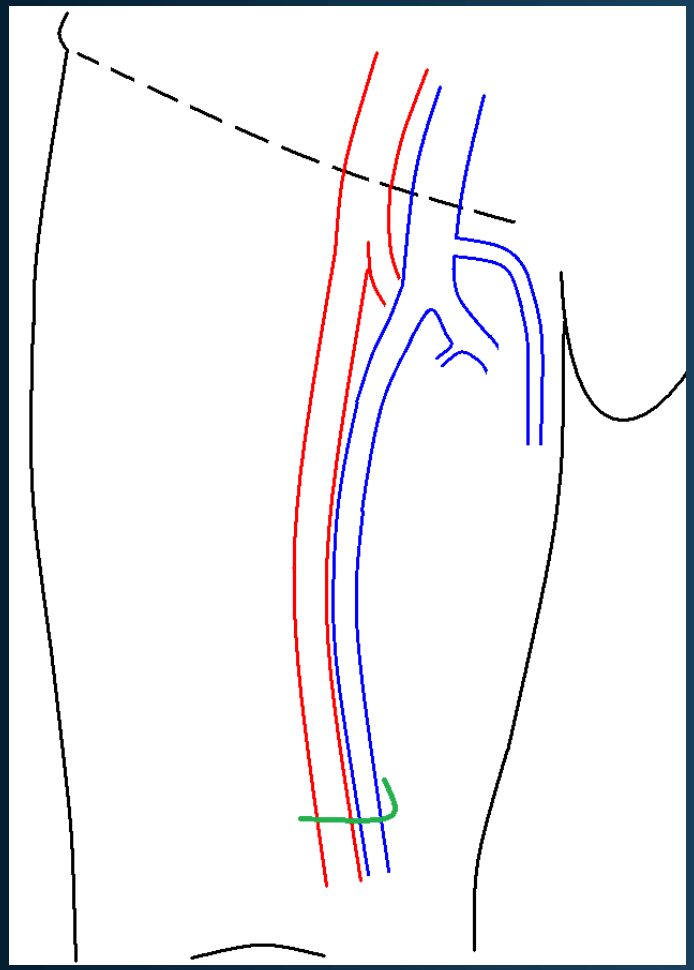
- Femoral vein transposition (tFV) was offered for our patients with bilateral central vein occlusion and/or lack of suitable arm vein.

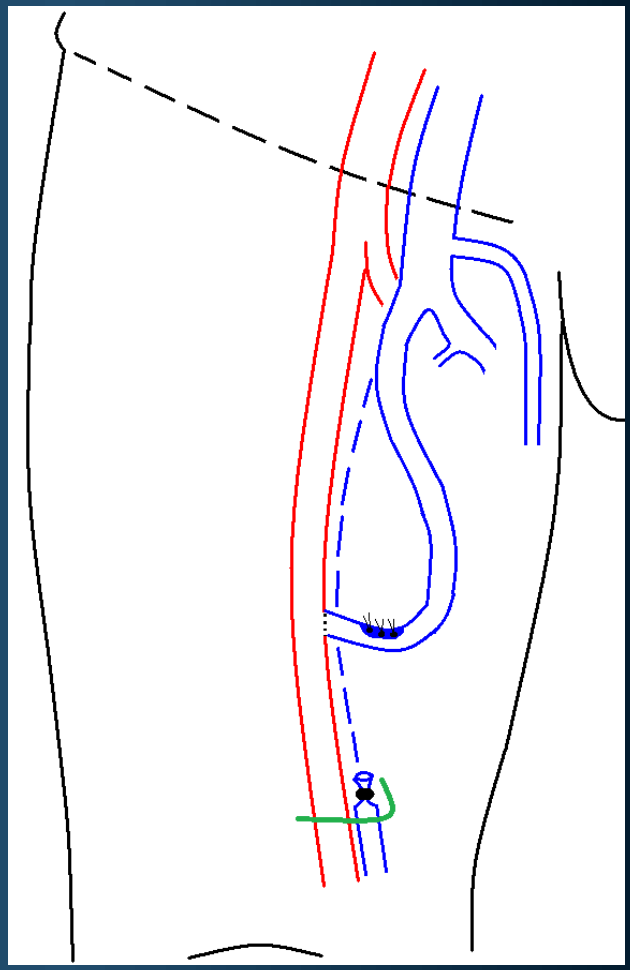
Preoperation evaluation

- Clinical and duplex ultrasound:
  - Good pedal pulse and ABI> 0.9.
  - No DVT or chronic venous disease (C2-C6).
  - The iliac vein must be checked for any stenosis.

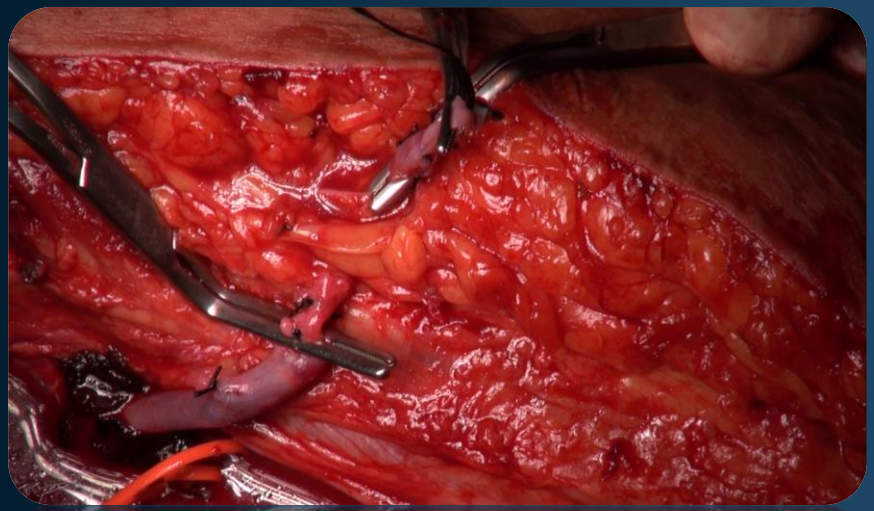
The operation was performed under spinal block

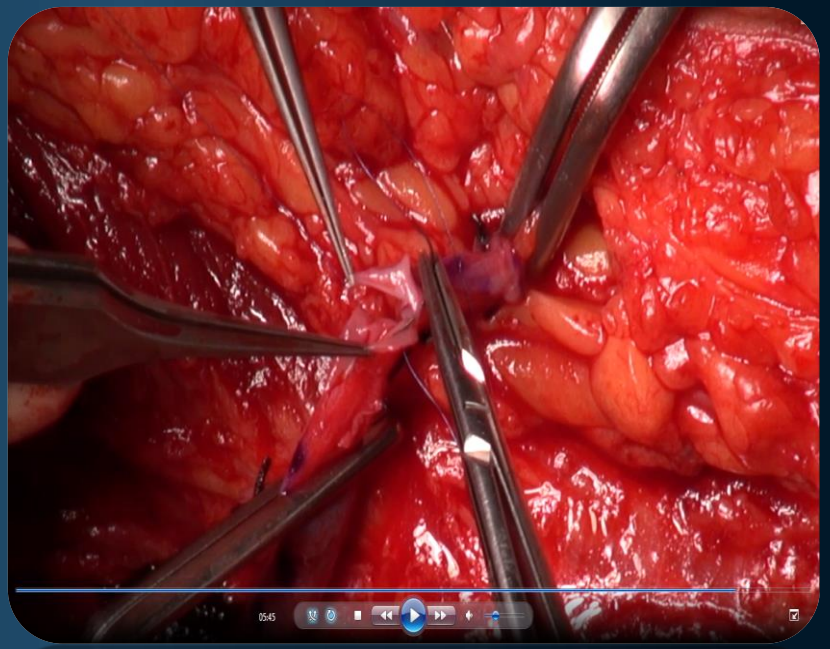
Transposed FV AVF





Composite saphenous vein and FV access is good for fat leg.

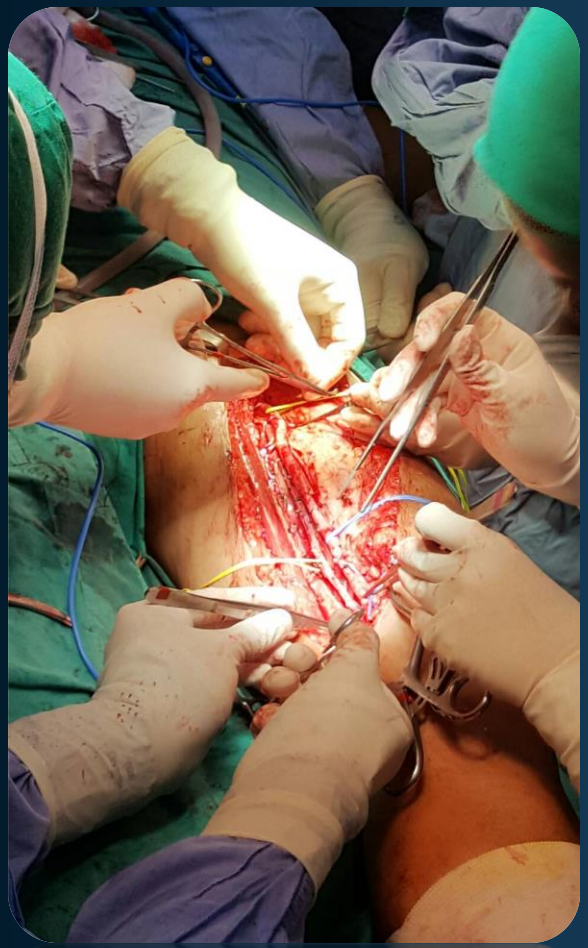


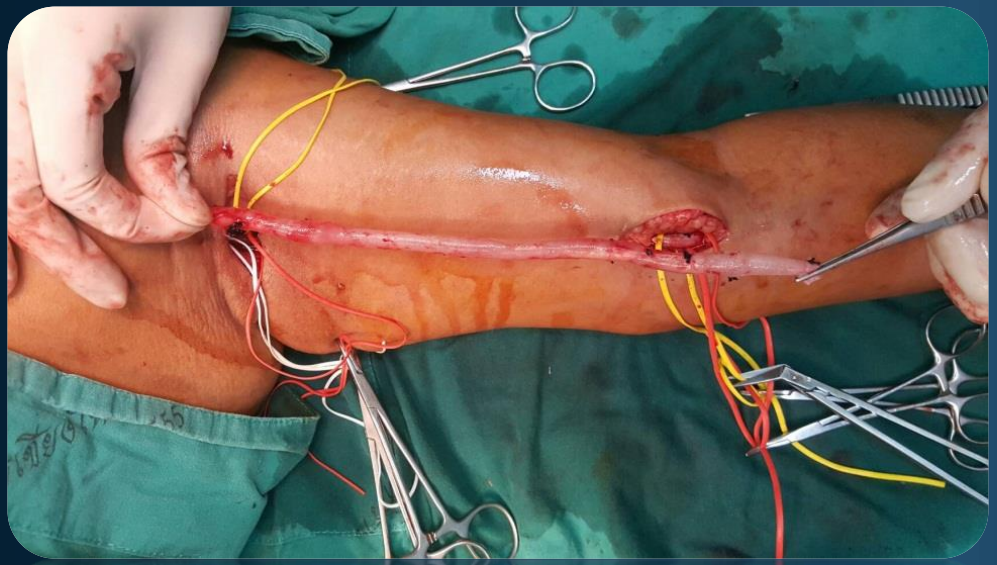


Two advantages

- **Increase overall length of the access**
- **Small diameter of saphenous vein limit the quantity of ischemic complication**

tFV for upper extremity





Lessens learned

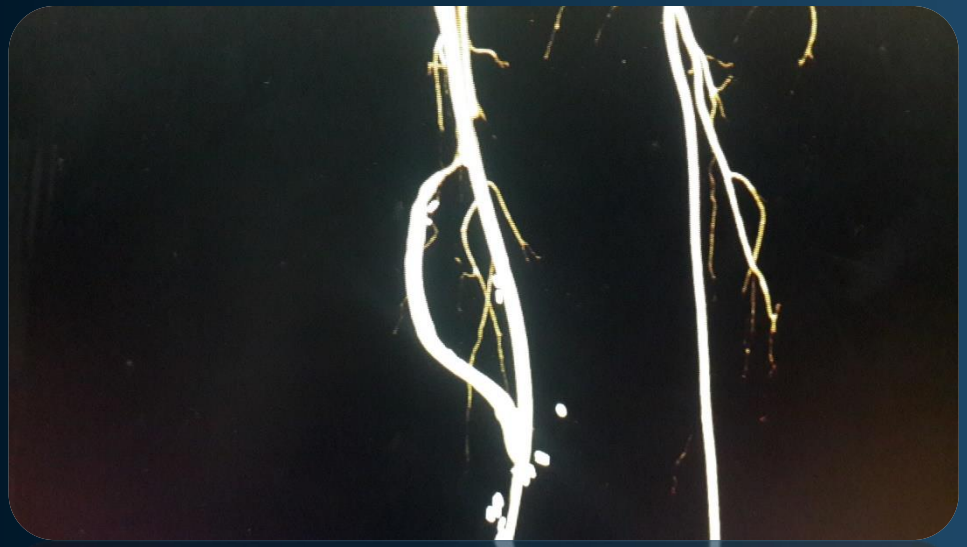
Patients with tFV AVF in the thigh in our center were reviewed.

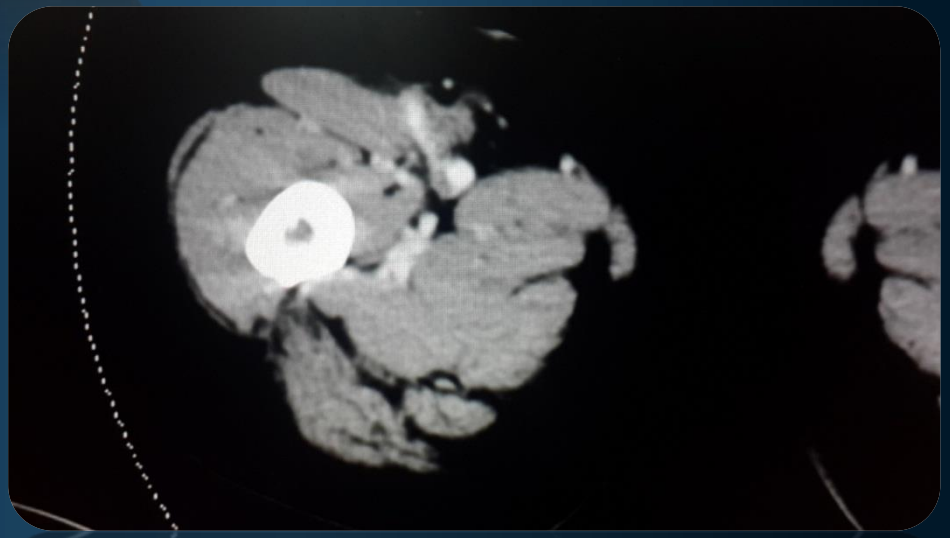
- 12 patients, the median number of prior access procedure was 3. Median time for beginning hemodialysis 6 weeks.
- Perioperative outcome: No death, no heart failure, no compartment syndrome, no steal syndrome and no DVT- no CVI (C4-6) except one case with massive edema and one case with minor wound problem.

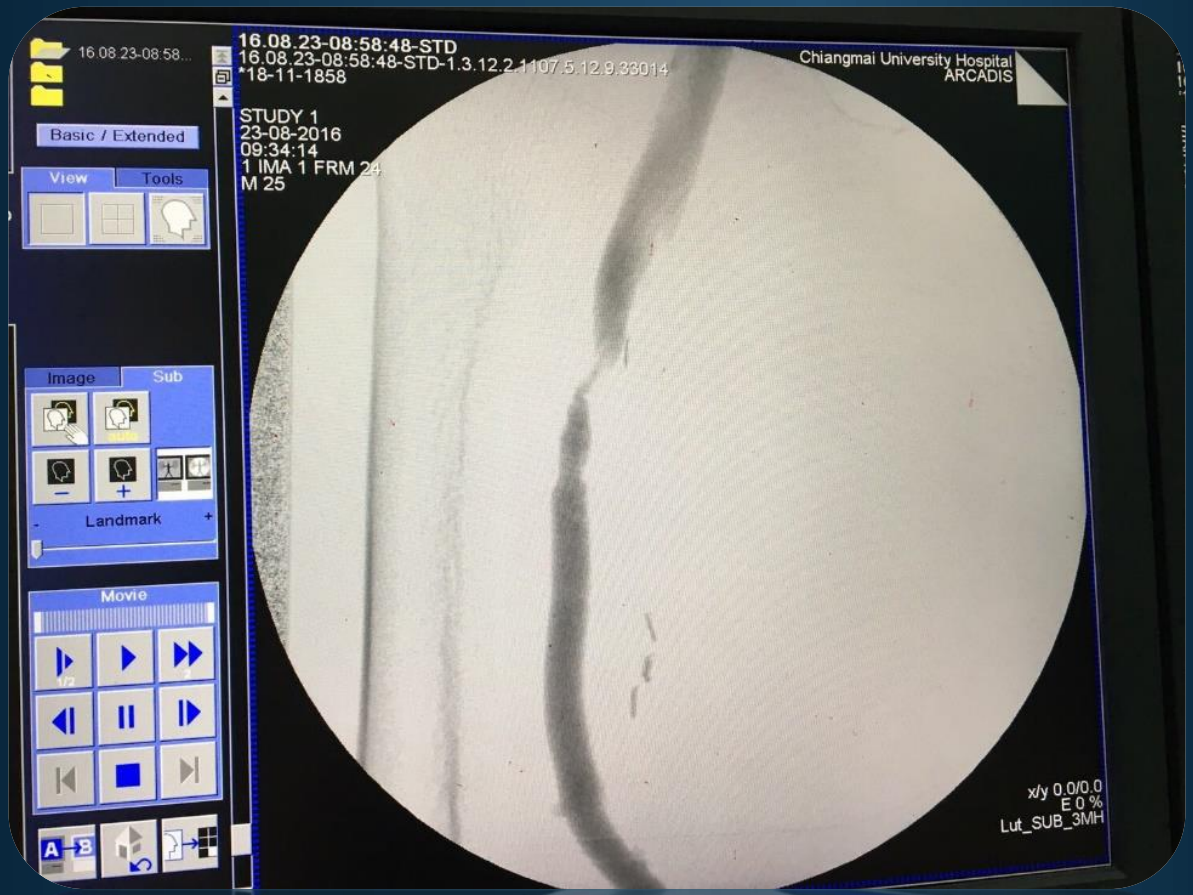
No	Sex/age	Number of previous AVF/Hx of bilateral CVS stenosis	EBL (ml)	Time of operation (Hr)	Post-op day in hospital (days)	Time from the beginning of HD to last use (Mo)	Reoperation
1	M/62	2/Y	120	3	3	7	N
2	M/63	3/Y	200	2..4	6	7	N
3	F/48	3/Y	50	2.10	6	5	Yes entrapment of muscle
4	F/38	5/Y	50	3.2	6	4	N
5	M/62	4/Y	40	2.1	1	36	Yes AVF stenosis
6	F/35	0 (SLE)/N	100	4 0	6	16	N
7	M/62	4/Y	50	3.25	6	2	N (small wound dehiscence)
8	M/28	2/Y	100	3.30	5	55	N
9	M/31	2/Y	50	4.05	2	6	N
10	M/24	6/Y	200	3.0	3	0	Ligation due to severe leg edema (iliac vein occlusion)
11	F/58	3/Y	200	3.0	3	36	Ligation (IVC occlusion)
12	M/60	2/Y	200	3.5	2	15	N

EBL= estimate blood loss, FU=follow up, M=male,, F=female, M=Male, cath=previous catherrisation
Y=yes, N=No, Hx=history, CVS= central vein of the upper extremity

Muscle entrapment



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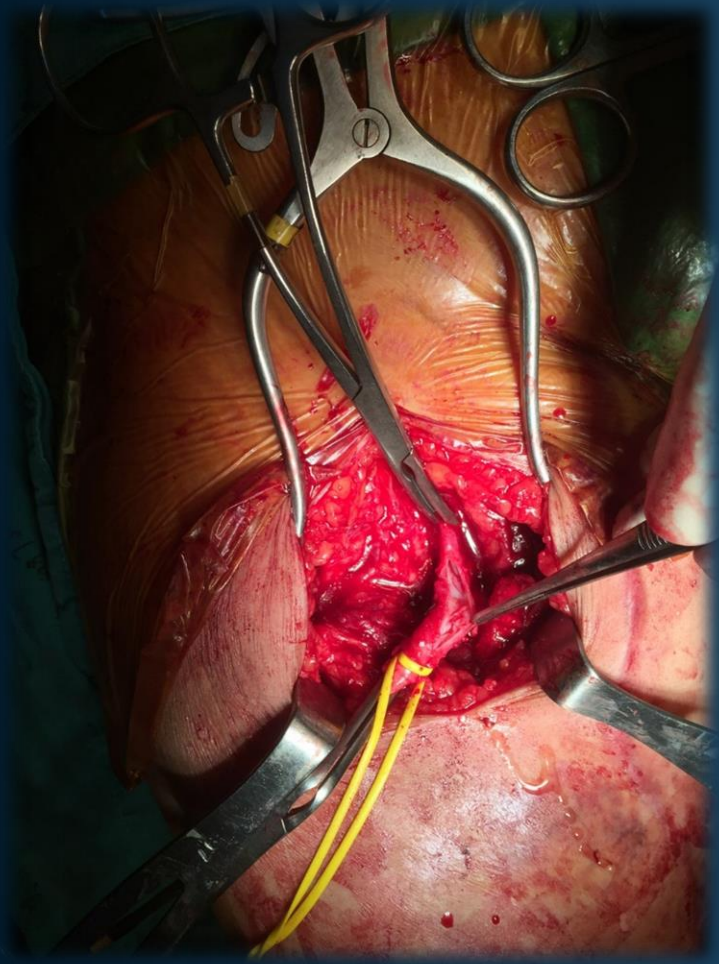

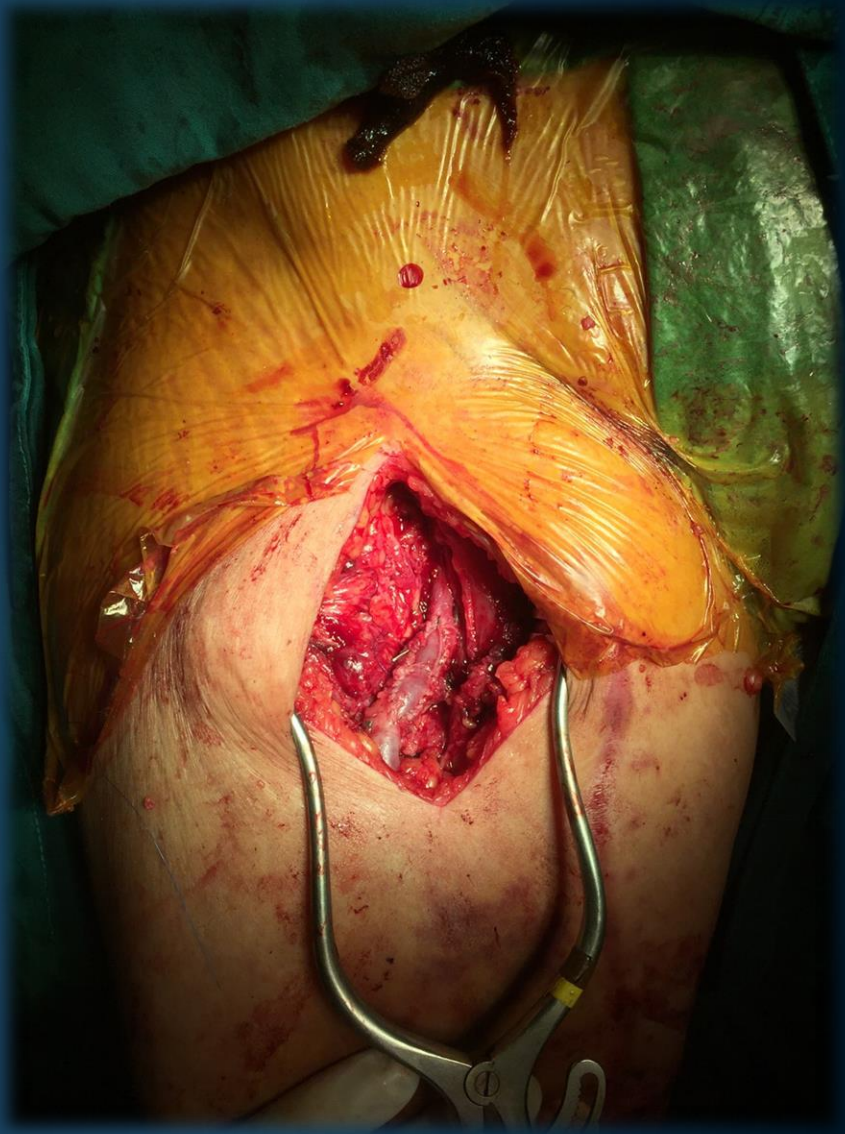

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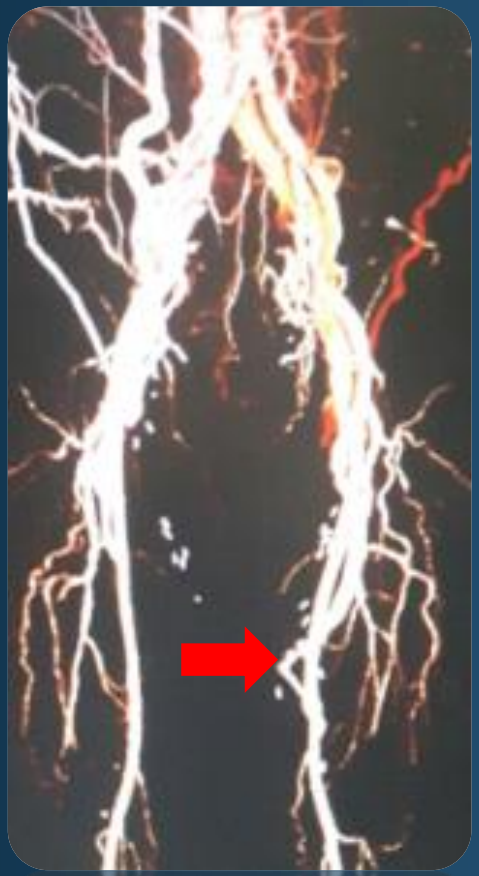
AVF stenosis in a patient with composite saphenous vein and FV: at GSV part rx: jump graft from CFV was performed.



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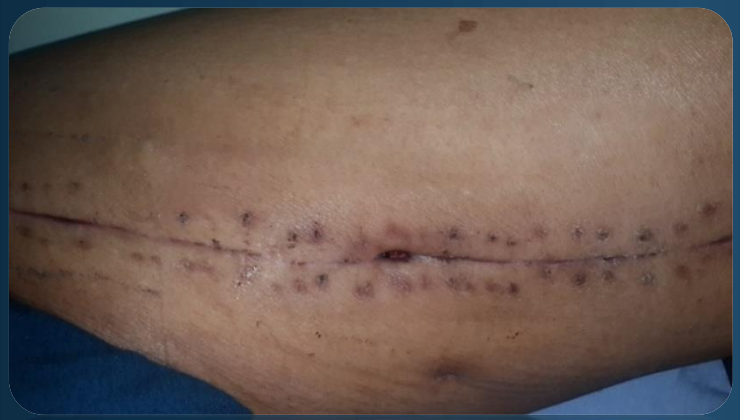
Minor wound dehiscence



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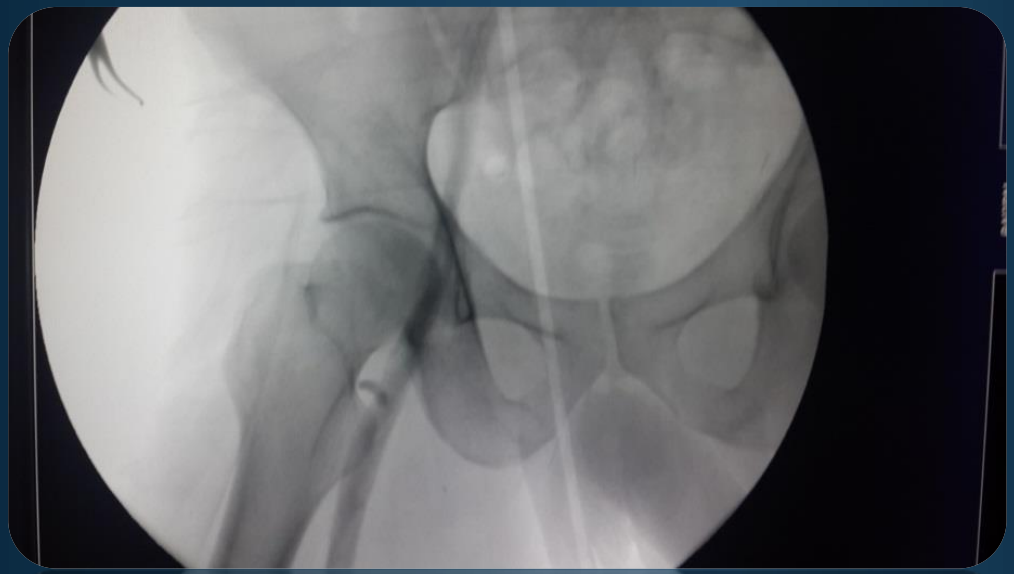
We learned intraoperative venogram is needed in any case with history of femoral catherisation even though duplex shows respiratory phasicity



Conclusion
the use of FV access

- FV is an excellent vessel to use in HD. The diameter is 6-8 mm for an adult, and the wall is thick.
- Low risk of infection, reasonable long term patency
- It should be reserved for good risk patients who have exhausted other autogenous option.

Thanks to

- Dr. John Swinnen, Westmead Hospital for encouraging myself to perform this procedure and also sharing some slides to me.

- Audiovisual Unit of Faculty of Medicine, Chiang Mai University for making VDO.

Thank you for your attention

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Eur J Vasc Endovasc Surg (2009) 38, 365—372

REVIEW

Lower-extremity Arteriovenous Access for Haemodialysis: A Systematic Review

G.A. Antoniou [a,b,*], M.K. Lazarides [b], G.S. Georgiadis [b], G.S. Sfyroeras [a], E.S. Nikolopoulos [b], A.D. Giannoukas [a]

	12 month mean primary patency	Access loss due to infection
FV transposition	83 %	1.61 %
Upper thigh AVG	48 %	18.40 %
Mid thigh AVG	43 %	18.33 %

Long term study for FV transposition (n=72)

	Primary patency	Secondary patency
1 year	91%	84%
9 year	45%	56%

Bourquelot J Vasc Surg 2012;56:440-5