How to Salvage Immature Fistula

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Immature Fistula

- Created successfully but never develops adequately to support dialysis treatment or fails within three months of its use
- Vein size of < 6 mm diameter 8 weeks after formation

Immature Fistula

- **Primary early failure**
  : 20-60%

  Kidney Int 62 (2002): 1109–1124
  Seminars in Dialysis 24(1)(2011): 107–114
- **Primary early failure of grafts**
  : 15-23%

  Seminars in Dialysis 24(1)(2011): 107–114

Immature Fistula

- **Pre-existing conditions**
  - Arterial problems (small, atherosclerotic lesions)
  - Accessory veins
- **Acquired**
  - Stenosis

Most common etiology of early failure
- Juxta-anastomotic Stenosis
- Presence of Accessory Veins

Factors associated with fistula failure to mature in patients with preoperative vascular mapping

Clinical Factor	Hazard Ratio	95% CI
Age (≥ 65 versus < 65 yr)	1.98	1.03 to 3.80
Gender (female versus male)	2.42	1.32 to 4.45
Fistula location (forearm versus upper arm)	2.25	1.22 to 4.17

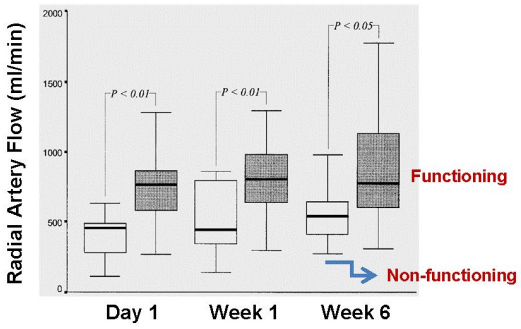
Clin J Am Soc Nephrol 3: 437-441, 2008

Study of Size and Flow

- If fistula diameter was 0.4 cm or greater, the chance that it would be adequate for dialysis was 89% versus 44% if it was less.
- If fistula blood flow was 500 ml/min or greater, the chance that it would be adequate was 84% versus 43% if it was less.
- Combining the two variables, the chance that it would be adequate was 95% versus 33% if neither of the criteria were met.

Robbin. Radiology 225:59-64, 2002

Postop. Radial Artery Blood Flow



Tordoir et al. Nephrol Dial Transplant 18:378-83, 2003

When To Evaluate

- All newly created fistulas should be evaluated at 4 to 6 weeks to determine their apparent adequacy.

Why should we evaluate early?

- If the patient has already begun dialysis – they are using a tunneled catheter.
- Vascular stenosis is a progressive process.

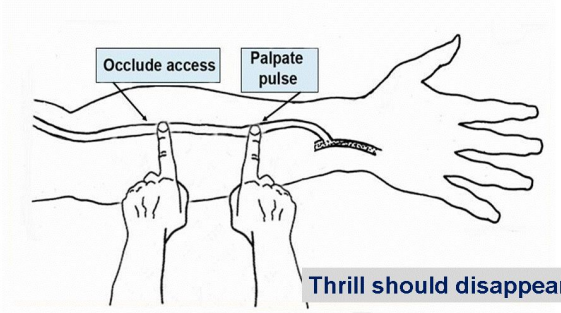
Requirement for Fistula Adequacy

- Cannulation
- Blood flow

Fistula Evaluation

- Physical examination is probably adequate.
  Question - Can it be cannulated?
  (Dialysis nurse)
- Augmentation Test must be done by someone that is capable.
  (Nephrologist must take the lead.)

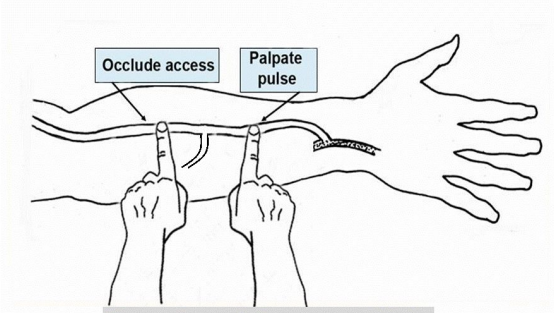
Augmentation Test



Thrill should disappear

Access should become hyperpulsatile

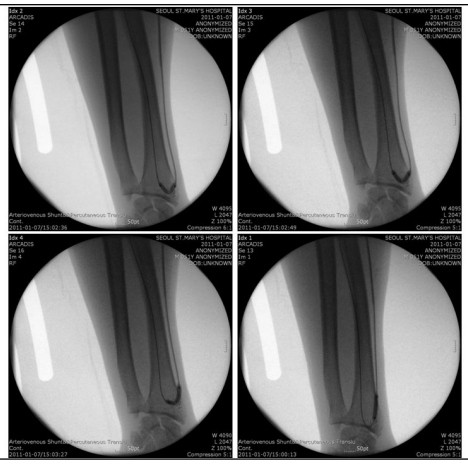
Augmentation Test

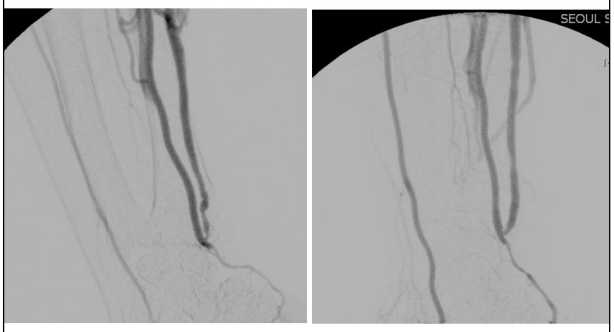


Detection of Accessory Vein

Case 1

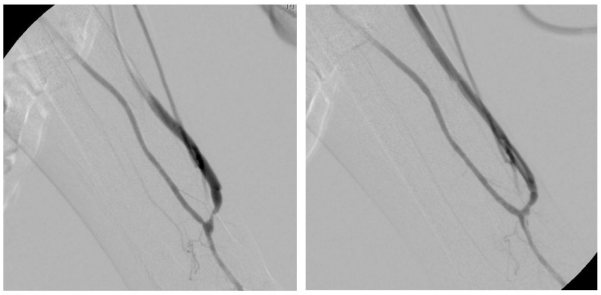
- M/51
- Access: Lt. Radio-cephalic fistula
- Interval from access creation
  : 3 months 4 days
- Problem
  : Cannulation difficulty
  : Low blood flow





Case 2

- M/74
- Access: Lt. Radio-cephalic fistula
- Interval from access creation
  : 2 months 16 days
- Problem: Low blood flow



Accessory Veins

- Easily diagnosed by physical exam
- Often are not a problem
- Can cause development failure
  - Retarded maturation
  - Diversion of flow
  - Difficult cannulation

Determining Significance

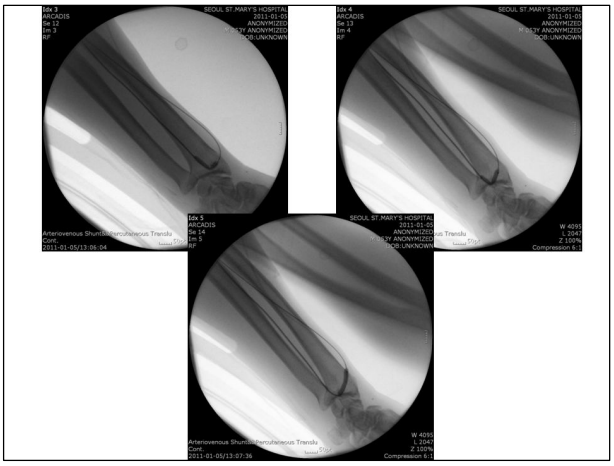
- Size
  25% of size of fistula or more
- Flow
  Assess with a puff of radiocontrast
- Changes with manual occlusion
  Augmentation Test
- If significant - treat

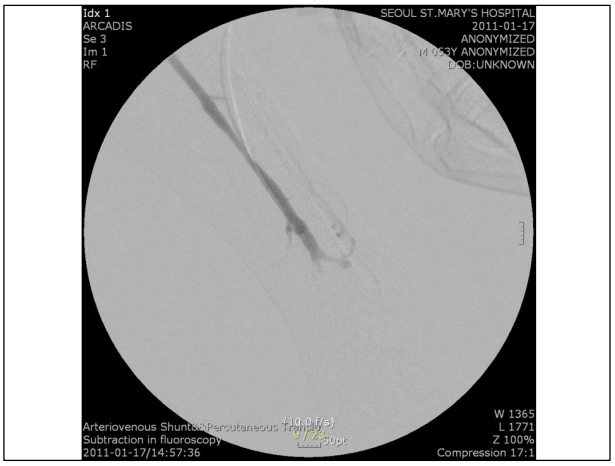
Techniques for Vein Obliteration

- Percutaneous ligation
- Surgical ligation (cut-down ligation)
- Embolization coil

Case 3

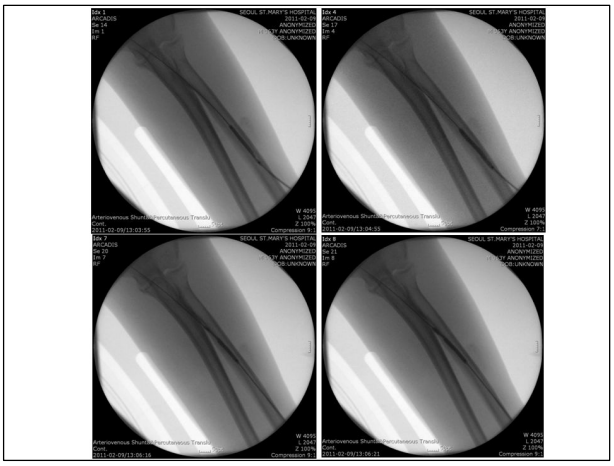
- M/53
- Access: Lt. Radio-cephalic fistula
- Interval from access creation
  : 4 months
- Problem
  : Cannulation difficulty
  : Low blood flow

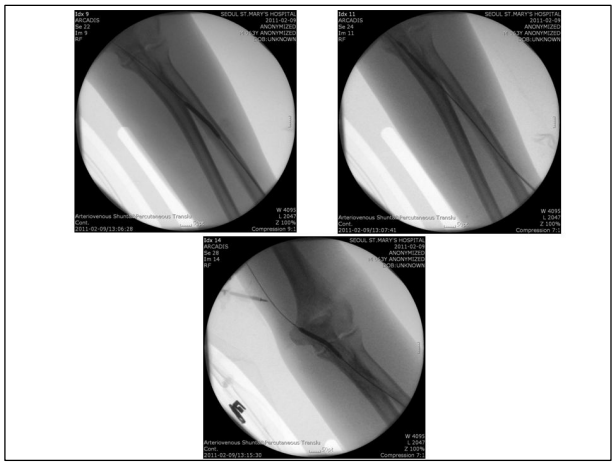


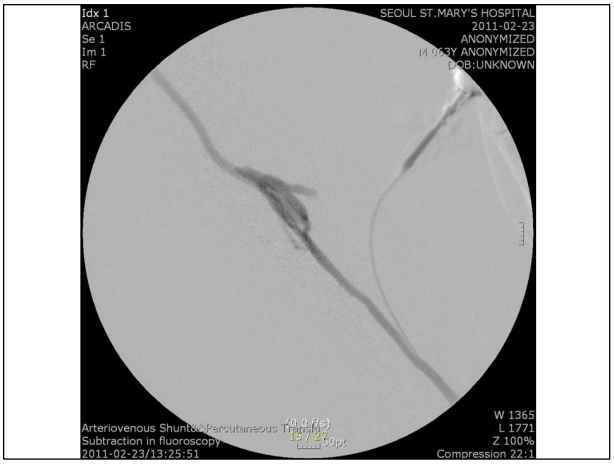


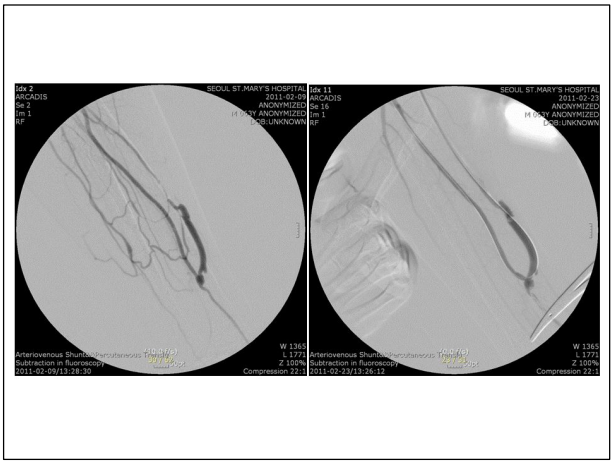
Case 4

- M/63
- Access: Lt. Radio-cephalic fistula
- Interval from access creation
  : 6 weeks 2 days
- Accessory vein ligation at 7th day
- Problem
  : Cannulation difficulty









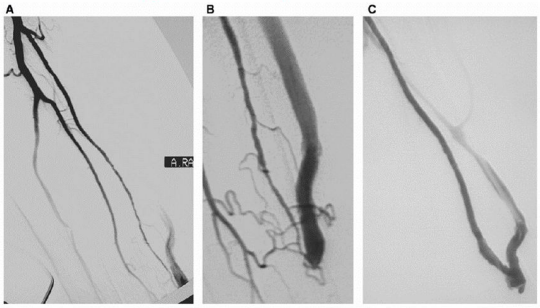
Percutaneous Salvage of Thrombosed Immature AVF

	Time (mon)	All AVFs (n=108)	BBF (n=24)	BCF (n=29)	FF (n=55)
Primary access patency	3	54%	50%	40%	63%
	6	29%	13%	22%	41%
Primary assisted patency	6	78%	73%	77%	80%
	12	59%	49%	52%	66%
Secondary access patency	12	90%	95%	84%	92%
	24	80%	95%	74%	79%
Postmaturation interventions per access-year		2.78	3.56	3.46	2.03

AVF, arteriovenous fistula; BBF, brachiobasilic fistula; BCF, brachiocephalic fistula; FF, forearm fistula.

Miller et al. Seminars in Dialysis 24(1): 107–114, 2011

Percutaneous Dilation of the Radial Artery in Nonmaturing Radial-Cephalic Fistulas for HD



Nephrol Dial Transplant (2009) 24: 3782–3788

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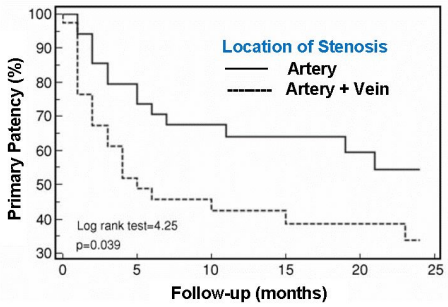

Nephrol Dial Transplant (2009) 24: 3782–3788

Summary

- Preoperative vascular mapping should be done to assist the surgeons in optimizing fistula success.
- Most common etiologies of early failure are Juxta-anastomotic stenosis and presence of accessory veins.
- All newly created fistulas should be evaluated at 4 to 6 weeks.
- Interventional approach is the most valuable method to salvage the immature fistula.