

## Cannulation techniques for Arteriovenous Fistulae



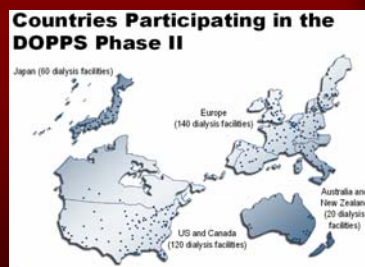
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## Overview

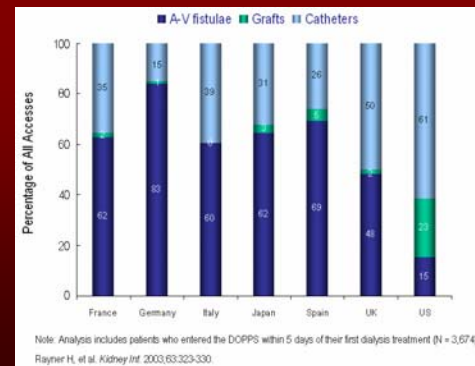
- Why we care
- What is a fistula?
- Fistula evaluation
- Approaches to cannulation
- Approaches to fistula failure

## DOPPS: Dialysis Outcome and Practice Pattern Study

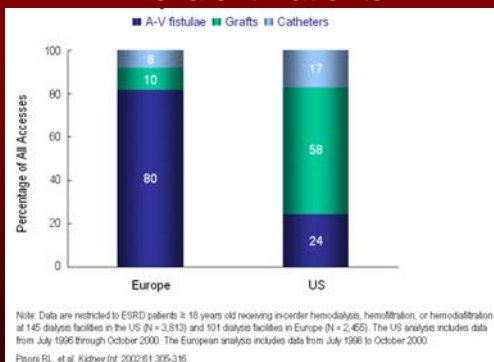
- Started 1996
- 16,200 patient
- Looked at Clinical factors as well as Access Type



## Incident Patients

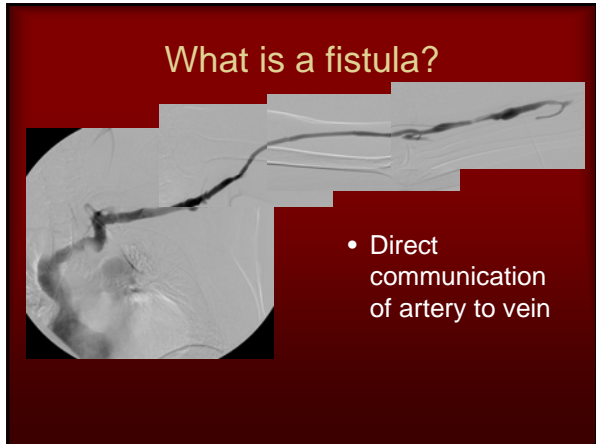


## Prevalent Patients



## NVAII Change Concepts

1. Routine CQI review of vascular access
2. Early referral to Nephrologist
3. Early referral to surgeon for "AVF only"
4. Surgeon selection
5. Full range of appropriate surgical approaches
6. Secondary AVFs in AVG patients
7. AVF placement in catheter patients
8. Cannulation training
9. Monitoring and surveillance
10. Continuing education: staff and patient
11. Outcomes feedback



# Types of Fistulae

**Antithrombotic AVF Algorithm**

Patent requiring chronic, direct replacement therapy (DRT) possible (transcatheter)?

AVF assessment: surgical revision already done in stage 4 (DRT/IGFR, etc.) or stage 2 (DRT/IGFR) or in dialysis?

Patent status:  Patent  Patent status of previous access not available

**Steno Algorithm**

Stenosis requires AVF revision, correction, patient would be referred for antithrombotic AVF access, patient not considered for DRT or AVF based on medical status.

AVF assessment: surgical revision already done in stage 4 (DRT/IGFR, etc.) or stage 2 (DRT/IGFR) or in dialysis?

Patent status:  Patent  Patent status of previous access not available

**AVF Construction Options:**

- Forearm**
  - Distal: radial-cephalic, transposed radial-basilic
  - Proximal: proximal radial-(or brachial)-cephalic (simple direct or transposed loop), proximal radial-(or brachial)-basilic (simple direct or transposed loop)
  - Antecubital: Graec variation
- Arm**
  - brachial-cephalic (simple direct or transposed)
  - brachial-basilic (transposed only/1- or 2-stage)
- Thigh**
  - femoral-saphenous (transposed or translocated saphenous v.)
  - femoral-femoral (transposed straight or loop)
- Ankle**: posterior (or anterior) tibial-saphenous
- Other**
  - Translocations
  - Retrograde/reverse flow constructions: arterial anastomosis
  - proximal AVF flow distal (retrograde flow)
  - Composite / creative constructions
  - "Blind" constructions (planned 2-stage procedure where no definable AVF vein conduit identified at 1<sup>st</sup> stage)

# Fistula Evaluation

- Initial evaluation at 4 weeks
- Assess 1<sup>st</sup> 3 cannulations & look for problems

**CENTERS FOR DIALYSIS CARE**  
**PROTOCOL FOR CANNULATING A NEW AVF**

PATIENT NAME: \_\_\_\_\_ Date access created: \_\_\_\_\_

PROTOCOL: Attempt # 1 2 3 Date to start protocol: \_\_\_\_\_

**DIRECTIONS:** This is the suggested protocol for cannulating a NEW AVF. The readiness of the AVF is determined by the surgeon and RN assessment. The goal is to start using the AVF closely to help promote maturation, i.e. the vein to withstand pressure (arterialization tendency) and the AVF to meet prescribed BFR. The protocol can be advanced based on RN assessment but the progression should be sequential. For example, even if the access looks good to start using, we only use results of catheter in a place and date to be used.

**Only experienced staff should attempt cannulation.** Always use a tourniquet. Use 16 gauge needles unless otherwise ordered by surgeon or based on RN assessment. If using 17 gauge needles, be sure to indicate on flow form, initials, a person who cannulated for access. Indicate if successful and any additional comments. Use a 17 gauge for cannulation.

If catheter is not in place or if not usable, either protocol (i.e. access not first treatment and go directly to work 2). If any vascular access event occurs, such as an infiltration or any other "unsuccessful" cannulation, have RN evaluate. Then contact MDT access team. Do not attempt another needle stick. Go back to using the catheter for 48 hours one week, and then start NEW protocol on following treatment (use new form and start date). If problem related to flow, obtain Transcatheter results and flow readings and then contact MDT access team.

Ex #	ART	VENOUS	BFR	RN	Date	Additional Comments
1	16g	Catheter	200 BFR	Initials:	Success?	Y, N
2	16g	Catheter	200 x 10 min, then 7 to 250 Initials:	Success?	Y, N	*Look for side of clotting with low BFR
3	16g	Catheter	200 x 10 min, then 7 to 250 Initials:	Success?	Y, N	
Work Sheet date: _____ Date: _____ Date: _____ Comments: _____						
1 <sup>st</sup> week	16g	16g	200 x 10 min, then 7 to 250	Success/Initials	Y, N	Y, N, Y, N
2 <sup>nd</sup> week	16g	16g	250 x 3 hrs	Success/Initials	Y, N	Y, N, Y, N
3 <sup>rd</sup> week	16g	16g	200 x 3 hrs	Success/Initials	Y, N	Y, N, Y, N
4 <sup>th</sup> week	16g	16g	Success/Initials	Y, N	Y, N	Y, N, Y, N
5 <sup>th</sup> week	16g	16g	Checked BFR:	Y, N	Y, N	*see note
6 <sup>th</sup> week	16g	16g	Success/Initials	Y, N	Y, N	Y, N, Y, N

Projected date to start using 17 gauge needles: \_\_\_\_\_ (per RN) (enter in Special Attention)

\* If no cannulation problems/complications occur, access function Transcatheter results and flow. Contact physician or surgeon with results and order for catheter removal.

Upon completion of form, file under the "Access" tab of the patient's medical chart

# Physical Examination

- Need to assess all patients regularly
- All patients with fistulae:
  - Assess current function
- All patients without fistulae:
  - Is there a vein that can be used to convert graft or catheter to fistula?
  - Communicate which vein to use to surgeon
- Examine all patients with tourniquet & look for cephalic vein
  - If cephalic is poor, is there an alternative?
  - Do I need imaging to find the vein?
- Supplement exam with flow screening if thrombosis rates high

# Physical Examination

- Thrill throughout = Normal access
- Pulsatile = Outflow stenosis
- No thrill and no pulse = Access thrombosis
- Examine weekly
- Follow trends
- Thrill at the venous end of dialysis grafts is predictive of successful outcome following intervention\*


\* Ponce P, et. al JVIR 14 (2) pt 2, Feb 2003; S28-29

# How to puncture


- Palpate with at least 2 fingers
- Puncture at 25-45 degrees
- Goal is a single wall puncture

## Cannulation Technique

- Identify the inflow & the outflow
  - May require palpation
  - Never puncture unless you are sure where the vein is & that it can be pinned
- Puncture at an angle
- Watch for flash
- Lower angle & advance

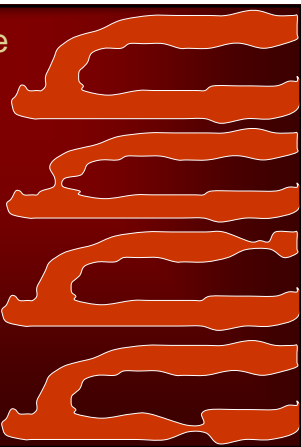


## How fistulas look



## Problems with the fistula

- Venous outflow problems
  - High venous pressures
  - Low flow
  - High recirculation
  - Infiltration
- Arterial inflow problems
  - High negative arterial pressure
  - Pulling clots

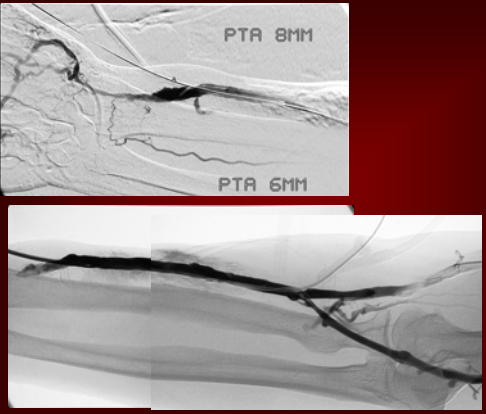


## What to do with problems

- Fistulagram
  - Change in physical exam
  - Problem with dialysis
  - Change in monitoring protocol (transonic or other)
  - Failure to mature

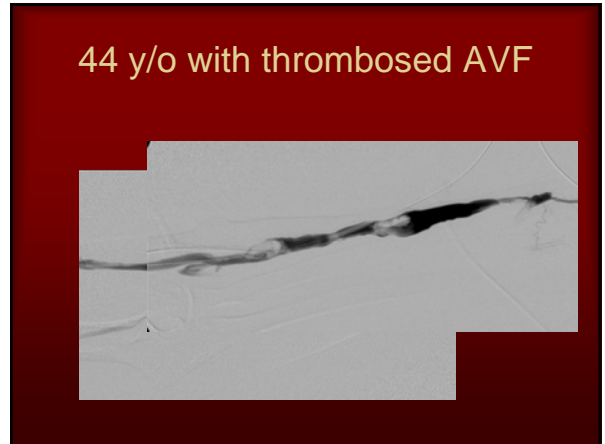
## Failure to Mature

- 84 y/o male with BCF

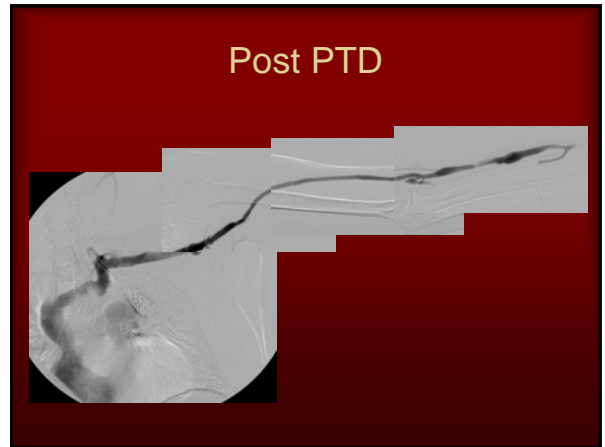


Dialysis Catheter Removed 6 weeks later



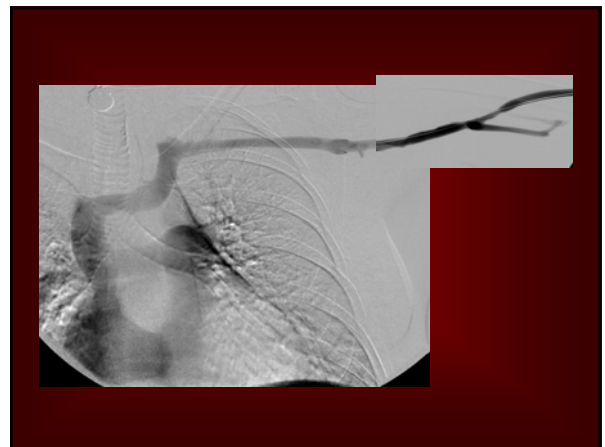
### Procedure

- 3000 U Heparin
- PTD
- OTW Fogarty
- Treat stenoses

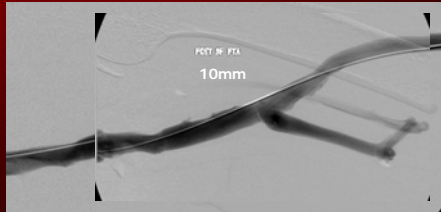
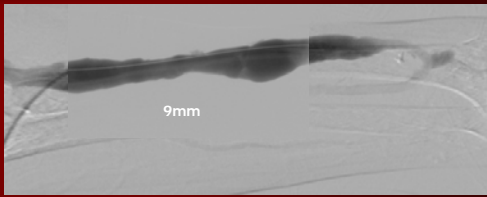


4 months Later

- Pt returns for high venous pressures



PTA



## Cannulation Camp!

- Goal:
  - To give you practice in puncturing collapsible structures similar to the native fistula
- 4 Stations
- Use dialysis needles
- Model is based upon ultrasound targeting models for trainees

## The Cannulation model

- Chicken Breasts
- Penrose drain
- Drain is collapsible
- Drain is tunneled under surface of chicken breast
- Opportunity to practice



Pump

## Summary

- Cannulation takes practice
- Be sure of physical exam prior to puncture
- Ask questions if you are not sure
- Use proper technique
  - Approach at 25-45degrees
  - Look for flash
  - Lower bevel & advance
- When problems arise in fistulae send them for fistulography