

DIALYSIS ACCESS

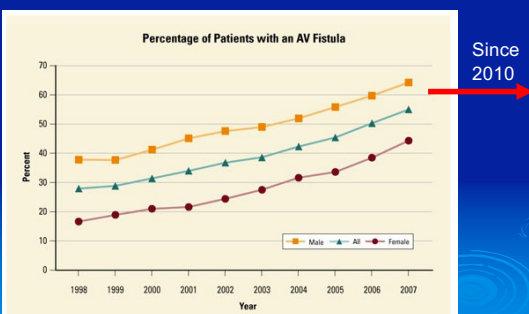
Post-Operative Evaluation

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Vascular Sonography Education

Evaluation for Dialysis Access

- Overall goal
 - Ability for hemodialysis 3X per week
 - Sustain flow rates > 400-500 ml/min
 - Suitable for large bore needle (17G) cannulation
 - Avoid post-operative complications

Dialysis Access



Indications for access evaluation

- Early post-operative evaluation of AVF for maturation (6 weeks)
- Routine surveillance has not been shown to be helpful in predicting access failure

Dialysis Access

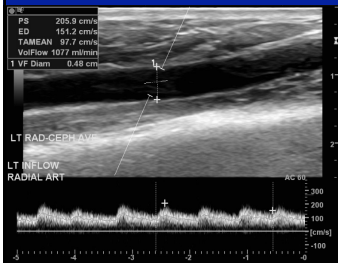
- Traditional methods of evaluation include:
 - Fistulography
 - Arteriography
- Preferred method:
 - Duplex Ultrasound

Dialysis Access Duplex Ultrasound Protocol

The Dialysis Access Mantra:

- Inflow
- Access
- Outflow

Dialysis Access Normal



Inflow

- High Velocity
- Continuous forward diastolic flow
- Marked spectral broadening

Dialysis Access Interpretative Criteria

- Normal fistula/graft velocities
 - PSV 150-300 cm/s
 - EDV 60-200 cm/s
- Marked spectral broadening throughout fistula/graft
- Low resistance flow in afferent artery
- A 2-3X increase in velocity at an arterial anastomotic site may be normal
- Increased velocities and pulsatility noted in efferent vein
 - PSV 30-100 cm/s

Dialysis Access Volume Flow Calculations

ACR Practice Guidelines - 2014:

Volume flow measured in mid-portion of draining vein in a region that is – straight non-tapering without turbulent flow



Dialysis Access Volume Flow Calculations

AVF volume flow calculations on the venous side are usually not consistent;

TAVMean = 250 cm/sec
Diameter = 0.34cm

➔ VF = 1080 ml/min

Dialysis Access Volume Flow Calculations



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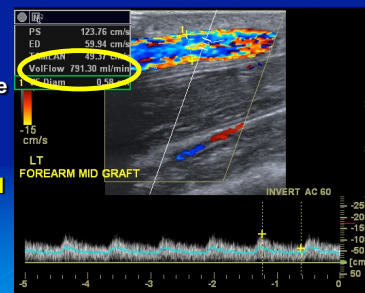
Accurate diameter measurements are difficult

TAVMean = 250 cm/sec
Diameter = 0.44cm

➔ VF = 1700 ml/min

Dialysis Access Volume Flow Calculations

Volume flow calculations should be made at inflow to fistula or mid graft; may need to average 3-4 measurements



Dialysis Access Volume Flow Calculations

Volume flow calculations should be made at inflow to fistula or mid graft; may need to average 3-4 measurements
Brachial artery is preferred site

Dialysis Access Duplex Ultrasound Protocol

➤ Early post-operative evaluation of AVF for Maturation: The Rule of 6's

- > 6cm straight segment
- At 6 weeks -
- Depth < 6mm
- VF > 600ml/min
- Diameter > 6mm

Dialysis Access Normal AVF

Dialysis Access Normal PTFE Graft

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Dialysis Access Obstacles to overcome

Dialysis Access Early Complications

- Virtually every fistula/shunt causes some degree of steal

Symptomatic steal not common (3-10%); more common in upper arm access

Tends to occur early in AV grafts, later for AVFs

Dialysis Access Early Complications

- Vascular Quality Initiative registry

Predictors	OR (95% CI)	P
White	1.65 (1.40-1.94)	<.001
Female	1.68 (1.43-1.98)	<.001
Peripheral artery disease	1.48 (1.17-1.87)	.001
Coronary artery disease	1.36 (1.14-1.63)	.001
Diabetes mellitus	1.40 (1.17-1.66)	<.001
Prior access	0.99 (0.83-1.18)	.895
Prosthetic graft	1.86 (1.54-2.23)	<.001
Post-op antiplatelet therapy	1.26 (1.07-1.49)	.006
Upper arm procedure	1.31 (1.05-1.62)	.016
Target vein diameter > 4 mm	1.24 (1.03-1.48)	.020
Target artery diameter > 3.9 mm	0.98 (0.82-1.17)	.810

Dialysis Access Early Complications

- Hand/forearm ischemia

May account for 10-35% of all complications

Failure rate may be as high as 40% in the first year

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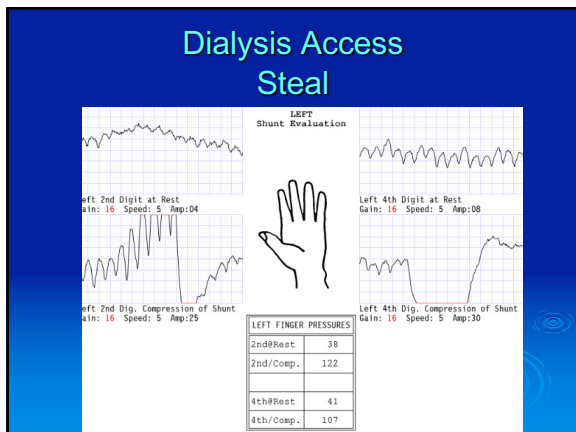
Treatment goal: Restore digit pressure >50mmHg

Dialysis Access Early Complications

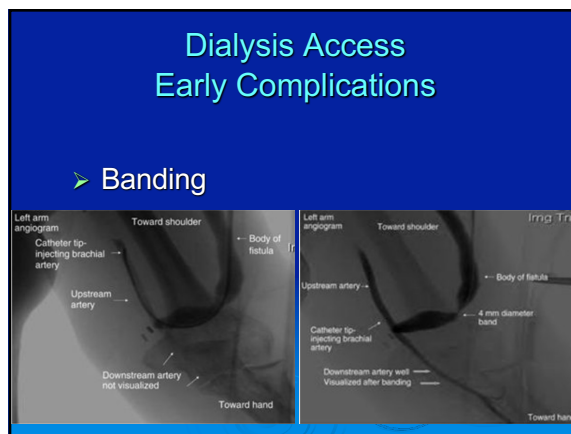
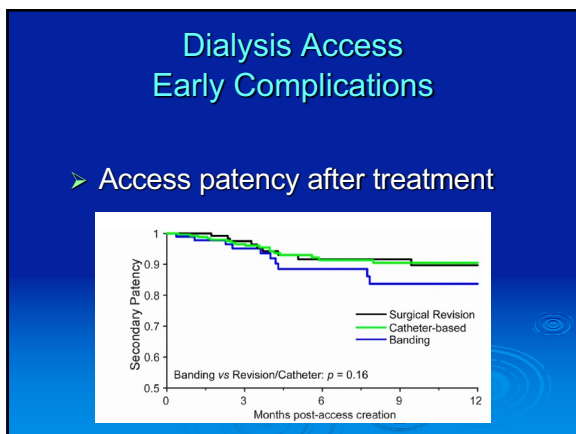
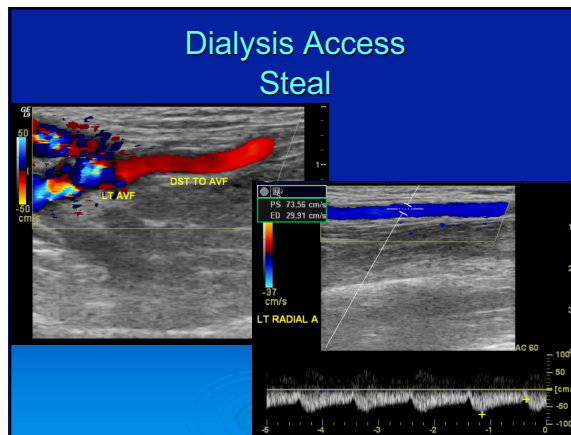
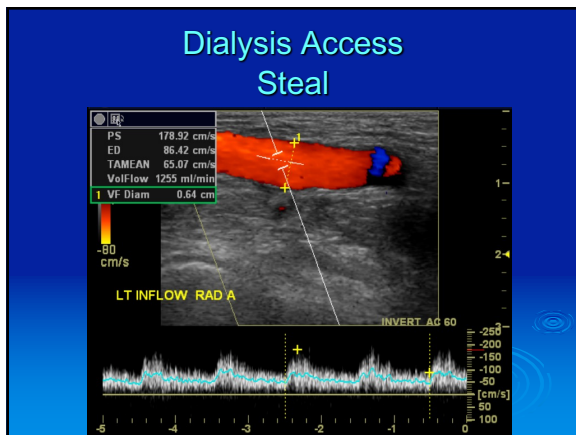
- “True” steal: Large venous anastomosis
➔ Low outflow resistance
- Poor inflow: Proximal arterial disease limits inflow, promotes steal
- Poor runoff: Distal runoff obstruction causes high resistance

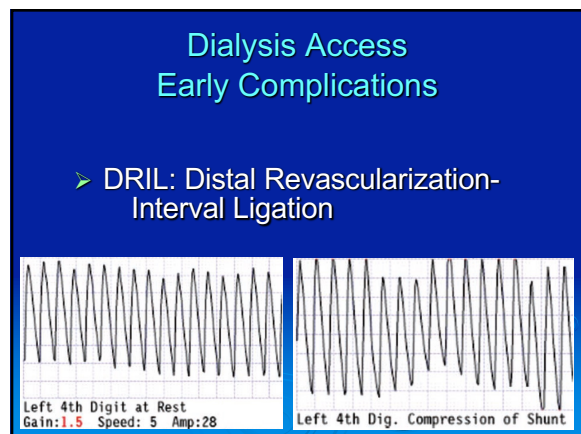
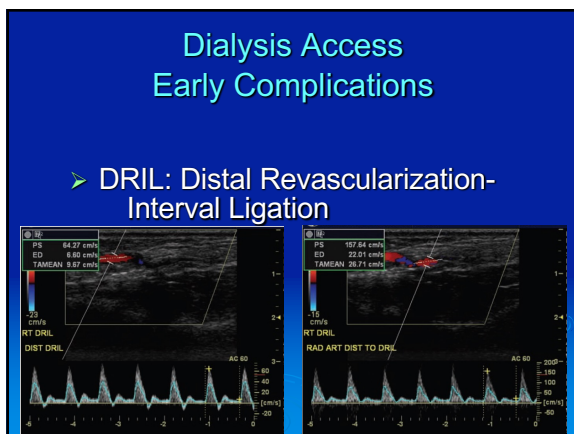
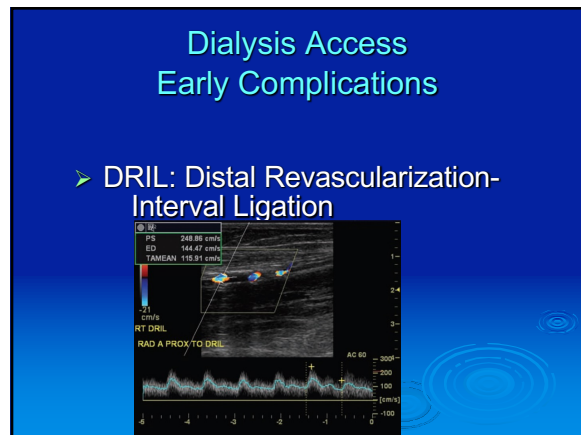
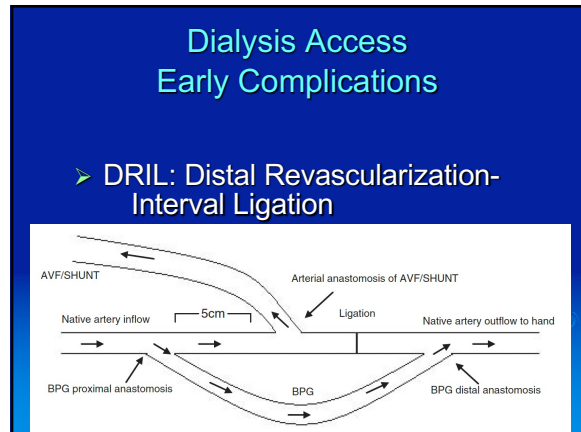
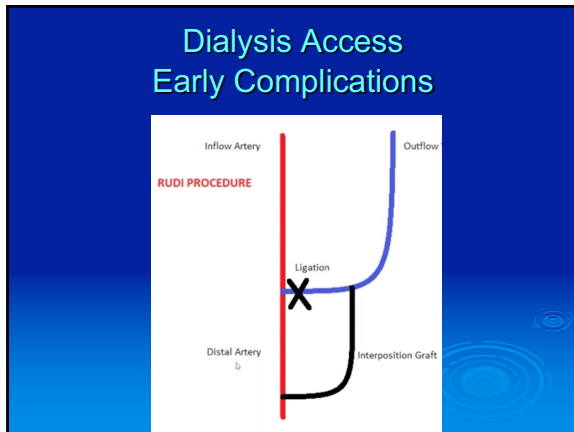
Evaluation for Steal

- Physiologic testing
 - Systolic pressures – Upper arm, radial/ulnar artery forearm and wrist
 - Doppler waveforms – Subclavian, axillary, brachial radial, ulnar
 - Digit plethysmography and pressures - with and without compression at fistula/graft outflow



- ### Evaluation for Steal
- Duplex ultrasound evaluation
 - Inflow – Subclavian, axillary, brachial, radial ulnar
 - Evaluate distal artery velocity or flow with and without compression of fistula/graft





Dialysis Access Duplex Ultrasound

Remember The Dialysis
Access Mantra:

- Inflow
- Access
- Outflow

Dialysis Access Duplex Ultrasound

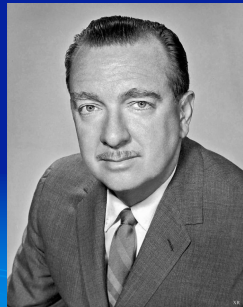
More detailed information:

- Dialysis Access Steal
Evaluation Procedures

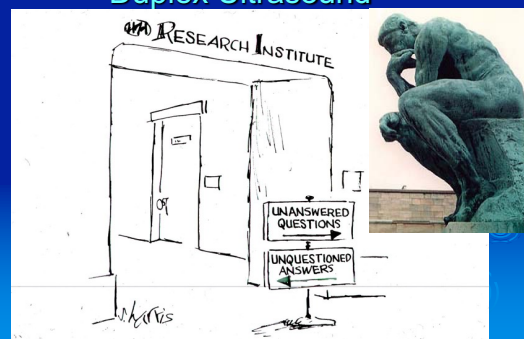
www.svu.net

Dialysis Access Duplex Ultrasound

"And that's the
way it is."
Saturday
November 23



Dialysis Access Duplex Ultrasound



Dialysis Access Duplex Ultrasound