

Complications

Bleeding

- Bleeding during treatment (oozing around needle or infiltration) = fragile vessel wall or back wall penetration; don't flip the needles
- Bleeding post-needle removal = fragile vessel wall or needle trauma or inadequate pressure at puncture sites
- Review needle-removal technique. Improper pressure with needle withdrawal = vessel damage
- A pattern of prolonged bleeding post-needle removal may indicate stenosis or clotting disorder. Evaluate bleeding after 20 minutes
- Educate patients about post-treatment hemostasis and what to do at home should the needle site re-bleed

2

Infiltration = Hematoma



3

Photo courtesy of D. Brouwer

Prevent Cannulation Infiltrations

- Don't flip needle
- Don't lift needle in vein
- Flush with NSS

4

Prevent Postdialysis Infiltrations

- Apply gauze without pressure
- Remove needle at insertion angle
- Apply pressure with 2 fingers
- Hold pressure 10–12 minutes

5

Treating Infiltrations

- Elevate arm above heart
- Ice 20 minutes on/20 minutes off for 24 hours
- Warm compresses after 24 hours
- Let fistula rest
- Second infiltration: Notify vascular access team
- Don't use AVF until directed

6

Infiltrations in New AVF

- Elevate arm above the level of heart
- While protecting the skin over access area with a clean cloth, gently apply:
 - Ice 20 minutes on/20 minutes off for first 24 hours
 - Warm compresses after 24 hours

7

Infiltrations in New AVF (cont'd)

- If the fistula infiltrates, let it “rest” until the swelling is resolved (see KDOQI Guidelines)
- If the fistula infiltrates a second time, the RN should notify the vascular access team, including the surgeon, as soon as possible for intervention
- Don't use that AVF until further directed

RN: registered nurse

8

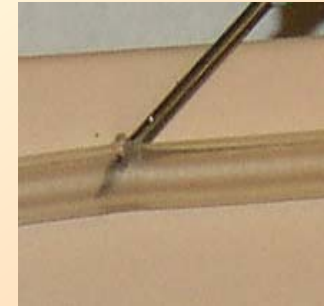
How to Prevent Infiltrations

- Check for flashback and aspirate
- Flush with NSS to ensure the needle flushes with ease and there are no signs or symptoms of infiltration
- Saline causes much less damage and discomfort than blood if an infiltration occurs

9

Post-Cannulation Bruising and Hematoma

- If bruising or hematoma occurs after dialysis, the surface skin site has sealed but the needle hole in the vessel wall has not
- Use 2 fingers per site for hemostasis
- It is crucial to apply pressure to both the skin and access wall puncture sites



Reprinted with permission of L. Ball and the American Nephrology Nurses' Association publisher, *Nephrol Nurs J.* 2006;33:302.

10

AVF Bleeding Emergency Kit for Dialysis Patients

- Gauze pads to apply to the bleeding site
- Tape to apply once the bleeding has stopped

Information Card:

1. Vascular access type/location
2. Name and phone number of the vascular access surgeon and address of the closest hospital, should the bleeding not stop and further assistance be required

11

Poor Flow

- May be due to location or position of needle(s)
- May need to change direction of arterial needle
- If poor flow persists after next session despite changing needle locations, refer to surgeon for evaluation and possible treatment options
- NOTE: Use tourniquet for cannulation only!
 - Do not leave in place for entire treatment!!!

12

Aneurysm

- Caused by stenosis as vessel narrowing increases “back pressure,” causing vessel distension and weakening of vessel wall
- May also be caused or aggravated by frequent cannulations in the same area



13

Photo courtesy of P. Cade

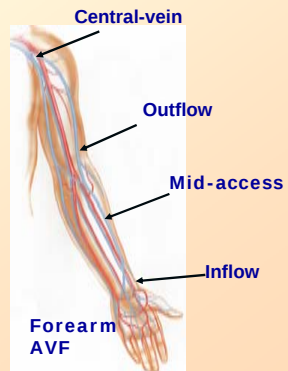
Stenosis

- Most common complication
- Causes:
 - IV, CVC, PICC lines
 - Surgery to create AVF
 - Aneurysms
 - May be caused by the back pressure associated with stenosis
 - Needle-stick injury

14

Types of Stenoses

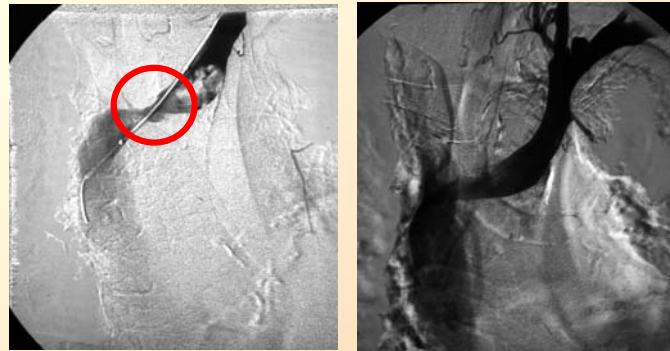
- Juxta-anastomotic (most common stenosis in AVF)
- Mid-access
- Outflow
- Central vessel



15

Graphic courtesy of L. Ball

Central-vein Stenosis



16

Images courtesy of Microvena Corp

Distended, Obstructed Left Shoulder Veins Indicative of Central-vein Stenosis



17

Photo courtesy of J. Holland

Clues to Stenosis

- Clotting of the extracorporeal circuit 2 or more times/month
- Persistently swollen access extremity
- Changes in bruit or thrill (ie, becomes pulse-like)
- Difficult needle placement
- Blood squirts out during cannulation
- Elevated venous pressures

18

Clues to Stenosis (cont'd)

- Excessively negative pre-pump AP
- Decreased blood pump speeds
- Inability to achieve BFR
- Changes in Kt/V and URR
- Recirculation
- Prolonged postdialysis bleeding
- Frequent episodes of access thrombosis

Kt/V: $\frac{\text{kidney or dialyzer (treatment time)}}{\text{Total volume of urea}}$

URR: urea reduction ratio

19

Observe Access Extremity for Evidence of Stenosis

Perform a physical exam for AVF stenosis

- Perform before patient has needles inserted
- Have patient keep access arm dependent and make a fist—observe vein filling
- Have patient slowly raise the access arm—the entire AVF should collapse if no stenosis; if entire vein is not flat, indicative of stenosis
- If a segment of the AVF has not collapsed, stenosis is located at junction between collapsed and noncollapsed segment
- Patient can do this at home

20

Thrombosis

- Surgical/technical problems
- Preexisting anatomic lesions (eg, old IV injury)
- Premature use
- Poor blood flow
- Hypotension
- Hypercoagulation
- Fistula compression

21

Infection

- AV fistulas have lowest risk of infection of any vascular access type. However...
- Each pre- and post-treatment exam should include:
 - Checking for signs/symptoms of infection, including:
 - Changes of skin over access area
 - ♦ Redness
 - ♦ Increase in temperature
 - ♦ Swelling, hardness
 - ♦ Drainage from incision, needle sites
 - ♦ Tenderness or pain
 - Patient complaints without other indications of
 - ♦ Malaise
 - ♦ Fever

22

Prevention of Infection

- Prevention
 - General hygiene
 - Pretreatment washing of access extremity
 - Hand washing, before and after cannulation
 - No scratching, irritation of skin of access extremity
 - Precannulation
 - Appropriate skin antisepsis
 - Sufficient antiseptic-skin contact time
 - Cannulate while antiseptic is wet or dry, as directed
 - Cannulation
 - Maintain needle sterility
 - Do not cannulate through scabs or abraded areas

23

Steal Syndrome/Ischemia

- Steal syndrome is a constellation of symptoms related to ischemia (inadequate blood supply to the hand) caused by the AVF “stealing” blood away from the extremity
- Steal causes hypoxia (lack of oxygen) to the tissues of the hand, resulting in severe pain and identified by nail bed discoloration, a cool hand, and a weak or absent pulse
- Neurological and soft tissue damage to the hand can occur, resulting in mobility limitations (eg, grip strength, dexterity), loss of function, ulcerations, necrosis
- Steal syndrome/ischemia is estimated to occur in approximately 5% of vascular access patients, mostly those with diabetes and peripheral vascular disease (PVD)

24

Clinical Clarification

- Steal syndrome is estimated to occur in approximately 5% of vascular access patients, mostly those with diabetes and peripheral vascular disease.

25

Henriksson AE, Bergqvist D. J Vasc Access. 2004;5:62-68.

“Claw Hand” Contracture From Steal Syndrome



26

Photo courtesy of J. Holland

Steal Syndrome/Ischemia

- Steal symptoms may improve due to the development of collateral circulation
- Procedures, such as the DRIL (distal revascularization-interval ligation), can successfully treat steal and ischemia
- Individuals who are at high risk for developing acute steal are:
 - Patients with diabetic neuropathy
 - Patients with PVD

27

Henriksson AE, Bergqvist D. J Vasc Access. 2004;5:62-68.

Is Steal Syndrome Serious?

- Steal/ischemia may lead to loss of function and amputation if not recognized and treated quickly
- Necrotic tissue cannot be “fixed”—it must be removed
- Steal/ischemia places patients at risk for infection
- Infection increases their risk for hospitalization
- Hospitalization increases their risk for death!

28

Educational Goals Achieved

- Understand the importance of AVF
- Upgrade your knowledge of cannulation techniques
- Troubleshoot problems
- Communicate effectively with other members of the patient care team

29

For further information
on cannulation and
other AVF issues,
please visit the official
Fistula First Web site at:
www.FistulaFirst.org

