Bleeding in Dialysis Patients
Diane M. Birnbaumer, M.D.

Two major issues related to emergency medicine
Dialysis site bleeding
Systemic bleeding and acquired coagulopathy

Dialysis site bleeding
Shunt anatomy
Connection between artery and vein
May be a fistula or graft
AV fistula: Direct subcutaneous anastomosis of an artery and vein without prosthetic material
Preferred means of vascular access for hemodialysis
Typically end-to-side vein-to-artery
Radial-cephalic (Brascia-Cimino forearm) most commonly used
Venous portion receives high pressure, becomes arterialized (hypertrophied and dilated), then suitable for dialysis
AV graft: AV bridge using a donor vein or synthetic material
Anatomic site usually forearm, but may be upper arm, thigh

Bleeding from dialysis site
May be life threatening; is a high pressure system
Repeated access and/or infection of the sites can lead to pseudoaneurysm or true aneurysm formation
Bleeding immediately after dialysis easiest to manage; usually from puncture site
Bleeding between dialyses more concerning; shunt infection or problems with access site including access rupture may lead to massive, potentially life-threatening blood loss
Goal is to control the bleeding but not put the shunt at risk of clotting
If possible, sterile technique should be used to prevent shunt infection

Approach
Note: Very little literature published on the topic; most recommendations are based on anecdote and opinion

The Basics
Resuscitation, including IV access with fluids and blood products, may be necessary
Consultation with a vascular surgeon may be necessary if bleeding cannot be controlled in the ED
Goal is to stop the bleeding but not clot off the access
However, if the patient’s life is at risk, clotting of the access site is a known potential outcome of hemostasis at the bleeding site

Direct pressure to the site of bleeding for a minimum of 5 minutes
Holes are usually small (from dialysis needle)
If true aneurysm or pseudoaneurysms rupture, patient can rapidly exsanguinate
Put pressure directly at the site of bleeding
Use fingertip in sterile glove or folded sterile gauze pad
If tunnel catheter is bleeding, pressure should be at site of vascular insertion (if possible), NOT at subcutaneous exit site
Not possible with subclavian catheters
AVOID bulky dressing or using elastic bandages as they lead to increased risk of clot formation in the dialysis access

Direct pressure on feeding vessels
- Digital pressure over feeding and draining vessels above and below bleeding site
- AVOID proximal occlusion (e.g. BP cuff, tourniquet) unless absolutely necessary

Suture
- Adequate visualization is crucial to localize bleeding site
  - Digital pressure to proximal and distal ends of shunt or fistula
  - Pneumatic blood pressure cuff
    - Distal to fistula or graft (impedes distal-to-proximal arterial flow), or proximal to a loop graft
- Subcutaneous injection of bleeding site with lidocaine with epinephrine
- Figure-of-eight or horizontal mattress suture with 4-0 nonabsorbptive suture using a noncutting needle
- Suture as superficially as possible to prevent damage to graft/fistula
- May require venogram to evaluate patency before next use
- Remove suture in several days

Thrombogenic agents
- Not effective for massive bleeding
- Best used for residual oozing remains after other methods to control bleeding
- Apply directly to site of ooze and hold in place
- May pose a potential site for future infection

Vasoconstrictive agents
- Subcutaneous injection of 2-4 mL lidocaine with epinephrine in a wheel around bleeding site
- May vasoconstrict / compress

Chemical cautery
- Not effective for massive bleeding
- Use for residual oozeing as with thrombogenic agents
- Silver nitrate directly at site
  - Dry area first as much as possible
  - Do not apply aggressively; may dislodge or dissolve clot

Correcting coagulopathy
- If massive bleeding that cannot be controlled with above
  - Consider DDAVP (for uremic platelet dysfunction)
  - Consider reversing other anticoagulants as indicated
    - Heparin (used in dialysis – see below)
    - Warfarin
  - Novel oral anticoagulants – extremely difficult to reverse and contraindicated in renal failure patients, so patients should not be on these agents

After bleeding stops
- Patient should be observed for 1-2 hours for possible rebleeding
  - Rare if bleeding from puncture site is controlled in ED
  - More likely if bleeding was from pseudoaneurysm / true aneurysm; these patients may need to be observed longer
There are no recommendations regarding how or when to evaluate the access for patency after treatment for bleeding

Coagulopathy

Uremia causes platelet dysfunction by mechanisms that are not entirely clear
Uremia alone not usually a significant issue, but added anticoagulants increase the risk of bleeding

Treatment of uremic platelet dysfunction

Desmopressin (DDAVP)
- Dose for uremic platelet dysfunction is 0.3 µg/kg IV single dose or every 12 hours
- Onset of action is 1-2 hours
- Duration of action is 6-8 hours
- Costly
- May cause anaphylaxis, water intoxication or hyponatremia, or rare thrombotic events

Cryoprecipitate
- May be useful, but DDAVP is preferred

Heparin-associated coagulopathy
- 3000-5000 units of heparin are used during dialysis and are stopped 1 hour before the end of a dialysis session
- Usually not an issue in the ED unless patient starts to bleed during dialysis
- If necessary, can reverse with protamine sulfate 1 mg per 100 units of heparin
- If patient on LMWH, use 1 mg per 1 mg of LMWH, but is less effective

Warfarin-associated coagulopathy (in patients with severe or life-threatening bleeding)
- Administer prothrombin complex concentrates (4-factor preferred) – low volume, much more rapid than FFP
- Vitamin K 5-10 mg IV (takes 12 hours for effect)
- FFP an option, but high volumes (1-2 liters), takes time to thaw and administer

Tranexamic acid
- Minimal data on its use in renal failure patients
- At this point, probably should not be used

**TAKE HOME POINTS**

1. Bleeding from dialysis access can be life threatening
2. A systematic approach starting with direct pressure is effective in most cases of bleeding from vascular access sites in dialysis patients
3. Clotting of the access site is a potential complication of treatment of significant bleeding
4. Uremic platelet dysfunction can be treated with DDAVP, but little data exists regarding when it is truly indicated
5. Dialysis patients on warfarin with severe or life-threatening bleeding may need to be reversed, preferably using prothrombin complex concentrates

Selected References

