Bleeding in Dialysis Patients

Two major issues for emergency practitioners
- Dialysis site bleeding
- Systemic bleeding and coagulopathy

Dialysis Shunt Anatomy

- A connection between an artery and a vein
- Can be a fistula or a graft
- Anatomic site usually forearm, but can be upper arm or thigh
Dialysis Shunt Anatomy

- 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

Dialysis Site Bleeding

- A potential life threat
  - A very high pressure system
  - Can be from three types of breaks in the site integrity
    - Repeated access punctures
    - Pseudoaneurysms
    - True aneurysms
  - Timing after dialysis helpful in determining type of bleeding

Dialysis Shunt Anatomy

- AV graft: AV bridge using a donor vein or synthetic material

Dialysis Shunt Anatomy

- AV fistula
  - Radial-cephalic (Brascia-Cimino forearm) most commonly used
  - Venous portion receives high pressure, becomes arterialized (hypertrophied and dilated), then suitable for dialysis
Dialysis Site Bleeding

- The balance
  - Stop the bleeding
  - Do not compromise the shunt

- However, if the bleeding is life threatening, clotting of the shunt is an acceptable risk to save the patient’s life.

Dialysis Site Bleeding

- 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.

Spock Approves

There is much logic in this.
Dialysis Site Bleeding

- Direct pressure to the site of bleeding for a minimum of 5 minutes
  - Holes are usually small (from dialysis needle)
  - If true aneurysm or pseudoaneurysm ruptures, patient can rapidly exsanguinate

Dialysis Site Bleeding

- Put pressure directly at the site of bleeding with fingertip or folded gauze pad

Dialysis Site Bleeding

- AVOID bulky dressing or using elastic bandages as they lead to increased risk of clot formation in the dialysis access

Wrong Way

Bleeding in Dialysis Patients

- Direct pressure on feeding vessels
  - Digital pressure over feeding and draining vessels above and below bleeding site
Bleeding in Dialysis Patients

- Direct pressure on feeding vessels
  - AVOID proximal occlusion (e.g. BP cuff, tourniquet) unless absolutely necessary

Bleeding in Dialysis Patients

- 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

Bleeding in Dialysis Patients

- 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

Bleeding in Dialysis Patients

- Suture
  - Subcutaneous injection of bleeding site with lidocaine with epinephrine
  - Figure-of-eight or horizontal mattress suture with 4-0 nonabsorptive suture using a noncutting needle
    - Suture as superficially as possible to prevent damage to graft/fistula
  - Remove suture in several days
Bleeding in Dialysis Patients

- **Suture**
  - May require venogram to evaluate patency before next use

Bleeding in Dialysis Patients

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

Bleeding in Dialysis Patients

- **Vasoconstrictive agents**
  - Subcutaneous injection of 2-4 mL lidocaine with epinephrine in a wheel around bleeding site
  - May vasoconstrict and / or compress
Bleeding in Dialysis Patients

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

Bleeding in Dialysis Patients

- 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)
      - Warfarin
      - Novel oral anticoagulants – extremely difficult to reverse and contraindicated in renal failure patients, so patients should not be on these agents

Bleeding in Dialysis Patients

- After the 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

Bleeding in Dialysis Patients

- After the bleeding stops
  - There are no recommendations regarding how or when to evaluate the access for patency after treatment for bleeding
Bleeding in Dialysis Patients

- 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.

Bleeding in Dialysis Patients

- 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.

Bleeding in Dialysis Patients

- Cryoprecipitate
  - May be useful, but DDAVP is preferred.

Bleeding in Dialysis Patients

- 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.
Bleeding in Dialysis Patients

- 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
  - Reversing NOACs
    - Contraindicated in renal failure
    - Very few options for reversal at this point

Take Home Points

- Bleeding from dialysis access can be life threatening
- A systematic approach starting with direct pressure is effective in most cases of bleeding from vascular access sites in dialysis patients

Clotting of the access site is a potential complication of treatment of significant bleeding
- Uremic platelet dysfunction can be treated with DDAVP, but little data exists regarding when it is truly indicated
Bleeding in Dialysis Patients

Take Home Points

- Dialysis patients on warfarin with severe or life-threatening bleeding may need to be reversed, preferably using prothrombin complex concentrates

Thank You For Your Attention!