The views presented reflect those of the author/presenter and do not necessarily reflect those of ASDIN nor serve as an endorsement of safety, efficacy or applicability of said procedure.

Catheters – From the Simple to the Infinitely Complicated

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The Simple

• We will skip …
• Except – don’t use the subclavian vein

Why isn’t the damn thing working?

• Tip position
  - SVC vs RA (JVIR 2003:527)
• Kinking of the catheter
• Clamps
• Fibrin sheath

From: Essentials of Percutaneous Dialysis Interventions
Bleeding Tract

- I have been using silver nitrate sticks
- Stitches
- Topical thrombin
- DDAVP 16 µg IV over 20 minutes
  - Dose 0.3 µg/kg, max. 20 µg

CVO

Needs a dialysis catheter
Catheter fell out two days ago
The “stuck” catheter

- Intraluminal balloon dilation
  - Can use 0.018 inch balloons
  - Two studies have shown technical success
    - Ryan, JVIR 2012:1089 – Hong, JVA 2011:381

Complications

- Pneumothorax
- Hemopericardium
- Air embolism
- Don’t assume catheter insertions are easy!
Femoral Placement

- 123 catheters
- Mean catheter primary patency failure time was 96.3 days
- Primary patency at 180 days was 27.1%
- Multivariate analysis revealed that patients whose catheters were on the left side (p=0.009), were of increasing age at the time of insertion (p=0.002) and had diabetes (p=0.001)
- The catheter infection rate was 1.4 per 1000 catheter days.

Translumbar Placement

Place patient prone (right is right)
US or CT guidance...or
Puncture 10 cm above iliac crest and 10 cm right of midline
Aim for L2/L3

From: Essentials of Percutaneous Dialysis Interventions

Translumbar Placement

21G 15cm needle advanced 45 degrees cephalad and medial towards IVC under fluoroscopic guidance
May touch vertebral body and redirect anterior
Can place a marker in IVC via femoral vein

Aspirate to confirm entry into IVC
Inject contrast to confirm needle placement then place 0.018 wire

Courtesy: Abigail Falk
A coaxial dilator with an inner metal stiffener is used to access IVC, stiff wire then placed into IVC tunnelling laterally and create long tunnel to exit side. Choose a long catheter, typically 55cm and split tip.

**Translumbar Placement**

- Risks - infection, fibrin sheath, IVC thrombosis, dislodgement (13%)
- Retroperitoneal Hemorrhage
- Can place catheter above/through IVC filter (target)
- Can perform catheter exchange over wire

**Retrospective study**

26 patients
39 translumbar catheters
1 retroperitoneal hematoma
1 year cumulative assisted primary patency rate 73%
2.84/1000 catheter days infection rate (2.02/1000 catheter days exit site infection**)

**Translumbar High Inferior Vena Cava Access**: Placement in Patients with Thrombosed Inferior Vena Cava Filters

Azygos Vein Dialysis Catheter Placement Using the Translumbar Approach in a Patient with Inferior Vena Cava Occlusion

- Translumbar placement of the catheter into the right ascending lumbar vein.
- Tip in upper portion of azygos vein.
Transhepatic Guidance of Translumbar Hemodialysis Catheter Placement

Occluded jugular, subclavian, femoral, renal and IVC. Transhepatic vein access with target/snare into IVC at left renal vein.

Transhepatic Catheter Placement

Much less common for hemodialysis catheter placement than translumbar placement. More commonly described in the pediatric literature.

Transhepatic Catheter Placement

Similar to biliary work, except the goal is to opacify a hepatic vein instead of the biliary tree

U/S guidance…or

Mid-axillary approach through the level of ribs 10-12

15-cm long 22-gauge Chiba needle (Cook, Inc) advanced above the rib into the liver parenchyma

Transhepatic Catheter Placement

Dilute contrast injected under fluoroscopy as needle withdrawn

Opacify hepatic vein

0.018-inch wire advanced into IVC

Place dilator with inner metal stiffener (Accustick, Boston Scientific)

Transhepatic Catheter Placement

Exchange for standard 0.035-inch stiff guidewire

Dilate tract and place peel-away sheath

Create tunnel superiorly (?)

Longer catheter required

Place tip in RA

Transhepatic Catheter Placement
Transhepatic Catheter Placement

Retrospective study
16 patients
21 catheters
30 exchanges in 10 patients
5 (24%) dislodged
6 (29%) complications, including one death from intraperitoneal hemorrhage


Transhepatic catheters: Functional outcome

Retrospective study
22 patients
127 catheters (tips in 105 RA, 15 IVC, 4 SVC, 1 hemiazygous, 1 hepatic, 1?)
24 transhepatic access sites
105 exchanges in 14 patients (high maintenance rate)
37% migration
22% sepsis
17% catheter thrombosis
Complications: bleeding, intercostal pain, one death due to MI


Transhepatic Catheter Placement

Risks - hepatic vein and IVC thrombosis, dislodgement, intraperitoneal hemorrhage, cardiac tamponade secondary to right atrial erosion, biliary portal fistula
Painful if intercostal placement


Other Placement Sites – Brachiocephalic Vein

Hold transducer at very steep angle posterior to clavicle.
Puncture without needle guide.
Clamp marks needle entry site into skin. Arrow entry site into vein. Final image.


Other Placement Sites – Neck Veins

U/S of neck - multiple collaterals, no jugular, assume stenosis/occlusion
Can access collateral under U/S
Place snare from below and use as target


Other Placement Sites – Transrenal IVC Access

Occl’d IVC at filter
Left transrenal wire into IVC/RA
Final CT image

Other Novel Sites

• Intercostal veins
• Collaterals in chest
• CT-V may help planning
  – HeRO

In Summary

• Careful technique is very important
• Visualize every step
• There are other options than traditional sites
• Exotic options are dangerous with limited patency