

# Provincial Guidelines for Vascular Access for Patients with Chronic Hemodialysis as Primary Modality

## 1.0 Creation

1. Counsel all patients about vein preservation as part of routine pre-dialysis care.
2. Refer for vascular access (VA) creation when the patient's eGFR has decreased to <15-20 mL/min/1.73 m<sup>2</sup> and the patient is expected to require dialysis within 12 months (Schechter, 2014<sup>1</sup>). This timeline assumes the anticipated surgical wait time for fistula creation is consistent with the BCR guideline [Indications & Urgency Criteria for Surgical Vascular Access Procedures for Hemodialysis \(Adults\)](#).
  - For CKD patients whose anticipated dialysis start is within 3 months, the target wait time between decision date and procedure date is 4 weeks.
  - For CKD patients whose anticipated dialysis start is more than 3 months, the target wait time from decision date to procedure date is 12 weeks.
3. Target the following timeframes for HD access creation/placement (evidence):
  - a) AVFs: >6 - 9 months prior to the anticipated start of HD.
  - b) AVGs: Place as soon as dialysis start date has been identified. If unable to place AVG within this timeframe, start dialysis with a catheter and arrange for an AVG as soon as possible (Rationale: Some AVGs only remain patent for 3 – 6 weeks).
  - c) Catheters: as close as possible to the anticipated start of HD
4. Prior to placement of a permanent HD access, undertake a thorough evaluation:
  - a) History and physical examination; and
  - b) Mapping of vessels using ultrasound.

Venography may be useful to further assess the veins +/- to rule out central vein stenosis on a case by case basis (evidence). For patients not yet on dialysis, weigh the benefits of venography against the risks associated with exposure to contrast media.
5. If the vessels are adequate, use the non-dominant arm for creation/placement of a permanent HD access; if not, use the dominant arm (evidence).
6. The order of preference for HD access for patients requiring chronic hemodialysis is AV fistula, then AV graft, then catheter (evidence).
7. For AV fistulas, the preferred order of creation is (evidence):
  - a) Radio-cephalic fistula (RCF) (wrist or forearm)
  - b) Brachio-cephalic fistula (BCF) (elbow)
  - c) Transposed brachio-basilic fistula (tBBF) (elbow)
8. For AV grafts, the preferred site and type of graft is:
  - a) Forearm looped graft
  - b) Upper arm straight graft
  - c) Femoral looped graft
9. Hemodialysis catheters are used as a last option for chronic HD access (evidence).
  - a) If a hemodialysis catheter is to remain in situ

<sup>1</sup> Schechter, S et al. Timing of Arteriovenous Fistula Creation in Patients With CKD: A Decision Analysis, 63(1), Jan 2014, p.p., 95 - 103. [www.ajkd.org/article/S0272-6386\(13\)01014-7/abstract](http://www.ajkd.org/article/S0272-6386(13)01014-7/abstract).

for greater than 2 weeks duration, utilize a tunneled cuffed catheter.

- b) The preferred site for a tunneled cuffed catheter is the right internal jugular vein.
- c) Tunneled, cuffed catheters are inserted under fluoroscopy. The catheter tip is adjusted so the tip is in the mid right atrium when the patient is supine (proximal right atrium when the patient is sitting) (evidence). Exception: Femoral catheters are inserted under ultrasound.
- d) Tunneled, cuffed catheters should not be placed on the same side as a maturing or planned AV access, if possible (evidence).

## 2.0 Monitoring

### a) Maturation of created access:

1. At **2 weeks** after creation: Trained individual (VA or kidney clinic nurse +/- nephrologist +/-vascular surgeon) assesses<sup>2</sup> AVF/graft:
  - a) If absent thrill or bruit, refer patient urgently referred back to the vascular surgeon.
2. At **6 weeks** after creations: VA team assesses AVF/graft for maturation failure:
  - a) If inadequate maturation, initiate appropriate investigations (fistulogram) and interventions.
3. **Q6 months:** VA team assesses preemptive AVF/graft for patency until dialysis is initiated.
4. At **4-6 weeks prior** to anticipated initiation of hemodialysis: Trained individual (VA or kidney clinic nurse +/- nephrologist +/-vascular surgeon) assesses AVF/graft for adequacy to cannulate:
  - a) If access inadequate for cannulation, initiate appropriate investigations and interventions.

### b) Upon initiation of dialysis:

1. Monitor AVFs/AVGs q 4-6 weeks by the following methods (preferred order):
  - a) Access flow measurements
  - b) Dynamic or venous pressure measurement
  - c) Access recirculation using 2 needle, 3 sample urea method if other technology not available
2. Monitor catheter function on a regular basis using:
  - a) Clinical indicators such as: ability to flush the HD catheter, ability to achieve desired blood pump speeds, adequacy of dialysis, alteplase utilization and the clinical condition of the patient.
  - b) Recirculation values preferably using the dilution method (transonic machine) q4 - 6 weeks, if identified by unit policy as a requirement.

Contact MD/NP to discuss next steps (e.g., alteplase intervention) in situations of high arterial and venous pressures and low blood pump speed in consecutive dialysis runs. A high recirculation (i.e., > 10%) gives additional evidence suggesting catheter dysfunction.

3. Investigation and treatment by venography (fistulogram) is recommended:
  - a) Within 48 hours for:
    - i. Access flows of <300 mL/min in AVF or <500 mL/min in AVG.
    - ii. Decrease in access flow of ≥50 % from baseline; or
    - iii. Blood pump speed <200 mL/min with 15g needle or >50% drop from baseline
    - iv. Evidence of SVC syndrome (acute facial swelling with respiratory compromise)
    - v. Stage 4 (severe) steal syndrome (arteriogram)

<sup>2</sup> Assessments are ideally done in-person. If not practical (i.e., patient lives a long distance from an HD unit), telephone or telehealth assessment is an appropriate alternative.

- b) Within 24 hours for suspected clotted fistula;  
AND:
  - i. Unable to cannulate; or
  - ii. Loss of pulse/thrill in AVG.

For indications within 4 weeks and 6 weeks, refer to the BCR guideline [Radiology Hemodialysis Procedures](#).

- 4. The use of TPA on >2 occasions in a 2-week period in a patient with a catheter needs to be investigated. Notify the physician for further orders.
- 5. If clinically suspicious and/or evidence of fibrin sheath or ongoing unexplained catheter dysfunction: (1) replace the catheter (preferred) or (2) identify catheter as resistant and administer alteplase on a regular basis (exceptional basis only).
- 6. Use venography in patients with persistent catheter dysfunction or in patients who develop new facial swelling to rule out central vein stenosis.

### c) Intervention

- 1. Angioplasty is the first option for treatment of stenosis of the AVF/AVG or central veins, unless otherwise directed by the radiologist or vascular surgeon.
- 2. Guidelines for angioplasty treatment are as follows:
  - a) Usually within 2 weeks
  - b) Within 48 hrs days if:
    - i. absolute access flow <300 ml/min (AVF) or <500 mL/min (AVG) or
    - ii. drop from baseline of >50% or
    - iii. clinical indication ( severe bleeding or unable to properly dialyze pts)
- 3. Surgical revision of a problematic fistula/graft should be done on an urgent basis, as per surgical priority scale.

## 3.0 Development

- Developed 2005
- Updated March 2013
- Updated January 2019.

## 4.0 Sponsors

- BC Renal Hemodialysis Committee
- BC Renal Medical Advisory Committee