Algorithm for optimal access from start to finish

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Long term outcomes of fistulas and grafts

- We evaluated 1177 fistulas and 350 grafts created in 2000-2005 and 2007-2009, allowing potential 3yr follow up on all patients. Fistulas = 77%.
- Males comprised 54.5% of this group and were more likely to receive a fistula (58.6%).
- Females received 59.6% of the grafts.
- Fistulas - 11% Cimino, 18% BB, 68% BC
- Grafts - 12% Cephalic, 52% Basilic, 28% Axillary
  - Most grafts were in the upper arm and were utilized in patients deemed to have poor vessels for fistulas or prior failed fistula
### Long term outcomes of fistulas and grafts

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Abandon</th>
<th>&gt;2yrs</th>
<th>&gt;3yrs</th>
<th>Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fistulas</td>
<td>60.2</td>
<td>24%</td>
<td>255 (23%)</td>
<td>172 (14.8%)</td>
<td>375/1098 fist .34/fist</td>
</tr>
<tr>
<td>Grafts</td>
<td>63.2</td>
<td>38%</td>
<td>67 (19%)</td>
<td>45 (12.8%)</td>
<td>390/324 graft 1.2/graft</td>
</tr>
</tbody>
</table>

No significant difference in outcomes except for number of procedures to maintain patency and percent abandoned (p=<.001).

Vessel mapping performed in 98% with >3mm vessel baseline for use.

Access use at first outpatient hemodialysis, by pre-ESRD nephrology care, 2011

Figure 1.22 (Volume 2)

Percent of patients

- Catheter only
- Catheter with maturing graft
- Catheter with maturing fistula
- AV graft
- AV fistula

All | No nephrologist | Neph 0-12 mo | Neph >12 mo | Any nephrologist

Incident hemodialysis patients, 2011.

USRDS 2013 ADR
Catheter Last

- 44% of patients starting with a catheter were still using it at 90 days.
- 33% were dialyzing via a graft at 90 days and only 25% were using a fistula.
- Fistula maturation times can take 3-6 months.
- Fistula maturation failure can occur in 14-44%.
- Average time to first catheter infection = 160 days
  - J Vasc Interv Radiol. 2013 Sep;24(9):1289-94
Maturation based on vein caliber

- UNC study - 2mm vein = 16% mature, >2mm = 76% mature, >3mm = 84% mature
- Virginia - 3mm vein = 75% functional
- Arizona group - 2.5mm = 57% mature, 4mm vein = 94% mature
- New Orleans - Transposed only if >4mm
But wait, there’s more

- Arterial size and calcification matter
  - Important to include arteries in pre-op mapping. Small calcified artery has low maturation despite vein size.

- Renal function is important
  - A GFR > 15 give you time to try a borderline vessel

- Does patient have a catheter already
  - The clock is ticking

- Know your maturation time for fistulas
  - Failures reported 20-60%. Functional maturation varies from 2 weeks to almost 6 months

- Age is a factor
  - HD and age >80 = 18 month life expectancy

- Body habitus matters
  - Obese pts will need transposition
Graft Materials
Access Methods

RC loop
Radio-basilic

FA graft with 2^0 BVT. NO CATH needed

JVA 2009 Jul-Sep;10(3):203-6

Ax-Fem
Transposition
Vascular Access Algorithm

- **GFR >20 - Fistula, even with borderline vessels.**
  - May need an intervention to reach maturity. If not successful within 3 months, move on. Possible first stage BB fistula.
  - If all vessels are 2mm or less, wait until GFR <15 and place graft.

- **GFR 15-20 – Cephalic fistulas, BVT**
  - Watch GFR. May need a mature access in 6-12 weeks. Know your success rate and time to maturity. Borderline vessels unlikely.

- **GFR <15 – Simple cephalic fistulas**
  - Transposition fistula if your success is >80% and achieve maturity < 3 months. Otherwise, graft. Watch GFR. If >80yrs, place graft if simple fistula not easily attained using >3mm vessels.

- If pt. ready to start or has a catheter in place-achieve your access ASAP.
  - Consider early use graft in forearm with BVT or BC in future as way to avoid or mitigate use of catheter and set up a second stage fistula.
Vascular Access Algorithm

- When access is clotted, aggressively restore function.
  - Use angiogram, plasty, stenting, revision as needed.
  - Repeated clot, consider anti-coag or anti-platelet meds for coagulopathy. May need new access in same or other arm.
  - For aneurysmal areas can stent, plicate, primary repair.
  - Can bypass failed fistula with graft in same arm.

- If new access needed, look for potential fistula in same or other arm.

- If central veins stenotic/occluded and above fails, consider HeRO, venolysis, rib or clavicle resection.
Vascular Access Algorithm

- Know your results with access in lower extremity and use techniques and materials that work best for you.
  - Consider saphenous or femoral vein fistulas.
  - Semi-biologics seem to work well in this position.
- Use lower extremity only when upper torso is exhausted or patient prefers.
- In rare instances unusual access may be needed.
  - Axillo-femoral, Ax-Jugular, Ax-atrium, Int. mammary fistula.
- Patient should only very rarely be declared “catheter dependent”.
  - This most commonly occurs when patient or surgeon give up further attempts at AV access.
Results from Start to Finish

- Patients starting HD with cath = 60%.
  - Fistulas in 32%, grafts in 8%.
  - 53% started acutely as inpatients.
- Prevalent patients at end of 2013
  - N=390
- Fistulas used on 67%, grafts on 26% and catheters on 7%.
  - Fistula prevalence past 7 years -67-70%.
Conclusions

- Vessel map (not vein map) the patient
- Examine the patient
- Know the GFR, patient age, body habitus.
- Know how long it takes for your various fistulas to mature.
- Know your fistula failure rate.
- Know the various graft materials and devices.
  - Hybrid, HeRO, Flixene, Acuseal, Artegraft, etc)
- Be creative but remember Primum non nocere.
- A good graft is better than a bad fistula
- Develop your algorithm