Resection, Reduction, and Revision of Aneurysmal AV Fistulas

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Aneurysmal AVF

• Over last decade K-DOQI recommendations and the “Fistula First” initiative have succeeded in having more fistulas created for dialysis access.

• In doing so, surgeons are using more upper arm and complex constructs to maintain autologous access.
Aneurysmal AVF

• Aneurysmal dilation of AVF is a known complication with an reported incidence of 1-5%. This appears higher in the upper arm AVF.

• Aneurysm formation in the venous outflow of an AVF is thought to be secondary to several factors
  - Central venous outflow obstruction
  - Overuse--sticking same general area repetitively
  - Thin walled veins
Aneursymal AVF

- Aneurysms in AVF result in several problems
  - Skin breakdown/ulceration
  - Bleeding
  - Poor flow
  - Thrombosis
  - Hematoma
  - Unpleasant appearance
Aneurysmal AVF

- While there are reports of revising focal aneurysmal AVF’s, most authors report resecting the aneurysmal portion and using PTFE for an interposition graft.

- Larger more diffuse aneurysmal AVF’s are sacrificed and replaced by standard PTFE dialysis grafts.
Aneursymal AVF

• In this series, 13 dialysis patients with large, diffuse, serpentine, aneurysmal AVF’s were evaluated and treated

• In an attempt to retain an all autologous construct, an operation was performed in which
  • Excess length was resected
  • The luminal diameter was reduced
  • The AVF was reconstructed
Aneurysmal AVF

• Between Jan 2005 and July 2007

• 13 patients have been treated with this technique

• All had tunneled dialysis catheters placed at time of surgery
## Patient Data

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Location/Type AVF</th>
<th>Yrs in use</th>
<th>Reason for Referral/Tx</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>F</td>
<td>RUE Basilic Trans.</td>
<td>1.5 years</td>
<td>Bleeding / Erosion</td>
<td>6.5 cm</td>
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<tr>
<td>46</td>
<td>M</td>
<td>RUE Cephalic</td>
<td>3.5 years</td>
<td>Bleeding / Erosion</td>
<td>5.5 cm</td>
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<tr>
<td>32</td>
<td>F</td>
<td>RUE Cephalic</td>
<td>4.5 years</td>
<td>Poor dialysis</td>
<td>4.5 cm</td>
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<td>29</td>
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<td>LUE Cephalic</td>
<td>3 years</td>
<td>Bleeding / Erosion</td>
<td>5.0 cm</td>
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<tr>
<td>34</td>
<td>M</td>
<td>LUE Cephalic</td>
<td>1 year</td>
<td>Bleeding / Erosion</td>
<td>4.5 cm</td>
</tr>
<tr>
<td>83</td>
<td>M</td>
<td>RUE Cephalic</td>
<td>5 years</td>
<td>Bleeding / Erosion</td>
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<tr>
<td>48</td>
<td>M</td>
<td>L Radiocephalic</td>
<td>2 years</td>
<td>Erosion / Infection</td>
<td>7 cm</td>
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<tr>
<td>34</td>
<td>F</td>
<td>LUE Cephalic</td>
<td>4 years</td>
<td>Erosion / Infection</td>
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<tr>
<td>39</td>
<td>F</td>
<td>LUE Cephalic</td>
<td>10 years</td>
<td>Bleeding/Erosion</td>
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<tr>
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<td>M</td>
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<td>Thrombosis</td>
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<tr>
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<td>Poor Flow</td>
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<td>6 years</td>
<td>Erosion / Infection</td>
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<th>Age</th>
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<th>Location/Type AVF</th>
<th>Failed Renal Transplant</th>
<th>Diabetes</th>
<th>Smoker</th>
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Pre-op Work Up

- All patients were examined with pre-op ultrasound
- All patients underwent fistulagrams to rule out central venous obstruction
Example Case

• 33 y/o female with polycystic kidney disease who had LUE basilic vein transposition done 4.5 years ago to prepare for dialysis.

• Received kidney tx prior to going on dialysis but AVF was aneurysmal after 6 months

• Transplant failed and on dialysis for 8 months

• Presents with 2 week history of erythema near largest part of aneurysm

• Admitted with fever, leukocytosis, and pain
Description of Surgery

- Aneursymal AVF is first exposed and dissected free from the surrounding tissue.

- The amount of excess length is determined.
Description of Surgery

- After heparin, the fistula is clamped and opened

- The excess length is then resected
Description of Surgery

- The excess vein width is trimmed and the back wall is sutured

- A 20 french red rubber catheter is used as a guide
Description of Surgery

• The vessel is reconstructed using 5-0 Prolene

• Any excess vein is trimmed or plicated in the suture line
Description of Surgery

- The suture line is positioned medially on the arm.
- Excess and scarred skin is resected
Description of Surgery

• A slight flap is created in the upper skin edge to make room for the new AVF and the skin is closed.

• A tunneled catheter is placed for between 6-8 wks, at which time it is removed and dialysis is started in the new AVF
Review of Procedure
Before & After
Outcome

• 11/13 AVF’s are patent and in use
  – 1 patent for 1 year then thrombosed secondary to cardiac arrest
  – 1 wound infection resulting in pseudoaneurysm requiring ligation

• Mean follow up = 1 year
  – Range: 1 week to 2.5 years

• No recurrent aneurysms to date
Complications

- 8/13 peri-incisional numbness
- 2/13 wound infections
  - 1 pseudoaneurysm
  - 1 superficially healed with local wound care
- 1/13 stenosis – treated with angioplasty
Observations

• Most patients are young (range 28 – 48 yr)
  – 3/13 > 50 years of age

• 7/13 patients have failed kidney transplant

• Low number of diabetics and smokers
  – 3/13 smokers
  – 4/13 diabetic

• 4/13 pts describe their fistula as becoming aneurysmal within months after creation, even prior to any attempts at dialysis
Conclusion

• Aneursymal AVFs can cause significant problems over time
  – Bleeding
  – Infection
  – Poor flow
  – Stigma

• The technique of resection, reduction, and revision of aneurysmal AVFs is a surgical option to salvage the AVF and maintain an all autologous construct
Thank you.