AV Fistula Salvage with Novel Procedure:

Zamora Patch-Wrap

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Disclosures:

Medical Advisor
For
-Artegraft Inc.
-Transonic Inc.
CAUSES:
- Almost always associated with Venous outflow stenosis/occlusion
- Vascular trauma from needle sticks (esp. Bottonhole)
- Thin, weak venous wall that both dilates and elongates
- Markedly pulsatile flow (inflow-outflow mismatch)
- Venous branches and scarring can immobilize vein leading to kinks/twists
AVF Aneurysmal change
**Venous Outflow Stenosis**

- **Types:**
  - Central venous stenosis/occlusion from IJ Dialysis catheters, pacemaker wires, occasionally CVL/PICC line
  - Cephalic arch stenosis- deltopectoral groove
  - Swing segment stenosis- basilic vein transposition
  - Buttonhole scars
  - Fistula vein kinking/twists
  - Fistula infiltration/hematoma
Venous Outflow Stenosis
Sequelae:

- Needle stick scarring and bleeding (esp. buttonhole)
- Fusiform aneurysms and/or saccular aneurysm/pseudoaneurysms
- Overlying “thin or shiny skin/scar” (pink or lacking pigment) and/or ulcer (no skin)
- Can have tremendous (>3 liter/min) vascular flow (high-output CHF)
- Steal Syndrome in ipsilateral hand/foot
Venous Outflow Stenosis
Present Techniques:
1. Excision aneurysm & primary re-anastamosis repair
2. Plication (side excision and repair fistula wall)
3. Advancement skin flaps
4. “Jump graft” interposition with Artegraft/PTFE (with or without excision of aneurysm)
5. Others
Present techniques do not address all of aneurysm “sequelae”

“Jump graft” interposition turns native fistula into graft

- Loses privileged interface with blood touching native venous endothelium
- Graft is more thrombogenic
- Grafts have more interventions and shorter access lifespan
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- Technique first performed in 2005
- 105 procedures in 81 patients thru 11/2013
  - 18 patients had multiple (2-3) wraps of different areas
- 55 patients wrapped with PTFE (most early) and 50 wrapped with Artegraft (starting 2011)
- All had aneurysmal dilatation and
  - All but 2-3 had radiologic outflow stenosis
  - 57 aneurysmal dilatation only
  - 13 steal syndrome
  - 6 hemorrhage
  - 5 central occlusion
- Several PTFE wraps removed for graft infection
- 85-90% of all patch-wraps still functioning
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- **4-pronged approach to aneurysmal AVF**
  1. Percutaneous angioplasty of outflow stenosis
  2. Transonic flow probes (2 crystal- or 4 crystal-Confidence) to quantitate AVF flow (pre and post wrap)
  3. External graft wrap (PTFE or Artegraft) of AV fistula
    - Fusiform aneurysms wrapped only
    - Saccular aneurysms wrapped after excision/reanastomosis or plication of aneurysm
    - Strengthens weakened fistula wall to prevent aneurysm recurrence
    - Can be used for “banding” of high flow AVFs
  4. Create subcutaneous flap to place AVF under virgin skin
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- Transonic Flow Probes
  1. Only external doppler probe that quantitates AVF flow
  2. Gives printed waveform and max-mean-min flows
Transonic Flow Probes

1. QC and Opti-max (2-crystal) probes detect “linear” flow only
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- **Transonic Flow Probes**
  1. Confidence (4-crystal) probe detects linear and tangential flow
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- Transonic Flow Probes
  1. Probes detect flow on Artegraft directly, but not PTFE
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- **PTFE wrap** with 10-19 mm Impra grafts
  1. Cut longitudinal and sewn with 5-0 proline
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- **Artegraft wrap** with 7-10.5 mm Bovine graft
  1. Cut longitudinal and sewn with 5-0 proline-”straight”
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- Artegraft wrap with 7-10.5 mm Bovine graft
  1. Cut longitudinal and sewn with 5-0 proline-”spiral”
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- **Graft Wrap**
  1. Easiest to sew from arterial to venous end
  2. Both grafts can be sewn in **tubular** (outflow=inflow diameter) or **conical** (outflow diameter> inflow diameter) configuration
Graft Wrap

1. 5-0 proline “pexy” of grafts to AVF at inflow and outflow
2. If “straight”, place suture line deep, away from needle sticks
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- **Subcutaneous Skin Flap**
  1. AVF elongates with dilatation so often redundant length
  2. Curvilinear Lateral (medial) flap created ~3-8 cm depth
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- **Subcutaneous Skin Flap**
  1. Place graft-wrapped AVF under new skin
  2. Pexy graft-wrapped AVF in place with 3-0 interrupted Vicryl
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- **Subcutaneous Skin Flap**
  1. Close “dead space” under flap with multi layer closure
  2. Use “low-heparin” dialysis for one week postop to prevent hematomas
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- Aneurysm excision & PTFE IMPRA wrap (2005)
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Basilic transposition plication/Artegraft wrap/banding (2014)
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FLOW (ml/min)

CHART SPEED - 20 MM/SEC

Probe ID: HQD12FTV18
MAX = 1260.00 ml/min
MEAN = 1004.00 ml/min
MIN = 772.00 ml/min
PI = 0.5

MAX = 2112.00 ml/min
MEAN = 1260.00 ml/min
MIN = 808.00 ml/min
PI = 1.0

MAX = 2384.00 ml/min
MEAN = 1612.00 ml/min
MIN = 1016.00 ml/min
PI = 0.8
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Artegraft “Patch Wrap” and Banding of Aneurysmal Cephalic AVF (2/26/2013)
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Transonic Flow-QC
FEB. 26, 2013 4:14PM

Patient: Brown, Raymond
术式: LKEAVF (POST resect)

MAP: 70

FLOW (ml/min)

Probe ID: HQD12FTV7
MAX = 4136.00 ml/min
MEAN = 3168.00 ml/min
MIN = 2492.00 ml/min
PI = 0.5

Transonic Flow-QC
FEB. 26, 2013 4:38PM

Patient: Brown, Raymond
术式: LKEAVF (POST wrap)

MAP: 68 probe

FLOW (ml/min)

Probe ID: HQD8FMV2132
MAX = 1822.00 ml/min
MEAN = 1354.00 ml/min
MIN = 1060.00 ml/min
PI = 0.6
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- Plastic, yet functional, repair that maintains blood in contact with native vein (still a fistula)
- Patch-wrap strengthens the AVF wall to prevent recurrent aneurysm
- Can be used for banding to markedly lessen flow in high-output CHF or ‘steal’ scenarios using Transonic probes
- Adjustable to central venous issues by matching inflow to compromised outflow
Medial/Lateral subcutaneous flap bypasses debilitated skin by placing graft-wrapped AVF under “new skin”

Versatile technique for AVF salvage:
- Spiral or straight wrap with Artegraft
- Tubular or conical wrap configuration
- Can be used with excision/plication/banding/nothing)

Artegraft use lessens “infection” potential

Patch-wrap gives new life to “old fistula” that might otherwise be replaced with graft
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