Should we re-intervene after failure of forearm wrist AVF?

Surendra Shenoy M.D., Ph.D.
Section of Transplantation
Department of Surgery
Barnes Jewish Hospital
Disclosure

Speaker name: Surendra Shenoy M.D., Ph.D.

I have the following potential conflicts of interest to report:

Consulting
Employment in industry
Shareholder in a healthcare company
Owner of a healthcare company
Other(s)

XX I do not have any potential conflict of interest for this presentation
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**Background**

Forearm AVF

‘an ideal vascular access’

Advantages of autologous tissue

- Better long term patency
- Lower risk of thrombosis
- Lower risk of infection

Advantage of forearm location

- Multiple outflows
- Lower number of interventions
- Low risk of high flow complications
- Low risk of steal
- Options for secondary AVF

‘Fistula at no other site has similar longevity’

Definite need to increase the prevalence of FA AVF
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**Background**

Patient with functioning FA AVF enjoy the benefit of getting adequate dialysis that is associated with improved longevity

**What is the problem?**

- Forearm to upper arm ratio: 32 - 80%
- Reported early failure: 0.3 – 26%
- Wide range failure to mature: 3 – 37%

Effect of poor understanding of creation/maturation on planning, execution of plan and trouble shooting

- Ohira S et.el. HDI 06; 10: 173
- Wilmink T et.al. Eu J Vasc Endo Vasc 2016;51: 134
- Buickians A et.al. JVS 2008; 47: 415

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**Background**

**Non maturation**

Attempts to increase AVF ‘joining vein to an artery’

Attempts to salvage failing AVF

Absurd increase in salvage procedures

Increasing catheter dependence

AVF really superior or AVG to start HD?

DeSilva RN et.al. JASN 2013;
Lacson E, et.al. AJKD 2007;50:379-95
Results of early intervention

Reports of fistula maturation following early intervention

- Thrombectomy
- Stenosis dilation
- Forceful vein dilation

Mostly single center, cohort experience
Lots of experience in interventional literature
Successful but small reports in surgical literature

\[\text{\downarrow patency} \quad \text{\uparrow need for interventions}\]

It works!

When? Where?

Why? How?

Beathard GA et.al. Am J Kid Dis 1999; 33:910
Clark TWI et.al. Radiol 2007; 242: 286
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Presentation Objective

Evaluate & learn from current experience

- Access maturation
- Failure mode
- Available treatment modalities
- Outcome
- Tailoring the treatment
Physiology of AVF maturation

Volume flow
Capacity of the pump diameter, stiffness & length of the tubes

Anatomic configuration and resultant flow pattern related injury dictates the short term and long term AVF function
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Hypothesis

Acute increase in the volume flow caused by AV communication creates flow related ‘stress zones’ in the access circuit. Stress that exceeds ‘physiological threshold’ results in ‘injury response’. Anatomic configuration and flow modulation can alter the stress.

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**Failure modes of AVF**

**Early failure**
- Thrombosis
- Patent (not usable)
- Deep veins
- High flow

**Late failure**
- Thrombosis
- NAS ulcers
- Nas aneurysm
- Circuit stenosis
- Infections
- Flow problems
  - High flow
  - Low flow
  - ‘STENOSIS’

**Clinical exam with CDDUS**
Management of early thrombosis FAVF

Clinical exam
US evaluation

- Stenosis type/site
  - Clot burden/duration
    - No surgical issues
      - Good inflow
      - Good outflow
      - Intervention
      - Institutional preference
      - Surgical
        - Borderline vessels
        - JAS with good outflow
    - Extended criteria
      - Poor inflow
      - Poor outflow
      - Precious access
        - Consider salvage
      - Other options ++
        - Abandon access
    - Interventional
      - Large vessels with multiple stenosis
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Early failure management

‘patent non mature’

Physical exam & US brachial artery flow and peripheral vein evaluation

Conduit
- deep
- branched

Pulsatility
- outflow

Blood flow
Low = inflow
High flow
?symptoms

Image guided intervention
- Angioplasty
- Stent
- Thrombectomy
- Flow reduction
- Tributary occlusion

Surgical intervention
- Thrombectomy
- Patch angioplasty
- Segment replacement
- Inflow/outflow relocation
- Tributary ligation
- Vein enhancement superficialization

Flow reduction
Distal flow enhancement (DRIL, RUDI, PAI)
Management of non-maturation

1st post op visit 10-14 days
Clinical evaluation
US if problems identified

No problem
Detection of problem

2nd visit 3-5 weeks
Clinic exam
US evaluation

Mature
Close to mature

Detectable problem
Medical imaging
Surgery
Angioplasty

Detection of problem
Observation
Surgery
Angioplasty

Flow >500-600ml/min
Diameter 6mm, length 10cm
Depth <5mm

Thrombectomy
Patch angioplasty
Flow relocation
Segment replacement
Enhancement
Superficialization
Valvotomy

Surgery
Angioplasty
BAM

Good flow deep vein: superficialize
Good flow branched vein: enhance

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Management of late failures

Any FA AVF that has been functioning well for an extended period of time is worth salvage. Ulcers, aneurysms, infections, transplant, high flows do not necessitate fistula closure.

**Principles**

Identify cause of problem
Mostly stenotic

**Interventional**
Mostly angioplasty

**Surgical**

No indication for stent is a FA fistula
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**SUMMARY**

Goal of access to provide longest lasting access needing least interventions without jeopardizing future access options in a reasonable period of time

Functioning forearm AVF is the closest to ‘ideal access’

It is worth attempting to salvage failing forearm access

‘A protocol based approach to evaluate the failure mode, plan the corrective action and maintaining the followup data would help improve our knowledge to make recommendations as to when and where to apply the available management tools in the most productive manner’
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