TADV Patient Pre/Post Ultrasound Evaluation

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Disclosure

Daniel van den Heuvel

I have the following potential conflicts of interest to report:

- Consulting LimFlow SA
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

☐ I do not have any potential conflict of interest
## Surveillance Imaging - What Am I Looking For?

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
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<tr>
<td><strong>Native arterial disease</strong></td>
<td>Even moderate stenosis can threaten graft patency</td>
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<tr>
<td><em>Inflow</em></td>
<td>Duplex findings: Low (&lt;100ml/min) distal VF rates</td>
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<td><strong>TADV In-stent stenosis</strong></td>
<td>Not a common reason for primary graft failure</td>
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<td><em>Conduit</em></td>
<td>Duplex findings: elevated velocities and color aliasing within the stents</td>
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<td><strong>Arterialized vein or venous return issue</strong></td>
<td>Stenosis of LPV, stealing-branch off LPV, venous outflow obstruction</td>
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<tr>
<td><em>Outflow</em></td>
<td>Duplex findings: High proximal VF rates &gt;350ml/min with low distal VF rates &lt;100ml/min (or in the case of venous outflow obstruction, highly resistive waveforms)</td>
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Pre-TADV Imaging Is Needed

Obtain baseline arterial duplex and TBI
- Help plan crossing location and identify heavily-calcified arteries that may create a challenge
- Rule out inflow disease that may threaten TADV patency

Establish a baseline for native tibial flow
- Quantify any reconstituted flow in distal vessels
- Facilitate a comparison between pre- and post-procedure tibial flow to rule-out inflow steal syndrome (proximal to TADV)

Plantar venous mapping to identify size and path of medial and lateral plantar veins
Venous Anatomy – Plantar View

Post-Index Imaging

1. **Obtain first duplex** prior to discharge

2. **Serial duplex every 2-4 weeks** for first 8 weeks

3. **Establish baseline Volume Flow (VF) rates post TADV**
   - CFA through Popliteal level = standard arterial duplex with PSV/EDV
   - Obtain VF rates through stents and into outflow arterialized vein
   - Ideal VF rate through stents and arterialized vein is **100-300ml/min**
   - Post-op TADV waveform should be hyperemic with multiphasic components, starting in femoral vessels
   - Provide a visual assessment of potential residual valves or stealing vessels in the foot that may need treatment
TADV Maturation – Patency Is Key

Why Volume Flow (VF) Rates and not Velocities?

Allows us to **quantify flow** through fistulas by taking **velocity** and **vessel area** into consideration

3 issues to consider when interpreting TADV duplexes

1. **Is flow too high?**
   Flow will not perfuse small metatarsal vessels needed to reach/heal wounds

2. **Is flow too low?**
   Stent patency is threatened

3. **Are there stealing vessels off the arterialized vein?**
   Stents will stay patent but to no perfusion or wound-healing benefit
High VF Rates

**TADV Stent into LPV**

- TADV Inflow VF 1117ml/min
- Distal Stent VF 473ml/min
- Prox LPV VF 440ml/min

**TADV Circuit Outflow/Venous Return**

- Venous return – Ant Tibial V
- Venous return – Parallel PTV
- Venous return – GSV at ankle
Low VF Rates - Native Arterial Stenosis

Moderate TP Trunk stenosis, 311cm/s

VF rate drop to 67ml/min at dist stent/ankle
Low VF Rates - Lateral Plantar Vein (LPV) Stenosis

Normal 256ml/min VF rate at ankle

Velocity of 479 cm/s at prox LPV

Color aliasing/stenosis prox LPV

VF rate drop to 92ml/min at mid LPV
Stealing Vessel (LPV)

Coiling branches directs flow back to LPV and helps pressurize forefoot
Summary

Have a very **low threshold** for duplex imaging post-TADV

**Act quickly to:**
- Maintain patency
- Expedite circuit maturation and perfusion
- Consider coiling to divert blood distally
- Promote wound healing

Duplex US training and frequency is **critical** for the success of TADV
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