Supera for the Juxta-anastomotic AVF Stenosis

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Disclosure

Speaker name:
Dr S. D. Thomas.................................................................

I have the following potential conflicts of interest to report:

☒ Consulting: Abbott Vascular
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☐ I do not have any potential conflict of interest
Venous Stenosis is the leading cause of Access Failure

The Juxta-anastomotic stenosis is the most common site

? Injury to vein during mobilisation
? Stripping of adventitia
? Torsion of Swing Vein
? Wall Sheer Stress, Flow Turbulence
? Geometry of the anastomosis

Juxta-Anastomotic Stenosis (JXAS) stenosis can lead to loss of the AVF

JXAS stenosis frequency ranging from 43% to 100% of all AVFs

JXAS stenosis was identified as the cause of a failure to mature 25-64% of Radiocephalic AVFs that had failed to mature

JXAS stenosis can cause recurrent thrombosis/AVF dysfunction in the mature AVF

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- Torsion of Swing Vein
- Wall Sheer Stress, Flow Turbulence
- Geometry of the anastomosis

Computational Fluid Dynamic Modelling suggests an obtuse shape leads to improved haemodynamics.

Juxta-Anastomotic Geometry

Computational Fluid Dynamic Modelling suggests an obtuse shape leads to improved haemodynamics: Particle Tracking

Juxta-Anastomotic Geometry

Computational Fluid Dynamic Modelling suggests an obtuse shape leads to improved haemodynamics: Velocity Dynamics

Standard End to Side AVF Configuration

Obtuse Shape AVF Configuration

Computational Fluid Dynamic Modelling suggests an obtuse shape leads to improved haemodynamics: Wall Shear Stress

Juxta-Anastomotic Geometry

An Obtuse shaped anastomosis is associated with improved AVF patency and maturation

CAN A VASCULOMIMETIC STENT BE USED TO FAVORABLY CHANGE THE ANASTOMOTIC GEOMETRY?
Standard Bare Metal Nitinol Stent in Juxta-anastomotic shape demonstrating Kink

Abbott Vascular Supera Nitinol Stent in Juxta-anastomotic shape demonstrating kink resistance
Supera can be used to change the anastomotic Shape

Pre-Stent JXAS Stenosis

Post-Stent Supera JXAS
A Stent can be used to taper the diameter transition from artery to vein.
A Stent can be used to taper the diameter transition from artery to vein.
CFD Simulation
Particle Acceleration and Tracking

Syst+ Diast Cycle Pre-Stent
JXAS

Syst+ Diast Cycle Post-Stent
Supera JXAS

Particles Coloured to Velocity-Magnitude in m/s
DOES IMPROVED GEOMETRY AND HAEMODYNAMICS LEAD TO IMPROVED CLINICAL OUTCOMES?
Retrospective Study

- First 42 consecutive patients at our institution
- Failing/Failed AVF
- Mean Follow up 1 year
- 5mm Supera Stent of Various Length

<table>
<thead>
<tr>
<th>Patients</th>
<th>N=42</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (male)</td>
<td>26</td>
<td>62</td>
</tr>
<tr>
<td>Age (at time of stent insertion)</td>
<td>66.7 +/-10.89 yrs.</td>
<td>(40-84)</td>
</tr>
<tr>
<td>Age of AVF (days)</td>
<td>642.3 +/-847.4</td>
<td>(7-3595)</td>
</tr>
<tr>
<td>Previous AVF intervention</td>
<td>22</td>
<td>52.4</td>
</tr>
<tr>
<td>Previous JXAS intervention</td>
<td>14</td>
<td>33.3</td>
</tr>
</tbody>
</table>

- Medical Comorbidities
  - Diabetes | 25 | 59.5 |
  - Hypertension | 37 | 88.1 |
  - High cholesterol | 27 | 64.3 |
  - Smoking | 14 | 33.3 |
  - Ischaemic heart disease | 22 | 52.4 |
  - Peripheral vascular disease | 9 | 21.4 |
  - Stroke | 5 | 11.9 |

- Cause of Renal Failure
  - Unknown | 3 | 7.1 |
  - Diabetes | 20 | 47.6 |
  - Glomerulonephritis | 4 | 9.5 |
  - Hypertension | 5 | 11.9 |
  - Reflux Nephropathy | 2 | 4.8 |
  - Polycystic Kidney Disease | 2 | 4.8 |
  - Renovascular Disease | 3 | 7.1 |
  - Lithium Induced | 2 | 4.8 |
  - Multiple Myeloma | 1 | 2.4 |

- Indications for Intervention
  - Flow Rate <500ml/min | 18 | 42.9 |
  - Dialysis Dysfunction | 9 | 21.4 |
  - Failure to Mature | 6 | 14.3 |
  - Occluded AVF | 9 | 21.4 |

Table 1. Baseline patient and access characteristics and Procedural Details
JXAS Primary Patency: 92.5% at 6 months, 59.8% at 12 months
JXAS Assisted Primary Patency 97.5% at 6 months, 92.9% at 12 months
JXAS Assisted Primary Patency 97.5% at 6 months, 92.9% at 12 months

JXAS Endovascular Re-Intervention rate .31/year
Dialysis performance parameters improved post intervention and were maintained.
Discussion

• How does it compare to other therapies

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<tr>
<th>Study Author</th>
<th>JXAS Intervention</th>
<th>Number of AVFs treated</th>
<th>1 year Primary Patency</th>
<th>1 year Assisted Primary Patency</th>
<th>Secondary Patency</th>
<th>Re-intervention rate (procedures/year)</th>
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<td>PTA</td>
<td>60</td>
<td>53%</td>
<td>NR</td>
<td>84%</td>
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<td>Long et al 2011</td>
<td>Open Surgery</td>
<td>21</td>
<td>71%</td>
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<td>NR</td>
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<td>Mortamais et al 2013</td>
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Primary patency compares favorably published JXAS interventions and surgery
**Discussion**

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Very Low Re-intervention rate with no AVFs lost/ abandoned
Conclusion

Early results suggest a Vasculomimetic stent provides favourable patency of the JXAS stenosis

Longer term results still pending

This is a promising technique to maintain long term vascular access through an arteriovenous fistula
Thank you
Supera for the Juxta-anastomomotic AVF Stenosis

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