Improving Therapies to Treat Dialysis Access Grafts

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LOUISIANA
Disclosures

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• None

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• None

Consultant:  
• None

Stockholder:  
• None

Grant/Research Support:  
• None

Medical/Scientific Boards:  
• None
### Effect of Change in Vascular Access on Patient Mortality in Hemodialysis Patients

#### Association of Mortality Risk With Change in Access Type During 1 Year

<table>
<thead>
<tr>
<th>Covariate Adjustment</th>
<th>RR</th>
<th>95% CI</th>
<th>RR</th>
<th>95% CI</th>
<th>RR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case-mix</td>
<td>2.38</td>
<td>1.76-3.23</td>
<td>1.37</td>
<td>0.81-2.32</td>
<td>3.43</td>
<td>2.42-4.86</td>
</tr>
<tr>
<td>Full set of baseline covariates</td>
<td>2.15</td>
<td>1.58-2.92</td>
<td>1.31</td>
<td>0.77-2.22</td>
<td>2.73</td>
<td>1.92-3.87</td>
</tr>
<tr>
<td>Full set of baseline covariates + follow-up albumin, anthropometric volume, systolic blood pressure, and non-access-related hospitalization rate</td>
<td>2.05</td>
<td>1.48-2.86</td>
<td>1.08</td>
<td>0.60-1.95</td>
<td>2.61</td>
<td>1.79-3.82</td>
</tr>
</tbody>
</table>
Dialysis Grafts

• VASCULAR ACCESS PROBLEMS:
  • PRIMARY FAILURE
    • Inflow
    • Anastamosis
    • Access/outflow
  • SECONDARY FAILURE
    • Stenosis
    • Thrombosis
    • Infection
    • Cannulation
HEAPRIN BONDED GRAFTS

Primary Patency

- 82% primary patency at six months

- Excluding three patients deemed not suitable for hemodialysis after repeated failures

Dr J ROSS; BAMBERG, South Carolina
Neointimal Hyperplasia Reduction — Canines

Canine femoro-femoral artery bypass grafting model

Neointimal hyperplasia at the distal anastomosis A) Control ePTFE; B) GORE PROPATEN® Vascular Graft
Propaten®

• Prospective, non-randomized, single-center study comparing 4 – 7 mm GORE PROPATEN® Vascular Graft to 4 – 7 mm non-heparin bonded ePTFE graft

• GORE PROPATEN® Vascular Grafts were generally preferred for difficult, high risk patients
  • GORE PROPATEN® Vascular Graft n = 83
  • Non-heparin bonded graft n = 67

• 1 Yr Clot free survival 78% vs. 58% for control

• Dr Ross in a single center study reported
  • Consecutive implants in high-risk patients with compromised veins or low flow state
  • 6 Months primary patency 77%

Abstract presented at the 35th Annual VEITH Symposium; November 19-23, 2008; New York, NY
SIROLIMUS GEL WRAP

![Graph showing lumen area comparison between control and sirolimus groups in 2D and 3D models. The graph indicates statistical significance with *p < 0.04 and **p < 0.05. The sample sizes are n = 7, n = 11, n = 8, and n = 11 for control and sirolimus groups respectively.]
Radiocephalic AVFs

63% reduction (p=0.02) in the risk of primary patency loss for RC AVF subjects (30 mcg)
PRT-201 ELASTASE

<table>
<thead>
<tr>
<th>Condition</th>
<th>Treatment</th>
<th>Days PPPY</th>
</tr>
</thead>
<tbody>
<tr>
<td>All AVF</td>
<td>Placebo</td>
<td>0.8</td>
</tr>
<tr>
<td>All Excl CS</td>
<td>Placebo</td>
<td>0.6</td>
</tr>
<tr>
<td>RC AVF</td>
<td>Placebo</td>
<td>0.4</td>
</tr>
<tr>
<td>BC AVF</td>
<td>Placebo</td>
<td>0.2</td>
</tr>
<tr>
<td>BC Excl CS</td>
<td>Placebo</td>
<td>0.1</td>
</tr>
</tbody>
</table>

- 68% ↓ p=0.03
- 79% ↓ p<0.01
- 80% ↓ p=0.05
- 55% ↓ p=0.29
- 78% ↓ p=0.06

30 mcg vs. placebo
DRUGS: Dipyridamole/Aspirin

![Graph showing the loss of primary unassisted graft patency over months for Placebo and ERDP-aspirin. The graph includes a table showing the number at risk for each group at different time points.]

**No. at Risk**

<table>
<thead>
<tr>
<th></th>
<th>ERDP-aspirin</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>321</td>
<td>328</td>
</tr>
<tr>
<td>2</td>
<td>236</td>
<td>236</td>
</tr>
<tr>
<td>4</td>
<td>171</td>
<td>162</td>
</tr>
<tr>
<td>6</td>
<td>146</td>
<td>119</td>
</tr>
<tr>
<td>8</td>
<td>108</td>
<td>94</td>
</tr>
<tr>
<td>10</td>
<td>88</td>
<td>74</td>
</tr>
<tr>
<td>12</td>
<td>69</td>
<td>56</td>
</tr>
</tbody>
</table>

Table 4. Primary and Secondary Outcomes

<table>
<thead>
<tr>
<th>End Point</th>
<th>No. (%) of Patients With an Event</th>
<th>Hazard Ratio (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vitamin Group (n = 1032)</td>
<td>Placebo Group (n = 1024)</td>
<td></td>
</tr>
<tr>
<td>Primary outcome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>448 (43)</td>
<td>436 (43)</td>
<td>1.04 (0.91-1.18)</td>
</tr>
<tr>
<td>Secondary outcomes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MI (fatal and nonfatal)</td>
<td>129 (13)</td>
<td>150 (15)</td>
<td>0.86 (0.67-1.08)</td>
</tr>
<tr>
<td>Stroke (fatal and nonfatal)</td>
<td>37 (4)</td>
<td>41 (4)</td>
<td>0.90 (0.58-1.40)</td>
</tr>
<tr>
<td>Amputation</td>
<td>60 (6)</td>
<td>53 (5)</td>
<td>1.14 (0.79-1.64)</td>
</tr>
<tr>
<td>Composite of all-cause mortality, MI, stroke, or amputation</td>
<td>523 (51)</td>
<td>525 (51)</td>
<td>0.99 (0.88-1.12)</td>
</tr>
<tr>
<td>Dialysis in advanced chronic kidney disease patients only (n = 1305)</td>
<td>365 (55)</td>
<td>340 (53)</td>
<td>1.07 (0.92-1.24)</td>
</tr>
<tr>
<td>Thrombosis in hemodialysis patients (n = 1397)</td>
<td>166 (24)</td>
<td>163 (23)</td>
<td>1.01 (0.81-1.25)</td>
</tr>
</tbody>
</table>

166 (24) 163 (23) 1.01 (0.81-1.25) .97

<table>
<thead>
<tr>
<th>Vitamins, No.</th>
<th>At risk</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1032</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>910</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>790</td>
<td>242</td>
</tr>
<tr>
<td></td>
<td>660</td>
<td>372</td>
</tr>
<tr>
<td></td>
<td>596</td>
<td>436</td>
</tr>
<tr>
<td></td>
<td>584</td>
<td>448</td>
</tr>
</tbody>
</table>
STENT: PTFE/Nitinol

B

Primary Patency of Access Circuit (%)

P = 0.03

Days after Initial Procedure

Stent graft

Balloon angioplasty
Plenary Session
IR Debates: Controversies and Opportunities

Wednesday, March 26, 2014
10:00 AM – 11:30 AM
Room: 6A/B

10:00 AM
Abstract No. 1

24-month final results from the renova study: a randomized controlled comparison of stent grafts and balloon angioplasty for dialysis access graft preservation

Z. Haskal; Radiology and Medical Imaging, Univ of Virginia, Charlottesville, VA

Purpose: To present the final, long-term data from the randomized comparison of an ePTFE stent graft (Flair®, Bard Peripheral Vascular) vs. balloon angioplasty (PTA) for treatment of A-V graft stenoses.

Materials and Methods: A 28-site prospective controlled U. S. study enrolled 270 patients with malfunctioning upper extremity arteriovenous grafts with graft-vein anastomotic intervention occurred significantly more often in the PTA (82.6%) vs. the SG group (63.0%, p <0.001).

Conclusion: At the 2 year conclusion of the RENOVA trial, stent grafts proved as safe as balloon angioplasty and more effective. They provided a two-fold sustained advantage over balloon angioplasty in treatment area and overall access patency. The need for repeat intervention was less and the time to subsequent intervention was longer in the stent graft patients.

10:12 AM
Abstract No. 2

Novel molecular targeting of Necl 5 to prevent intimal hyperplasia and restenosis

M. Naeem, R. Abid, T. Murphy, W.K. Park, D.R. Mills; ¹Vascular and Interventional Radiology/Vascular Disease Research Center, Rhode Island Hospital / Warren Alpert Medical School, Brown University, Providence, RI; ²Molecular Imaging/Diagnostic Imaging, Rhode Island Hospital / Warren Alpert Medical School, Brown University, Providence, RI; ³Cardiothoracic Surgery, Rhode Island Hospital / Warren Alpert Medical School, Brown University, Providence, RI; ⁴Hematology and Oncology, Rhode Island Hospital / Warren Alpert Medical School, Brown University, Providence, RI

Purpose: Intimal hyperplasia (IH) is implicated in the pathogenesis of restenosis and is the main reason for treatment failure after percutaneous intervention procedures. One example of a
## STENT: REVISE

<table>
<thead>
<tr>
<th></th>
<th>Angioplasty + GORE VIABAHN Device Group</th>
<th>Angioplasty Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effectiveness Population</strong></td>
<td>N = 131</td>
<td>N = 138</td>
</tr>
<tr>
<td><strong>At 6 months</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target lesion primary patency†</td>
<td>53%</td>
<td>36%</td>
</tr>
<tr>
<td>Circuit primary patency‡</td>
<td>43%</td>
<td>29%</td>
</tr>
<tr>
<td><strong>At 24 months</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access secondary patency</td>
<td>69%</td>
<td>67%§</td>
</tr>
<tr>
<td>Repeat interventions at the target lesion</td>
<td>2.7</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Stentula or Secondary Fistula
6 m: cumulative target lesion primary patency

70% in PCB group vs. 25% in BA group, p < 0.001
<table>
<thead>
<tr>
<th>No.</th>
<th>Status</th>
<th>Study Description</th>
<th>Condition</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Not yet recruiting</td>
<td>Drug-Eluting Balloon Angioplasty for the Treatment of Hemodialysis Vascular Access Stenosis (DEBAVAS)</td>
<td>Dysfunction of Hemodialysis Vascular Access (Fistula and Graft)</td>
<td>Device: PTA Balloon dilatation catheter Advance® (Cook® Medical); Device: Drug-eluting PTA Balloon dilatation catheter Advance® 18 PTX®</td>
</tr>
<tr>
<td>11</td>
<td>Recruiting</td>
<td>FREERIDE STUDY, Freeway Paclitaxel Coated Balloon Catheter to Treat Peripheral Artery Disease</td>
<td>Peripheral Artery Disease</td>
<td>Device: Percutaneous transluminal angioplasty with uncoated balloon; Device: Percutaneous transluminal angioplasty with Paclitaxel balloon</td>
</tr>
<tr>
<td>12</td>
<td>Completed</td>
<td>Paclitaxel-coated Balloons in Femoral Indication to Defeat Restenosis</td>
<td>Peripheral Artery Disease</td>
<td>Procedure: Percutaneous transluminal angioplasty (PTA)</td>
</tr>
<tr>
<td>13</td>
<td>Recruiting</td>
<td>Clinical Trial on Peripheral Arteries Treated With SeQuent® Please P Paclitaxel Coated Balloon Catheter</td>
<td>Stenosis; Restenosis</td>
<td>Device: Paclitaxel coated balloon; Device: uncoated PTA catheter</td>
</tr>
<tr>
<td>14</td>
<td>Not yet recruiting</td>
<td>Drug Eluting Balloon for Prevention of Hemodialysis Access Restenosis</td>
<td>Arteriovenous Fistulae; Arteriovenous Graft</td>
<td>Device: Paclitaxel Eluting Balloon Angioplasty; Device: Percutaneous Transluminal Angioplasty (PTA)</td>
</tr>
</tbody>
</table>
Early Use Vascular Access Graft

- Tri-layered graft (segmented polyetherurethaneurea / siloxane containing a surface modifying additive)
- Self-sealing properties allowing early cannulation
- Enhanced graft anchoring
Early Use Graft: Early Studies

• Glickman et al, 2001
  • Results
• 53.9% Vectra grafts cannulated within 9 days vs. 0% ePTFE
• 80.7% homeostasis within 5 minutes in Vectra grafts vs. 26.8% in ePTFE
• Higher incidence of kinking events in Vectra group (10 vs. 0 events)
EARLY DATA SHOW POTENTIAL FOR INVESTIGATIONAL BIOENGINEERED VESSEL AS DIALYSIS GRAFT

Submitted by admin on Wed, 2013-11-20 22:15  Health & Medicine

Primary Topic:
Health & Medicine

DURHAM, N.C. – An investigational, man-made blood vessel used in vascular grafts for kidney dialysis patients may potentially show encouraging early results among study patients in Poland, according to preliminary data reported Wednesday by a researcher at Duke Medicine.

Presented at the American Heart Association Scientific Sessions meeting in Dallas, the early findings of this interim patient data track 28 hemodialysis patients who received grafts using the investigational bioengineered vessel during a multi-center study launched in Poland last December.

The investigational bioengineered blood vessel, designed to be the first off-the-shelf product incorporating human tissue in the bioengineering process, provided blood flow in 100 percent of the study patients, reported Jeffrey H. Lawson, M.D., Ph.D., professor of surgery and pathology at Duke University School of Medicine. Eight patients later lost blood flow, but it was restored with interventions in each case.

Lawson said there is a significant need for alternative types of vascular technology. Current synthetic vascular grafts used for hemodialysis access provide initial blood flow in less than 50 percent of patients at six months, and with secondary interventions the success rates rises to 77 percent, Lawson said.
Tissue-engineered vascular graft

- Biopsy sample from the patient
- Bioengineered graft
- Implantation of the graft
- Assessed mechanical stability (safety phase 0–3 months)
- Hemodialysis to establish effectiveness of the graft
ESRD

- COMPLEX PATIENTS
  - SOCIOECONOMIC
- MULTIPLE RISKS
  - CARDIAC
  - PAD
- VASCULAR ACCESS CARE
  - TIMELY
  - EFFECTIVE
  - LASTING
Improving Therapies to Treat Dialysis Access Grafts

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