Does Transfer Increase Mortality for rAAA: A Case for Regionalization

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Disclosures

- We Have run rupture courses for W L Gore and Medtronic
- Off IFU use of EVAR for Raaa
- 1049 Ruptured Aortic Aneurysms
- (251 EVAR, 112 TEVAR)
- Thank you Hazim, Ali, Tony and David
- It’s a honor to be invited
OUR NETWORK
CUTTING EDGE CARE, CLOSE TO HOME
21 BOARD CERTIFIED VASCULAR SURGEONS
16 HOSPITALS
10 ANGIO SUITES
2 Outpatient Angio Facility
1 64 slice CT Scanner
10 VASCULAR LABS (including Mobile Labs)
Research/Fellowship/Residency
138 Employees
Why Regionalize?

Expertise Of High Volume Centers
Optimal Resource Utilization
Expense
Need For Extensive Infrastructure
(Level One Vascular/Trauma Centers)
VASCULAR SURGERY EMERGENCY CONCERNS

- Delayed Diagnosis
- Volume Dependent Outcomes
- Institutional Support
- Quality/Cost Is Variable
Vascular Emergencies are more Potentially Fatal than Trauma and Cardiac

**Cardiac**

<table>
<thead>
<tr>
<th>Type</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective Mortality</td>
<td>&lt; 2%</td>
</tr>
<tr>
<td>Emergency Mortality</td>
<td>5-10%</td>
</tr>
</tbody>
</table>

**Vascular**

<table>
<thead>
<tr>
<th>Type</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective Mortality</td>
<td>1-17%</td>
</tr>
<tr>
<td>Emergency Mortality</td>
<td>20-70%</td>
</tr>
</tbody>
</table>

*Gunshot Wounds: Mortality 10.8%*
Perceived Limitations of Regionalization

- Transfer Will Cause Delay/ Worse Outcomes
- It Will Hinder Training
- Practice Limitations
- Ego (Hospital and Surgeons)
How We Think Emergencies Work
All hospitals cannot do everything equally well
We can’t be everywhere
We need a team to provide the best outcomes
How Hospitals View Physicians

Achievement

You can do anything you set your mind to when you have vision, determination, and an endless supply of expendable labor.
Epidemic Of Administrators

“It is amazing that people who think we cannot afford to pay for doctors, hospitals, and medication, somehow think that we can afford to pay for doctors, hospitals, medication, and a government bureaucracy to administer it.” –Thomas Sowell
Vascular Surgeons
The Eternal Optimist

OPTIMISM

It doesn't matter if the glass is half full or half empty if you have a lot of glasses
What Prevents Every Hospital From Wanting To Do “All” Procedures

Cost of Infrastructure
Risk Of Procedures
Lack of Expertese
Total Cost of Equipment
Risk Of Bad Results
VASCULAR SURGERY IS A TEAM SPORT

- Everybody plays a vital role (and that role may evolve over time)

The Team includes Nurses (OR, Floor, ICU, Angio Office), Techs, Anesthesiologists, Cardiology, Endocrine, Neurology, ICU Staff, Discharge Planners, Administration, Patients and Families, as well as Vascular Surgeons

New Vascular Intensive Care Unit Complete
‘Cycle of Care’ for Patients
Albany Medical Center
Specific Benefits

- Superb Nursing Staff
- Dedicated Vascular ICU (VICU)
- Well Trained Floor Nurses
- Dedicated Vascular Nurses/Techs
- Seamless Transfer System
- Excellent Data Collection
- Dedicated Vascular Group
- Cutting-edge Research and Education
Regionalization of Emergent Vascular Surgery for Patients with Ruptured AAA Improves Outcomes

Courtney J. Warner, Sean P. Roddy, Benjamin B. Chang, Paul B. Kreienberg
Yaron Sternbach, John B. Taggert, Kathleen J. Ozsvath, Chin-Chin Yeh,
Steven C. Stain, R. Clement Darling III
Background

- Treatment of ruptured abdominal aortic aneurysms (r-AAA) has evolved over the last two decades
- Endovascular aneurysm repair (EVAR) associated with a reduction in short-term morbidity and mortality
Background

- Emerging model of care delivery parallels advanced trauma care: transfer of all r-AAA to centers with necessary infrastructure and expertise

- Several centers have published experiences with multi-disciplinary protocols to expedite EVAR for r-AAA
  - The Vascular Group, Albany NY
  - University of Washington, Seattle
  - Stanford University
  - University of Calgary
Background

- Safe and efficient EVAR for r-AAA requires infrastructure and surgical expertise
  - OR fluoroscopy
  - Specialty nursing staff and radiological technicians
  - Device shelf stock
  - Ancillary services (cardiology, anesthesia, etc)

- Most hospitals lack the infrastructure to perform emergent EVAR for rupture
• Over the last 12 years, our strategy has been to manage all r-AAA with a single group of vascular surgeons over a 12-hospital geographic area

• Objective: analyze experience and outcomes of regionalizing all patients to the central tertiary medical center whenever possible
Methods

- Rupture protocol: when feasible, patients with r-AAA at community hospitals (CH) are transferred to the tertiary medical center (MC)
Methods

• Patients divided into three groups:
  • Arrived and treated at community hospital (CH)
  • Arrived at CH, transferred to medical center (MC)
  • Arrived and treated at MC

• Patient demographics, transfer status, repair type, and intraoperative variables were recorded
  • Transfer-related data: lowest SBP, need for ACLS protocol, arrival hgb

• Outcomes:
  • Perioperative morbidity and mortality (30 day)
Results

451 ruptured AAA

321 (71%) presented to CH

133 (41%) remained at CH

130 (29%) presented to MC

188 (59%) transferred to MC
Open Ruptures Repaired Retro
## Results: Baseline Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Presented and treated at CH</th>
<th>Transfer from CH to MC</th>
<th>Presented and treated at MC</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total repairs</td>
<td>133</td>
<td>188</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>73.4</td>
<td>74.6</td>
<td>73.7</td>
<td>p&gt;0.2</td>
</tr>
<tr>
<td>Male (%)</td>
<td>71</td>
<td>68</td>
<td>70</td>
<td>p&gt;0.2</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>50</td>
<td>64</td>
<td>70</td>
<td>p=0.002</td>
</tr>
<tr>
<td>Smoking (%)</td>
<td>19</td>
<td>20</td>
<td>19</td>
<td>p&gt;0.2</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>8</td>
<td>13</td>
<td>17</td>
<td>p=0.1</td>
</tr>
<tr>
<td>CAD (%)</td>
<td>24</td>
<td>45</td>
<td>46</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>CKD (%)</td>
<td>5</td>
<td>6</td>
<td>9</td>
<td>p&gt;0.2</td>
</tr>
<tr>
<td>COPD (%)</td>
<td>10</td>
<td>20</td>
<td>17</td>
<td>p=0.04</td>
</tr>
</tbody>
</table>

CH = community hospital, MC = medical center
# Results: 30-day Mortality

<table>
<thead>
<tr>
<th>Repair type</th>
<th>Presented and treated at CH</th>
<th>Transfer from CH to MC</th>
<th>Presented and treated at MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total repairs</td>
<td>133</td>
<td>188</td>
<td>130</td>
</tr>
<tr>
<td>Open</td>
<td>125 (94%)</td>
<td>72 (38%)</td>
<td>50 (38%)</td>
</tr>
<tr>
<td>Endovascular</td>
<td>8 (6%)</td>
<td>116 (62%)</td>
<td>80 (62%)</td>
</tr>
</tbody>
</table>

- **30-day mortality**
  - Open: 60 (48%) to 26 (36.1%) to 19 (38%)
  - Endovascular: 1 (12.5%) to 24 (20.7%) to 16 (20%)

*CH = community hospital, MC = medical center*
318 rAAA treated at tertiary medical center

- 122 (38%) open repair
  - 30-day mortality 37%

- 196 (62%) EVAR
  - 30-day mortality 20%

P<0.001
Results

• Transfer did not influence r-EVAR mortality
  – 20% in rEVAR group presenting to MC
  – 20.1% in rEVAR transferred

<table>
<thead>
<tr>
<th></th>
<th>Transfer to MC</th>
<th>Arrival at MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest SBP&lt;80</td>
<td>34.8%</td>
<td>34.3%</td>
</tr>
<tr>
<td>ACLS</td>
<td>5.1%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Hgb on arrival</td>
<td>11.1</td>
<td>11.0</td>
</tr>
</tbody>
</table>

• Overall rAAA mortality was 20% lower at the tertiary medical center (27% vs 46%, p<0.001)
Conclusions

• Regionalization of r-AAA to centers equipped for both emergent EVAR and open repair decreased overall mortality by ~20%

• Transfer status did not impact the low mortality of r-EVAR at the tertiary medical center

• Development of treatment algorithms and coordination with community hospitals to expedite triage to specialized centers is critical

• The vast majority of patients will benefit from transfer to an experienced high volume vascular center
89 Year Old RAAA Repaired by EVAR
Regionalization: Institutional Support

- Facilities: beds, ICUs, operating rooms, angiography suites, blood bank
- People: nurses, technologists, mid-level providers, administrators (24/7 on call?)
- Specialists: anesthesia, cardiology, GI, critical care, general surgery, stroke/neurology, haematology
- Inventory: Endografts, stents, balloons, thrombectomy/atherectomy devices, lytic agents
- Culture: “can do” attitude
• Emergencies (including ruptured AAA) should be sent to a tertiary care hospital, even hypotensive patients
• One number for ease of hospital transfers
• In-house anesthesia (minimal delay)
• X-ray technologist on-call
• Staff comfortable with endo /open procedures
• Staff backup, as needed
• We need to create a system like Trauma centers
Transferring rAAA Patients can be Transferred Safely but...you need

Education/Early Diagnosis
Hypotensive Hemostasis
Seamless Communication
Early Recognition and Transfer
Infrastructure
Adequate Support
THANK YOU!

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Physician Assistants and Nurses please consider joining
The SVS and Nurses can also join Society for Vascular Nursing