Vortex Strategy for Massive PE

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Faculty Disclosures

- I disclose the following financial relationships:
  - None

AHA Guidelines

Management of Massive and Submassive Pulmonary Embolism, Biofemoral Deep Vein Thrombosis, and Chronic Thromboembolic Pulmonary Hypertension

Circulation 2011;123:1788-1830

High Risk PE

- 5% of patients
- Hypotension, shock
- 15% - 50% mortality
- Systemic thrombolysis recommended (1B)
  - Peripheral intravenous
  - Short infusion
- Less than half treated
  - 50% with contraindications
  - Environmental factors

CT Scan for Initial Diagnosis

CIT July/August 2014

PERT Team

Hospital Practice 2016;42:1,31-37
Guidelines for Surgical Embolectomy

- Massive PE and contraindications to fibrinolysis (Class IIa; Level of Evidence C).
- Massive PE who remain unstable after receiving fibrinolysis (Class IIa; Level of Evidence C).
- May be considered for submassive acute PE judged to have clinical evidence of adverse prognosis (new hemodynamic instability, worsening respiratory failure, severe RV dysfunction, or major myocardial necrosis) (Class III; Level of Evidence C).
- Not recommended for patients with low-risk PE or submassive acute PE with minor RV dysfunction, minor myocardial necrosis, and no clinical worsening (Class III; Level of Evidence C).

Indications for Transcatheter Procedures

- Alternative to lysis when contraindications or when emergency surgery is unavailable or contraindicated
- Failure of lysis to improve hemodynamics in acute setting
- Hybrid therapy includes both catheter-based clot fragmentation and local thrombolysis

Unresolved Problems

We lack good alternatives for the treatment of patients with massive PE/IVC and iliofemoral DVT:

- Poor candidates for open pulmonary thromboembolectomy
- Who have contraindications to thrombolysis
- Who require urgent pharmacologic and mechanical thrombolysis due to phlegmasia/hemodynamic instability

Vortex Angiovac

- Evaluate the use of a Large bore device for the removal of Undesirable Intravascular Material (UIM)
- Emboli Trap
- Suction to engage and remove UIM
- Reinfusion of shed blood

AngioVac Cannula and Circuit

The AngioVac device is an alternative to open surgery for patients with massive PE/IVC and iliofemoral DVT. It allows for safe and effective retrieval of emboli and thrombus, reducing the risk of severe complications.
**AngioVac Cannula**

- Open or Percutaneous
- Large bore (22F)
- Tracks over a .035" guidewire, kink resistant, collapse resistant
- Specialized funnel shaped tip
  - Remotely deployable
  - Engage and conform UIM
  - Maintain local blood flow
  - Prevent vessel collapse

**AngioVac Initial Experience**

<table>
<thead>
<tr>
<th>Patients</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age</td>
<td>52</td>
</tr>
<tr>
<td>Gender</td>
<td>55% Male, 45% Female</td>
</tr>
<tr>
<td>Primary Location of UIM™</td>
<td>RA 39%, RA 32%, IVC 29%</td>
</tr>
<tr>
<td>Material Aspirated</td>
<td>87%</td>
</tr>
<tr>
<td>Procedural Success</td>
<td>73%</td>
</tr>
<tr>
<td>Conversion to Open</td>
<td>10%</td>
</tr>
<tr>
<td>Complications</td>
<td>6.4%</td>
</tr>
<tr>
<td>1) Tamponade</td>
<td></td>
</tr>
<tr>
<td>1) Urgent PE/TVP under CPB</td>
<td></td>
</tr>
<tr>
<td>Procedural Mortality</td>
<td>3.2%</td>
</tr>
<tr>
<td>1) RA Perforation</td>
<td></td>
</tr>
</tbody>
</table>

**AngioVac Cannula Placements**

- Superior Vena Cava (SVC)
- Right Atrium (RA)
**NEWTON-WELLESLEY HOSPITAL**

**Vortex Suction Thrombectomy**

- Percutaneous placement of a 24 F Vortex (inflow) cannula via right common femoral vein.
- Percutaneous placement of a 17F (outflow) cannula in left CFV
- TEE guided VORTEX aspiration (suction thrombectomy) of mobile mass in RA and SVC

**PA Angiogram**

**VORTEX ASPIRATION THROMBECTOMY**

**SVC->RA**

- Percutaneous placement of a 24 F Vortex (inflow) cannula via right common femoral vein.
- Percutaneous placement of a 17F (outflow) cannula in left CFV
- TEE guided VORTEX aspiration (suction thrombectomy) of mobile mass in RA and SVC
AngioVac® Clinical Experience (2009-2012)

<table>
<thead>
<tr>
<th>Patients</th>
<th>375</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age</td>
<td>54</td>
</tr>
<tr>
<td>Gender</td>
<td>52% Male 48% Female</td>
</tr>
<tr>
<td>Primary Location of UIM™</td>
<td>PA 29% RA 35% Ilium/IVC 43% Other 2%</td>
</tr>
<tr>
<td>Material Aspirated</td>
<td>97%</td>
</tr>
<tr>
<td>Procedural Success</td>
<td>80% - 90%</td>
</tr>
<tr>
<td>Conversion to Open</td>
<td>1.0%</td>
</tr>
<tr>
<td>Complications</td>
<td>0.6%</td>
</tr>
<tr>
<td>*wire perfs prior to AngioVac insertion</td>
<td></td>
</tr>
<tr>
<td>Procedural Mortality</td>
<td>&lt; 1%</td>
</tr>
</tbody>
</table>

Conclusions

- This device represents a novel option for the management of patients with extensive IVC and iliac vein thrombosis, pulmonary emboli, atrial thrombus, particularly those with contra-indications to thrombolysis
- The Vortex AngioVac represents a safe and effective device for the treatment of acute IVC and iliac vein thrombosis
- RAPID registry - The Rapid database will evaluate patterns of use, safety and effectiveness data for patients treated with the AngioVac system to remove fresh, soft thrombi or emboli