Aortic Arch Dissection: An Area of Controversy

Jason K. Lempel, M.D.
Section of Thoracic Imaging
Cleveland Clinic Foundation
March 18, 2014

Learning Objectives

1. Review original dissection classification systems and identify their limitations with reference to arch dissections
2. Examine the controversy between radiologists and surgeons regarding arch dissections and understand each perspective
3. Understand potential adverse consequences resulting from using discrepant terminology
4. Recommend modified classification system to promote more effective communication and help avoid clinical errors

Anatomy of the Thoracic Aorta

Classification of Aortic Dissection

De Bakey classification system,
De Bakey and colleagues, 1965

Dr. Michael E. De Bakey, M.D.

Stanford classification system,
Daily and colleagues, 1970

Dr. Pat O. Daily, M.D.
Types of Dissection

Commonly used Stanford Classification

Type A dissection
Surgical management
- coronary artery occlusion
- rupture into pericardium leading to tamponade
- dissection into the aortic valve causing aortic insufficiency

Type B dissection
Medical management
- generally does not dissect toward ascending aorta and aortic root

Aortic Arch Dissection

Definition
- Aortic dissection flap (arrow) or intramural hematoma (arrow)
- May be confined to arch between innominate artery and left subclavian artery
- May originate in arch and extend distally into descending aorta
- May originate in descending aorta and extend proximally into transverse arch

Dissection Classification

Revisited

De Bakey classification system
Type 1: Ascending + Descending
Type 2: Ascending only
Type 3: Descending only

Stanford classification system
Type A: Ascending + Descending
Type B: Descending only
Arch: ?
Arch Dissection: Radiological Perspective

- Type A dissections involve ascending aorta or aortic arch
- Type B dissections involve aorta distal to origin of left subclavian artery

Arch Dissection: Surgical Perspective

- "From the standpoint of pathophysiology and therapeutic strategy, we believe that aortic dissections should be classified according to the presence or absence of involvement of the ascending aorta, irrespective of the primary site of intimal entry".

Rationale for therapeutic planning based on classification

<table>
<thead>
<tr>
<th>Type A dissection, surgical management</th>
<th>Type B dissection, medical management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary artery occlusion</td>
<td>Generally do not dissect proximally</td>
</tr>
<tr>
<td>Rupture into pericardium leading to</td>
<td>toward ascending aorta</td>
</tr>
<tr>
<td>tamponade</td>
<td></td>
</tr>
<tr>
<td>Dissection into aortic valve resulting in aortic insufficiency</td>
<td></td>
</tr>
</tbody>
</table>
**Prevalence of Arch Dissections**

**CTA results**

- Total number of acute aortic dissections = 121
  - n = 75, 62%
  - n = 37, 31%
  - n = 9, 7%
  - n = 75, 62%

### ASCENDING AORTIC DISSECTIONS


### DESCENDING AORTIC DISSECTIONS

- Clinical Management and Outcomes

<table>
<thead>
<tr>
<th>Initial visit</th>
<th>6 month follow up</th>
<th>12 month follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management and outcome of aortic arch</td>
<td>Medical management, no proximal dissection</td>
<td>Medical management, no proximal dissection</td>
</tr>
<tr>
<td>Overall patient management and outcome</td>
<td>4 patients with distal malperfusion required descending aortic stent</td>
<td>1 patient with renal malperfusion required descending aortic stent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 patients had uncomplicated recovery and follow up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 patients lost to follow up</td>
</tr>
</tbody>
</table>

### ADVERSE CONSEQUENCES

**COMMUNICATION**
- Radiologist reports arch dissection as Type A
- Surgeon considers arch dissection as Type B
- Radiologist interpretation may imply a surgical lesion when it is usually not according to surgeon
- Confusion may occur as to proper treatment

**MEDICO-LEGAL**
- Arch dissection reported by radiologist as Type A
- Surgeon considers them as Type B
- Surgeon may operate inappropriately and be liable for poor outcome
- Patient may be treated medically (per reported Type B protocol) with liability claim for poor outcome

### RECOMMENDATION

**Unified Classification System**
- Type A dissection - involves the ascending aorta
- Type B* dissection with arch involvement - involves the arch and may extend distally
- Type B dissection - involves the aorta distal to left subclavian artery

**FUTURE CONCERNS**
- Should we necessarily conform to our surgical colleagues
- More outcome studies need to be performed with CTA imaging; most of original surgical data stems from conventional angiography
- Are there differences in outcome between IMH, PAU and spectrum of acute aortic syndromes involving the aortic arch
Summary

- Arch dissections are a small but important component of aortic dissections
- Differences in surgical and radiologic terminology may lead to miscommunication and potential clinical harm
- Referring to aortic dissections with proximal flap extension into the arch as Type B dissection with aortic arch involvement may provide the best compromise

Does this patient have a type A or type B dissection and what management would you recommend?

Thank You!