Advances in Heart Disease 2008

Takotsubo Cardiomyopathy

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Case Presentation

49 year old woman with dull pain starting in back, radiating to the chest, both arms, and the jaw while driving to work on 11-03-2008.

No previous episodes of chest discomfort.

Chronic hypertension treated with lisinopril.

No tobacco use. Two glasses of wine daily.

Works as a nurse in a busy urban hospital.
Physical Examination

BP 130/80 mmHg. HR 100 bpm. RR 18 breaths/min.

Pulmonary: Clear lung fields. No rales or wheezing.

Cardiac: JVP 12 cm. Regular tachycardia. No murmur. No gallop or rub. Normal peripheral pulses. Mild edema.

Neurologic: Normal mental status. No motor deficits.
Electrocardiogram: 4.5 Hours after Presentation
Electrocardiogram: 24 Hours after Presentation
Clinical Laboratory Data

Normal complete blood count

Normal coagulation parameters

Normal metabolic panel and electrolytes

Troponin I: Initial ED presentation = 0.39 ng/mL
Troponin I: 4.5 Hours after presentation = 13.68 ng/mL
Troponin I: 24 hours after presentation = 23.25 ng/mL
Left Ventriculogram: 2.5 Hours after Presentation
Parasternal Short Axis View: Day of Admission

QuickTime™ and a Microsoft Video 1 decompressor are needed to see this picture.
Apical Four-Chamber View: Day of Admission
<table>
<thead>
<tr>
<th>Nomenclature used for acute, reversible cardiomyopathy involving the LV apex</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Takotsubo cardiomyopathy</td>
</tr>
<tr>
<td>- Apical ballooning syndrome</td>
</tr>
<tr>
<td>- Stress cardiomyopathy</td>
</tr>
<tr>
<td>- Ampulla cardiomyopathy</td>
</tr>
<tr>
<td>- Broken heart syndrome</td>
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Cardiology Rounds
December 2006


**Nomenclature used for acute, reversible cardiomyopathy involving the LV apex**

- Takotsubo cardiomyopathy
- Apical ballooning syndrome
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- Broken heart syndrome
Table 4: Proposed Mayo criteria for the clinical diagnosis of the transient left ventricular apical ballooning syndrome*

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transient akinesis or dyskinesis of the left ventricular apical and mid-ventricular segments with regional wall-motion abnormalities extending beyond a single epicardial vascular distribution</td>
<td></td>
</tr>
<tr>
<td>Absence of obstructive coronary disease or angiographic evidence of acute plaque rupture</td>
<td></td>
</tr>
<tr>
<td>New electrocardiographic abnormalities (either ST-segment elevation or T-wave inversion)</td>
<td></td>
</tr>
<tr>
<td>Absence of:</td>
<td></td>
</tr>
<tr>
<td>– Recent significant head trauma</td>
<td></td>
</tr>
<tr>
<td>– Intracranial bleeding</td>
<td></td>
</tr>
<tr>
<td>– Pheochromocytoma</td>
<td></td>
</tr>
<tr>
<td>– Obstructive epicardial coronary artery disease</td>
<td></td>
</tr>
<tr>
<td>– Myocarditis</td>
<td></td>
</tr>
<tr>
<td>– Hypertrophic cardiomyopathy</td>
<td></td>
</tr>
</tbody>
</table>

*Annals of Internal Medicine 2004;141:858-865*
### Nomenclature used for acute, reversible cardiomyopathy involving the LV apex

- Takotsubo cardiomyopathy
- Apical ballooning syndrome
- Stress cardiomyopathy
- Ampulla cardiomyopathy
- Broken heart syndrome
Table 1. Clinical Characteristics of 19 Patients with Stress Cardiomyopathy on Admission.\textsuperscript{a}

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Age (yr)</th>
<th>Sex (F)</th>
<th>Race or Ethnic Origin</th>
<th>Coronary Risk Factors</th>
<th>Emotional Stressor</th>
<th>Time after Symptom Onset\textsuperscript{b} (hr)</th>
<th>Heart Rate (beats/min)</th>
<th>MAP (mm Hg)</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>62</td>
<td>F</td>
<td>B</td>
<td>HTN, smoking</td>
<td>Mother’s death</td>
<td>12</td>
<td>71</td>
<td>96</td>
<td>Chest pain</td>
</tr>
<tr>
<td>2</td>
<td>63</td>
<td>F</td>
<td>AA</td>
<td>HTN, Chol</td>
<td>Car accident</td>
<td>1</td>
<td>86</td>
<td>52</td>
<td>Heart failure; hypotension</td>
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<tr>
<td>3</td>
<td>48</td>
<td>F</td>
<td>W</td>
<td>HTN, Chol, smoking</td>
<td>Surprise reunion</td>
<td>4</td>
<td>85</td>
<td>88</td>
<td>Chest pain</td>
</tr>
<tr>
<td>4</td>
<td>60</td>
<td>F</td>
<td>W</td>
<td>HTN</td>
<td>Surprise party</td>
<td>2</td>
<td>109</td>
<td>53</td>
<td>Chest pain; hypotension (IABP)</td>
</tr>
<tr>
<td>5</td>
<td>66</td>
<td>F</td>
<td>W</td>
<td>HTN, FH</td>
<td>Father’s death</td>
<td>5</td>
<td>65</td>
<td>91</td>
<td>Chest pain</td>
</tr>
<tr>
<td>6</td>
<td>77</td>
<td>F</td>
<td>W</td>
<td>HTN, FH</td>
<td>Husband’s death</td>
<td>6</td>
<td>106</td>
<td>98</td>
<td>Chest pain</td>
</tr>
<tr>
<td>7</td>
<td>52</td>
<td>F</td>
<td>W</td>
<td>Smoking</td>
<td>Friend’s death</td>
<td>2</td>
<td>92</td>
<td>50</td>
<td>Chest pain; hypotension (IABP)</td>
</tr>
<tr>
<td>8</td>
<td>52</td>
<td>F</td>
<td>W</td>
<td>HTN</td>
<td>Father’s death</td>
<td>5</td>
<td>88</td>
<td>93</td>
<td>Chest pain</td>
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<tr>
<td>9</td>
<td>32</td>
<td>F</td>
<td>W</td>
<td>Chol, FH</td>
<td>Mother’s death</td>
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<td>74</td>
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<td>10</td>
<td>61</td>
<td>F</td>
<td>W</td>
<td>Chol</td>
<td>Fear of procedure</td>
<td>1</td>
<td>108</td>
<td>45</td>
<td>Chest pain; shock (IABP)</td>
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</tbody>
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\textsuperscript{a} New England Journal of Medicine 2005;352:539-548
<table>
<thead>
<tr>
<th>No.</th>
<th>Age</th>
<th>Sex</th>
<th>History</th>
<th>Trigger</th>
<th>Heart Rate</th>
<th>Blood Pressure</th>
<th>Condition</th>
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<tbody>
<tr>
<td>11</td>
<td>66</td>
<td>F</td>
<td>W</td>
<td>Smoking</td>
<td>2</td>
<td>66</td>
<td>109 Chest pain</td>
</tr>
<tr>
<td>12</td>
<td>87</td>
<td>F</td>
<td>W</td>
<td>HTN, Chol, DM</td>
<td>1</td>
<td>99</td>
<td>75 Chest pain</td>
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<tr>
<td>13</td>
<td>69</td>
<td>M</td>
<td>W</td>
<td>HTN, Chol</td>
<td>2</td>
<td>81</td>
<td>73 Chest pain</td>
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<tr>
<td>14</td>
<td>50</td>
<td>F</td>
<td>W</td>
<td>None</td>
<td>2</td>
<td>84</td>
<td>100 Chest pain; heart failure</td>
</tr>
<tr>
<td>15</td>
<td>71</td>
<td>F</td>
<td>W</td>
<td>None</td>
<td>1</td>
<td>67</td>
<td>108 Chest pain</td>
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<tr>
<td>16</td>
<td>76</td>
<td>F</td>
<td>W</td>
<td>HTN, DM, smoking</td>
<td>2</td>
<td>109</td>
<td>101 Chest pain</td>
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<tr>
<td>17</td>
<td>65</td>
<td>F</td>
<td>W</td>
<td>HTN, Chol, smoking</td>
<td>2</td>
<td>95</td>
<td>91 Chest pain</td>
</tr>
<tr>
<td>18</td>
<td>71</td>
<td>F</td>
<td>W</td>
<td>HTN</td>
<td>6</td>
<td>70</td>
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<tr>
<td>19</td>
<td>27</td>
<td>F</td>
<td>A</td>
<td>None</td>
<td>3</td>
<td>64</td>
<td>52 Chest pain; hypotension</td>
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</tbody>
</table>

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>11</td>
<td>66</td>
<td>F</td>
<td>W</td>
<td>Smoking</td>
<td>Fierce argument</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>87</td>
<td>F</td>
<td>W</td>
<td>HTN, Chol, DM</td>
<td>Friend’s death</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>69</td>
<td>M</td>
<td>W</td>
<td>HTN, Chol</td>
<td>Court appearance</td>
<td>2</td>
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<tr>
<td>14</td>
<td>50</td>
<td>F</td>
<td>W</td>
<td>None</td>
<td>Fear of choking</td>
<td>2</td>
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<tr>
<td>15</td>
<td>71</td>
<td>F</td>
<td>W</td>
<td>None</td>
<td>Public speaking</td>
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<tr>
<td>16</td>
<td>76</td>
<td>F</td>
<td>W</td>
<td>HTN, DM, smoking</td>
<td>Husband’s death</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>65</td>
<td>F</td>
<td>W</td>
<td>HTN, Chol, smoking</td>
<td>Armed robbery</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>71</td>
<td>F</td>
<td>W</td>
<td>HTN</td>
<td>Son’s death</td>
<td>6</td>
</tr>
<tr>
<td>19</td>
<td>27</td>
<td>F</td>
<td>A</td>
<td>None</td>
<td>Tragic news</td>
<td>3</td>
</tr>
</tbody>
</table>

Acute infarction
Stressors reported to trigger ABS

Emotional Stress
  Death or severe illness or injury of family member, friend, pet
  Receiving bad news - diagnosis of a major illness, daughter’s
  divorce, spouse leaving for war
  Severe argument
  Public speaking
  Involvement with legal proceedings
  Financial loss - business, gambling
  Car accident
  Surprise party
  Move to a new residence

American Heart Journal 2008;155:408-417
Stressors reported to trigger ABS

Physical Stress

Non-cardiac surgery or procedure - cholecystectomy, hysterectomy
  Severe illness - asthma or chronic obstructive airway exacerbation,
  connective tissue disorders, pseudomembranous colitis
Pain - fracture, renal colic, pneumothorax, pulmonary embolism
Recovery from general anesthesia
Cocaine abuse
Opiate withdrawal
Stress testing - dobutamine stress echo, exercise sestamibi
Thyrotoxicosis

American Heart Journal 2008;155:408-417
Cardiac Troponin T Release: ABS vs. AMI

Figure 2

Reperfused anterior STEMI
Apical ballooning syndrome

Onset of T wave inversion and QT prolongation

American Heart Journal 2008;155:408-417
peak troponin I: median value 0.18 ng/mL
interquartile range 0.08 to 0.69
normal value < 0.06

peak troponin T: range < 0.01 to 25.8 ng/mL
normal value < 0.04
Revised Mayo Clinic Criteria for ABS

- Transient hypokinesis, akinesis, or dyskinesis of the left ventricular mid segments with or without involvement of the apex. The regional wall motion abnormalities extend beyond a single epicardial vascular distribution. Stressful trigger can often be identified, but is not always present.

- Absence of obstructive epicardial coronary artery disease or angiographic evidence of an acute plaque rupture.

- New electrocardiographic abnormalities: ST elevation with or without T wave inversion. Modest elevation in troponins.

- Absence of pheochromocytoma or myocarditis.
Initial Management

Supportive therapy leads to spontaneous recovery.

Heart failure is the most common complication.

It is important to exclude dynamic left ventricular outflow tract obstruction with echocardiography in patients with severe heart failure or hypotension.

*American Heart Journal 2008;155:408-417*
Initial Management

Left ventricular outflow tract obstruction absent:

Diuretics are effective in most heart failure cases.

If tolerated, it is reasonable to initiate β-blockers.

Cardiogenic shock may require inotrope therapy or intra-aortic balloon counterpulsation (IABP).

*American Heart Journal 2008;155:408-417*
Initial Management

Left ventricular outflow tract obstruction present:

Systolic anterior motion of mitral leaflet and MR.

Cautious trial of intravenous fluids and β-blocker.

Alternatively, phenylephrine to increase afterload.

American Heart Journal 2008;155:408-417
Initial Management

Mechanical complications are relatively rare.

Reports of free wall rupture or severe MR.

Ventricular tachycardia and fibrillation are rare.

Atrial arrhythmias and non-sustained VT.

Left ventricular thrombus formation is infrequent.
Chronic Management

β-blocker therapy to reduce likelihood of recurrence.
Consider angiotensin-converting enzyme inhibitor.
Annual follow-up because natural history is unclear.

American Heart Journal 2008;155:408-417
Figure 1  Recurrent Rate of ABS

Kaplan-Meier curve showing recurrence of apical ballooning syndrome (ABS) over time for the total patient population. Number of patients still at risk is noted at 2-year intervals below the time axis.

J. Am. Coll. Cardiol. 2007;50:448-452
Figure 2: Survival of Patients With ABS Versus an Age- and Gender-Matched Population

Kaplan-Meier curves showing estimated survival over time. Expected survival of an age- and gender-matched population (expected) is shown along with survival of patients with apical ballooning syndrome.

J. Am. Coll. Cardiol. 2007;50:448-452
Unanswered Questions

Why are women susceptible to stress cardiomyopathy?

What mechanisms cause this form of cardiomyopathy?

How long should pharmacological therapy be continued?

What is the optimal use of magnetic resonance imaging?
Recommended References


Recommended References

