Stress Induced Cardiovascular Disease

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CASE HISTORY

- 64 yr-old women with sudden onset chest pain during episode of emotional upset at work. Office manager at a ENT office close to the hospital.
- Meds: Premarin, progesterone and synthroid supplements
- Prior smoker with underlying COPD
- Obese
EKG taken by EMS

Code Heart called

<table>
<thead>
<tr>
<th>Name:</th>
<th>12-Lead 2</th>
<th>HR 95 bpm</th>
<th><strong>ACUTE MI SUSPECTED</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ID:</td>
<td>052784188317</td>
<td>18:14:47</td>
<td><strong>Abnormal ECG</strong></td>
</tr>
<tr>
<td>Patient ID:</td>
<td>27 May 84</td>
<td>QRS 0.068s</td>
<td><strong>Unconfirmed</strong></td>
</tr>
<tr>
<td>Incident:</td>
<td>PR 0.182s</td>
<td>QT/QTc:</td>
<td>Normal sinus rhythm</td>
</tr>
<tr>
<td>Age: 64</td>
<td>QT 0.34/s</td>
<td>0.407s</td>
<td>Anteroseptal infarct, possibly acute</td>
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<tr>
<td>Sex: M</td>
<td>P-QRS-T Axes: 72° 51° 16°</td>
<td>Lateral injury pattern</td>
<td></td>
</tr>
<tr>
<td>aVR</td>
<td></td>
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</tbody>
</table>

Campus Rescue Hollywood 3811371-672 2604K94046JSP7R LP1213430845

PRINTED
EKG on arrival to MRH ER
Persistent Chest Pain

HR = 94 bpm
Left Ventriculogram in RAO Projection
LEFT CORONARY ARTERY
Right Coronary
Left Ventricle
LV CONTRACTION PATTERN
CK 77, peak 116
Trop T 0.01 and peak 0.43
ESR 10

Day 2
EKG 5 days later (at discharge) .....and full recovery on F/U
“Takotsubo” Cardiomyopathy

- Described in Japan in 1991 by Dr. Sato who named it Takotsubo (because of a similarity of the LV wall motion abnormality to an “octopus catcher” (Tako-tsubo).
Definition

- Transient LV apical ballooning with **no significant obstructive CAD**
- Often triggered by emotional or physical stress
- Presentation mimics acute MI with EKG ST changes and positive CE at **low levels**
- Postmenopausal women in > 90% cases
- Totally reversible within 2-3 weeks
- Good prognosis after acute phase
Evolution of Concept

- Initially thought to be present in Asians but subsequently described in Western countries
- Several names have been used: Apical Ballooning Syndrome, Takotsubo Cardiomyopathy, Ampulla Cardiomyopathy, Stress induced cardiomyopathy...
- Under-recognized for several years... even until today!
76 yr old woman presented for outpatient cath due to an abnormal stress test done in November 2009. Coronaries showed no obstructive disease.
Why patient had an ICD?
75 yr old with h/o diabetes, PVD, ESRD and hypercholesterolemia admitted with CHF. EKG. Trop T peaked at 0.39 with CK 97 and MB 7%
Coronary Arteries
RECORD REVIEW: MARCH 2008

EF 35%
EPS:
Up to 3 Extra-stimuli: Negative
Isuprel and 3 extrastimuli: VF was induced
Decision of proceed with ICD!!
JAPANESE FISHERMEN ABOVE

(octopus trap in Japanese)

Tako-tsubo

Calm, happy octopus

leave it in there!

ooohhlaa!

catecholamine-induced transient myocardial stunning
Japanese Takotsubo Speakers

Takotsubo souvenirs

Takotsubo T-shirts

Takotsubo cardiomyopathy:

- Pronounced as "takotsubo cardiomyopathy.
- Also known as "broken heart syndrome." Takotsubo cardiomyopathy is a serious disease in which a severe emotional problem causes a heart muscle to weaken and can be fatal without proper treatment. It seems like a heart attack and may be diagnosed as heart failure unless doctors investigate not only medically but also get to know the patient's background and personal life history.
- "Takotsubo cardiomyopathy is a real condition."
With more experience…….New patterns were identified

80 yr old woman with $O_2$ dependent COPD admitted with acute pulmonary edema and shock after the death of her daughter.
Mid-Ventricular Type
“Broken Heart Syndrome”
28 yr old comes to ER with rash and itching. Treated with epinephrine SQ and developed chest pain, EKG changes and troponin T 0.21.
I went to look in the literature......

Physicians of the Mayo Clinic described a basal LV abnormality in 3 young women (30, 32, 30): emotional stress, acute flare MS and Metamphetamine use.

American Journal Cardiology 2007
Basal Type

Diastole

Systole
Accidentally I found something very curious in a Cardiology Journal.
My patient in January 2003

78 yr old with COPD and PVD had an adenosine stress test. Had persistent chest pain with mild ST elevation in anteriorly + I and aVL.
No Sig CAD
Localized Type: Another case

- 61 yr old woman with h/o HTN and high cholesterol presents with atypical chest and epigastric discomfort.
- Lots of stress but she was not specific.
- Trop 0.08
- Mildly abn EKG.
“You see what you look for and recognize what you know”

Unknown

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Transient LV Dysfunction Syndromes: TYPES

1. Apical Type or “Typical”
2. Midventricular Type or “Atypical”
3. Basal Type
4. Localized: anterior or inferior
5. Diffuse
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1. Apical Type or “Typical”
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3. Basal Type*
4. Localized: anterior or inferior
5. Diffuse

* Young women
1. Mimics Acute Myocardial Infarction with STE and/or ischemic appearing ST/T wave abnormalities, QT prolongation. Changes up to several weeks.
2. No significant CAD and typical LV wall motion
3. Frequently precipitated by Stress
4. Postmenopausal women
5. Reversible and full recovery of LV function occurs in 2-4 weeks. Good prognosis after acute phase.
6. Minimal elevation of cardiac enzymes
7. May involve the RV
8. Variable severity of presentation:
   1. Subclinical or incident finding
   2. Acute CHF
   3. Shock
   4. Ventricular arrhythmias or Sudden death
   5. CVA / LV apical clot / ventricular rupture
PRECIPITANT FACTORS

- Emotional Stress ("broken heart syndrome")
- Physical stress: pneumonia, COPD exacerbation, surgery or anesthesia, stroke or intracranial bleeding, brain death
- Automobile accidents
- Exercise or Dobutamine stress test
- Epinephrine or other IV catecholamines
- Sometimes not obvious
PATHOGENESIS

Cathecolamines play a central role
- Levels found to be quite higher than in MI
- Direct cytotoxic effect
- Microvascular spasm
- Metabolic cell abnormalities

Postmenopausal hormonal state, estrogen deficiency
- Demographics
- Experimental model in rats
- Increased frequency? Relation with less estrogen replacement therapy (premarin prescriptions)

Viral Infection: Parvovirus, CMV
TREATMENT

1. Conservative: Carvedilol, ACE inh, Diuretics, etc.
2. Consider short term of coumadin in apical type.
3. Consider a life vest in severe cases
4. No ICDs acutely.
5. Follow up evaluation of LVF.
FAQ

• Why the characteristic LV wall motion abnormality?
  – More abundance of adrenergic receptors in the apex.
  – Less noradrenergic nerve endings in the apex may explain less neurally-mediated injury in some patients

• Is it more common? Or more recognized?
  – Premarin prescriptions dropped after the negative large prevention study on estrogen supplementation
  – About 2% emergency caths for STEMI (5-7% among women)
Thank you !!!

Questions?