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Case of the Week

Pam Fry, MD

June 23, 2010
Objectives:

- Review an interesting case or 2 seen in the ER
- Discuss management of an acutely ill patient in the ER
- Discuss etiology of patient’s illness
One night at St. Joe’s…

• You just hang up the phone with the ME after a cardiac arrest in the ER when you hear…
• “…Code Blue 7 East…”
• …The charge nurse then comes running up to you stating “that’s a nurse working on 7 East, our code team is responding and bringing the patient to you”…
15-20 minutes later...

- The code team arrives with the patient:
  - 35 year-old African American woman
- Pt had a witnessed generalized tonic-clonic seizure
- Code team interventions:
  - Ativan 1mg IM
  - Started IV and gave ativan 1mg IV
  - Seizure aborted
  - Placed in full spine precautions
  - Ventilatory assistance with BVM
  - Lost IV in transit to ER
Now what?

ABC’s & IV/O2/ Monitor
CT Scan
CXR
Differential Dx
DONT
EKG
HPI

Interventions*
Labs
Medications*****
MRI
PMH*
Physical Exam
Ultrasound
ABC’s & IV/O2/Monitor

• Airway:
  ▪ Spontaneous agonal breathing + BVM
  ▪ RR 20
  ▪ GCS 3

• Breathing:
  ▪ Coarse breath sounds, equal bilaterally

• Circulation:
  ▪ 2+ pulses throughout

• IV: being established

• O2: 100% with BVM providing FiO2 100%

• Monitor: HR 158 (sinus tach), BP 144/94
Do the DON’T!

- Dextrose:
  - Accucheck: 213
- Oxygen:
  - BVM with 100% FiO2
- Nalaxone:
  - Not given
- Thiamine:
  - Not given
Intervention:
Intubation Successful, But...
Nitroglycerin
HPI:

• Pt came to work this evening and was feeling and acting normal.

• A fellow RN heard a scream “like a manic patient” and several thuds and turned to find the patient stumbling down the hall. The pt then fell and started seizing.

• Possible seizure in the past, unknown if pt is on any medications.
Past Medical History:
Magnesium

Elements – Atomic Structure

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<tr>
<th>Shell #</th>
<th>Sub-shell</th>
<th>Orbitals</th>
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</thead>
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<tr>
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<td>1</td>
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</tbody>
</table>

x = Electrons (e)

Magnesium (Mg)
P+ = e- = 12
Atomic #(Z) = 12

Source Unknown
Sodium Bicarbonate

\[ \text{Na}^+ \cdot \text{O} \cdot \text{C} \cdot \text{OH} \cdot \text{O} \]

Source Unknown

Tszrkx, Wikimedia Commons
Lasix

intropin, flickr

BrokenSphere, Wikimedia Commons
PTU/Steroids

Thyroid and Parathyroid Glands

© PD-GOV  Wikimedia Commons

Zaldymlg, flickr

© BY  arbyreed, flickr
Past Medical History:

- **PMH:**
  - Grave’s Disease
  - Seizure 2009
  - G3P2, currently pregnant about 12 weeks
- **PSH:** None
- **Allergies:** NKDA
- **Medications:**
  - PTU 100 mg BID (recently changed from methimazole)
  - Vitamin C
  - Folic acid 0.4 mg Daily
- **Social:** No tobacco, ETOH, or drug use. Married with 2 children at home. RN at St. Joe’s
- **Family:** No seizures or heart disease
Physical Exam:

- VS: T 98.2, HR 158, BP 159/97, RR 20, O2 100% BVM
- General: Pt on backboard with c-collar in place receiving BVM ventilation support, unresponsive.
- HEENT: NC/AT, PERRL 4mm-2mm, blood and frothy sputum present in nares, no trauma noted in mouth
- Neck: C-collar in place, no thyromegaly
- Chest: Agonal respirations, coarse breath sounds present & equal bilaterally
- Heart: Tachycardiac rate, regular rhythm, no m/r/g
- Abdomen: Soft, distention of BLQ, NT, no masses or organomegaly
- Extremities: No deformities or edema noted
- Neuro: Unresponsive, GCS 3, no seizure movements
Labs:

- CBC: WBC 22, Hgb 13.5, Plt 347
- Basic: Na 135, K 4.6, Cl 102, CO2 17, BUN 10, Cr 0.74, glucose 217, iCal 3.6, Mag 2.6, Phos 10.4; LFT’s: normal
- UA: protein 2+, RBC 19, WBC 3, nitrite neg, LE neg; UDS: negative
- Coags: PTT 37.8, INR 1.05
- ABG: 6.99/83/290/19/99%
- BNP 177, Myoglobin 189, Troponin 0.05
- TSH 0.29, Free T4 1.37
- Beta-hcg 32516
Ultrasound:
To Summarize

- 35 YO woman 12-14 weeks pregnant with a history of hyperthyroidism and ? prior seizure presents to the ER after screaming, stumbling, collapsing and seizing.
- GCS on arrival is 3 & pt intubated for airway protection & agonal respirations.
- Severe pulmonary edema present.
- Pt with hypertension and tachycardia.
Differential Diagnosis:

- SAH
- Venous Sinus Thrombosis
- Brain Tumor
- Eclampsia
- Electrolyte abnormalities
- Thyrotoxicosis
- PE
- Cardiomyopathy
- Pheochromocytoma

- Infection
  - Meningitis
  - UTI
  - Pneumonia
- Status Epilepticus
- Stroke
- MI
- DKA
- Hypoglycemia
- Toxins
MRI

FOR RADIOLOGIST USE ONLY:

Preliminary results:

No acute sinus disease.
No acute infarct.
Since CT done 3 hours ago, interval improvement in nasal effusion with some residual.
Minimal periorbital swelling. Has been rapid improvement. Has my consent to secure.
No ICH or mass affect.

Radiologist name (PLEASE PRINT): M. DiNardo

Report called to: Code 373.5.3.4

5/11/2010

MICHIGAN
Beta-blocker
Hospital Day 1

- Pt admitted to ICU: HR 110, BP 110/75
- Neurology: s/p tonic-clonic seizure, CT/MR -
  - LP performed given ?bleed on flair MR images
  - Neurogenic pulmonary edema from seizure
  - Neurology: Recommended EEG and anti-epileptics, husband refused anti-epileptics given pregnancy
- Cardiology: Pt developed hypotension, remained tachycardiac
  - Troponin elevated 4.66
  - TTE: Severe global LV hypokinesis, mild MR, moderate TR, moderated pulmonary hypertension, EF 20-25%
  - Cardiology: Tachycardia secondary to pump failure, TTE most c/w Tako-Tsubo syndrome
• Given cardiogenic shock with WMA on TTE pt taken emergently to cath lab
  ▪ Clean coronary arteries
  ▪ Intra-aortic balloon pump (IABP) placed
  ▪ Swan-Ganz catheter placed
  ▪ Pt transferred to Cardiac ICU
• Repeat thyroid studies: TSH <0.01 (0.29), FT4 2.22 (1.37), FT3 7.8
  ▪ Endocrine consulted: PTU and Hydrocortisone started
• Formal fetal USN: Normal limited fetal survey, EGA 14 5/7 weeks
Hospital Day 2

- **Endocrine:** HR and BP improved with PTU and hydrocortisone tx
  - FT4 2.55 (2.22, 1.37)
- **Neuro:** Pt alert, following simple/complex commands, no recurrent seizures
  - EEG: normal
- **Cardiology:** Pt continues on IABP
  - TTE: slight improvement to no change from previous TTE; EF 30%
- **Respiratory:** Improved FiO2, Tachypnea with spontaneous trials
  - Keep intubated until IABP removed
Hospital Day 3

- **Endocrine:** Pt continues on PTU & Hydrocortisone
  - FT4 2.39 (2.55, 2.22, 1.37) FT3 3.9 (7.8)
- **Neuro:** Still refusing anti-epileptics, no recurrent seizures
- **Cardiology:** IABP removed without incident
- **Respiratory:** Pt extubated after removal of IABP
Hospital Days 4 & 5

- **Day 4:**
  - PO Metoprolol started given HTN
  - PTU and Hydrocortisone continued
  - Pt declined anti-convulsants, will reconsider at end of 2nd trimester

- **Day 5:**
  - PO Metoprolol dose increased given HTN
  - FT4 2.59 (2.39), FT3 5.5 (3.9)
Hospital Day 6

- TTE: Severe Apical Hypokinesis, EF 33%
- Pt discharged home!
  - Discharge Diagnosis:
    - Graves Disease with thyrotoxic storm
    - Grand Mal Seizure
    - Cardiomyopathy
    - Acute Respiratory Failure
  - Discharge Medications:
    - Metoprolol 25 mg PO BID
    - PTU 200 mg PO QID
  - Outpatient follow-up
HA & Collapse in Pregnancy

- **Eclampsia**
  - Dx: HTN, seizure, edema, proteinuria, +/- elevated LFT’s & thrombocytopenia
  - Tx: Magnesium + OB

- **SAH**
  - Dx: CT + LP
  - Tx: BP control + Neurosurgery

- **Venous Sinus Thrombosis**
  - Dx: MR
  - Tx: Anticoagulation + Neurosurgery
Thyroid Function in Pregnancy

• Increase in thyroxine-binding globulin
  ▪ Increase in total T4 & T3

• hCG stimulates the TSH receptor
  ▪ Decrease in TSH levels
  ▪ Increase in free T4 & T3

• Hyperthyroidism in pregnancy:
  ▪ TSH <0.01 mU/L +
  ▪ High free T4 level
Changes in maternal thyroid function during pregnancy:

![Graph showing changes in maternal thyroid function during pregnancy.](source-unknown)
# Thyroid Storm

<table>
<thead>
<tr>
<th>Temperature</th>
<th>CNS Effects</th>
<th>Tachycardia</th>
<th>Score Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>99-99.9</td>
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## Temperature

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<td>≥104</td>
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## CNS Effects

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<tbody>
<tr>
<td>Agitation</td>
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<tr>
<td>Delirium, psychosis, extreme lethargy</td>
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<tr>
<td>Seizure, coma</td>
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</table>

## Tachycardia

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## CHF

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<td>Pedal edema</td>
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<tr>
<td>Bibasilar rales or a-fib</td>
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</tr>
<tr>
<td>Pulmonary edema</td>
<td>15</td>
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</tbody>
</table>

## GI symptoms

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<tbody>
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<td>Diarrhea, n/v, abdo pain</td>
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</tr>
<tr>
<td>Unexplained jaundice</td>
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</table>

## Precipitant

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<tbody>
<tr>
<td>No</td>
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</tr>
<tr>
<td>Yes</td>
<td>10</td>
</tr>
</tbody>
</table>
Treatment of Thyroid Storm:

- **Step 1**: Block peripheral effect of thyroid hormone
  - IV beta-blocker
- **Step 2**: Stop the production of thyroid hormone
  - PTU or methimazole
  - Dexamethasone or hydrocortisone
- **Step 3**: Inhibit hormone release
  - Iodine 1-2 hours after antithyroid medication
Methimazole embryopathy:
Management of Hyperthyroidism in Pregnancy:

- **LNMP** 1st Trimester
- Discontinue MMI

Thyrotropin
Free T4 Index

- MMI, 10 mg
- PTU, 100 mg three times daily
- MMI, 20 mg daily
- MMI, 10 mg daily
- MMI, 5 mg daily

Free T4 Index

- 0 mg/L
- <0.1 mg/L

Gestational Week
Stress-Induced (Takotsubo) CM

- Mayo Clinic Diagnostic Criteria:
  1. Transient hypokinesis, akinesis, or dyskinesis of LV mid segments +/- apical involvement
  2. Absence of obstructive coronary disease
  3. New EKG changes OR modest elevation in cardiac troponin
  4. Absence of pheochromocytoma, neuropathology, or myocarditis
Treatment of HF in Pregnancy

- **Afterload Reduction:**
  - Hydralazine
  - Amlodipine
  - Nitroglycerin
  - Lasix

- **Iontropes:**
  - Dobutamine
  - Dopamine
  - Digoxin

- **Vasopressors:**
  - Dopamine

- **Stable HF:**
  - Beta-blockers

- **Edema:**
  - Loop Diuretics

- **Mild-Moderate HF:**
  - Hydralazine
  - Digoxin

- **Decompensated HF + normal BP:**
  - Nitroglycerine

- **Decompensated HF + hypotension:**
  - Dopamine
Take home points

- ABC’s & IV/O2/Monitor every patient
- Thyroid storm is a clinical diagnosis
- Hyperthyroidism & storm more common in 1st trimester secondary to pregnancy related hormone changes
- Treat thyroid storm in pregnancy with beta-blockers (careful if in decompensated CHF), PTU +/- steroids in the ER
- Treat decompensated HF in pregnancy in the ER as you would any pt
  - Pressor of choice = dopamine
Quick case:

• CF 25 YO man arrives via EMS in respiratory extremis
• History of asthma with increasing SOB over past few days
• Last night pt was partying and smoked MJ and cigarettes
• Awoke at 5 AM with severe respiratory distress
• Used albuterol inhaler 5 times with no improvement and called EMS
• EMS interventions: IV established, Oxygen via NRB, PO prednisone, duoneb NMT’s, and epinephrine 0.3 mg IM
Patient

- Vitals: P 117, BP 225/129, RR 38, O2 sat 64%
- General: Pt in respiratory extremis, tripod position, panicking, extremely diaphoretic, pulled out IV, won’t keep oxygen mask on, stating “help me,” bilateral prominent JVD
- Respiratory: In extremis, very faint breath sounds with slight end-expiratory wheezes bilaterally. Extremely diminished breath sounds
Intubate!
Needle Decompression/CT
References:

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Thanks!