POST-OP SCENARIOS

Part III -- August 3rd, 2011 -- Rebecca Kruisselbrink
Objectives

- Case-based approach to typical post-operative cardiac emergencies
  - Scenario
  - Ddx
  - Immediate investigations and management
- Post-operative MI
- Participation is mandatory
Case 1

- 80 M POD 1 elective resection large bowel Ca
- You are called around 21:00 because.....
  - Tachycardic and short of breath
  - Vitals: HR 160s, BP 90 systolic, O2 sats 93% on 4L

- On the phone:
  - Chart at bedside
  - Repeat vitals, EKG, and CXR
  - Bloodwork: CBC, all chemistry, trop/CK
  - “I’ll be up shortly”
Case 1 – ddx?

Tachycardia:
- Narrow complex and REGULAR
  - Sinus
  - Atrial flutter with 2:1 block
  - SVT
  - Junctional tachycardia
- Narrow complex and IRREGULAR
  - Atrial fib
  - Atrial flutter with variable block
  - MAT
  - SVT with multiple PACs
- Wide complex
  - SVT with aberrant conduction OR?
  - VT
Case 1 - EKG

[Image of EKG waveform]
Case 1 - PSVT

- **Stable or unstable?**
  - Is the tachycardia causing hypotension, angina, shock, dyspnea?
  - Electrical cardioversion (ie – RACE/CCRT stat)

- **If stable:**
  - Goal: slow AV nodal activity to better characterize the underlying rhythm
  - Options: Valsalva maneuver, carotid sinus massage – or adenosine
Case 1 – Adenosine

- 6 mg, then 12 mg given
- Patient kept on monitor (you want to capture rhythm strip)
- Successful termination of the PSVT – and conversion to sinus rhythm

Question: what would you do if it was sinus tach?
Sinus tachycardia

DDX – catecholamine surge
- Cardiac – hypotension/shock, anemia, ischemia, CHF, pericardial disease
- Respiratory – PE, COPD, hypoxia
- Drugs – stimulants - caffeine, nicotine, illicit drugs; withdrawal
- Systemic – fever, sepsis
- Psychological – anxiety, fright
- Endocrine – hyperthyroidism, pheo
Case 1 – PSVT – bottom line(s)

1. EKGs don’t have to be scary.
   Tachy/brady
   Narrow/wide
   Regular/irregular
   P waves or not?

2. Narrow complex tachycardia:
   First question: stable or unstable?
   Is it sinus tach?
Case 2

- Same patient
- Same differential
- New EKG
Case 2
Case 2 – diagnosis?

- Approach: stable vs unstable
- Unstable: cardioversion
  - Energy dose?
- Stable?
  - Etiologies
  - Medical management
- Denies chest pain/palpitations; HR 130s; BP 110/70; denies chest pain; oxygenating well on 4L
Etiology:

- Cardiac: HTN, ischemia, valvular heart disease, CHF, pericarditis
- Noncardiac: PE, COPD, Hyperthyroidism, Alcohol, drugs (sympathomimetics)
- Post-op state: electrolyte shifts, sympathetic surge, atrial stretch d/t IV fluid volumes
Case 2 – AFRVR

- **History:**
  - Cardiac – HTN, **known Afib**, ischemia, **previous Echo?**
  - Operative- fluids, drugs, type of surgery
  - **Medications** – patients may not have taken their normal rate-controlling meds the day of surgery
  - Current symptoms: palpitations, SOB, angina, pre-syncope

- **Full physical exam**

- **Labs:** electrolytes (including Ca, Mg, Phos); trop/CK; CBC, renal fxn
Case 2 – AFRVR – Rate Control

- **Beta Blockers** – ie Metoprolol 2.5-5 iv
  - Underlying ischemia and no significant heart failure
- **CCB** – ie Diltiazem 0.25mg/kg iv - 0.35 mg/kg iv
- **Amiodarone** - 150mg over 10-20mins
  - Hypotension, LV dysfunction, suspected or confirmed pre-excitation
- **Digoxin**
  - AF secondary to heart failure
  - Can be given IV on the floor
  - Dosing: “total digitalizing dose” = 0.5 – 1 mg IV
  - Half (0.25-0.5 mg IV) at time 0, followed by ¼ (0.125-0.25 mg IV q 6h x 2).
Case 2: AFVRV – what about WPW?

- Atrial fibrillation with pre-excitation
  - Rhythm on ECG will be WIDE complex tachycardia
  - Do NOT give AV Nodal blocking agents
  - The result is V Fib

- Treatment officially is procainamide
- At the bedside – use Amiodarone in cases of WCT where etiology is in any way unclear.
1. First question always is “stable or not”
   2. Try to determine etiology
   3. Know the key meds for rate control
   4. Don’t give AVN blockers to WCT
   5. Think about Digoxin if your patient is in florid heart failure and atrial fibrillation
Case 3

- Previously well 48F
- Two days post-op ORIF left ankle fracture
- Tachycardic, hypertensive, and low-grade fever (37.9)
- Tremulous, agitated

Further history:
- Heavy Etoh user (binge pattern)
- Last drink the day she fell
- “Blackouts” but no previous sz
- Denies other drug use

Other symptoms
- Nausea, sweating, agitation, hallucinations
Case 3 – EtOH withdrawal

Stages:
- Tremulousness – HTN, tachy, tremors: 6 hrs – 2 days
- Withdrawal SZ – 2 days
- “hallucinosis” – 2 days
- DTs – delirium, agitation, psychosis, autonomic instability, SZ – 3-5 days after last drink

- Mortality rate of DTs ➔ 5%
Case 3 – Management

- **ABCs**
- **Exclude other causes of tachycardia, HTN**
  - Full physical exam
  - Labs: CBC, lytes, ext lytes, renal and liver fxns, trop/CK, albumin, cultures, urine, tox screen, EKG
  - Depending on the clinical scenario, lumbar puncture +/- CT head may be indicated
- **Pharmacologic therapy**
  - Multivitamins, thiamine 300 mg daily x 5, folate
  - Ensure adequately hydrated, electrolytes grossly normal
Case 3- Management

- Benzodiazepines – several options
  - Diazepam (Valium) or Lorazepam (Ativan)
    - Use lorazepam in end stage liver disease (shorter half life)
  - IV or PO
    - Depends on patient!
  - CIWA vs front-loaded therapy vs fixed schedule therapy
    - Goal is to achieve a calm, hemodynamically stable, sedated state
    - Fixed schedule therapy for patients with previous hx of seizure, DT, or prolonged, heavy consumption
    - I.e.: Diazepam 10mg po q6h x 1 d, 5mg po q6h x 2 d with 5 mg PRNs

- Seizures: benzos

- Psychotic symptoms: low dose Haldol
Case 3 – bottom line

1. Etoh withdrawal can be life-threatening so consider and recognize early.
2. Exclude other causes of tachycardia, HTN, agitation, etc.
3. Treat aggressively. LOTS of benzos.
Case 4

- 61 M, hx DM II and HTN, POD 2 elective right TKA

- Nurse calls to tell you he is complaining of chest pain

- You request:
  - Vitals
  - Trop/CK, lytes, EKG
  - Chest XR

-  HR 100
-  BP 130/80
-  O2 95% on 2L
-  Blood work sent
-  EKG is done
Case 4 – EKG
Case 4 – Post-op NSTEMI

- Overall risk of post-op cardiac death or major cardiac complications = 5%
- Predictors of risk (Revised Goldman cardiac risk index)
  - High risk OR (intraperitoneal, intra-thoracic, or suprainguinal vascular)
  - Hx of IHD
  - Hx of CHF
  - Hx of cerebrovascular disease
  - DM requiring insulin
  - Pre-op creatinine > 177 mmol/L
Case 4 – post-op NSTEMI

- Rate of cardiac death, nonfatal myocardial infarction, and nonfatal cardiac arrest according to the number of predictors
  - No risk factors - 0.4 percent (95% CI 0.1-0.8 percent)
  - One risk factor - 1.0 percent (95% CI 0.5-1.4 percent)
  - Two risk factors - 2.4 percent (95% CI 1.3-3.5 percent)
  - Three or more risk factors - 5.4 percent (95% CI 2.8-7.9 percent)
Case 4 – post-op NSTEMI

- Devereaux et al and the POISE investigators group looked at characteristics and short-term outcomes of perioperative MI
- 190 centers, 23 countries, 8351 patients (from original POISE)
- Definition as described in following slide
  - Within 30 days of random assignment, 5% had periop MI; 74% within 48 hrs of surgery; 65% with no symptoms of ischemia
Case 4 – post-op NSTEMI

- The clinical diagnostic criteria for an acute MI post op:
  - typical rise in troponin without an alternate explanation (eg, pulmonary embolism) plus at least one of the following
    - Ischemic signs or symptoms (including shortness of breath)
    - New pathologic Q waves
    - Changes indicative of ischemia on the ECG
    - Coronary artery intervention
    - New wall motion abnormality on echo or defect myocardial perfusion imaging

- Up to 65% are asymptomatic
- 75% occur within 48 hrs of surgery

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Case 4 – post-op NSTEMI

- **Management**
  - IVs, O2, monitored setting
  - CK and trop q 8h x 3; check electrolytes and Hgb
  - Treat angina – nitro, morphine if required
  - Reduce ischemic demand - beta blocker (unless in CHF)

- **Reperfusion:**
  - NSTEMI – antiplatelet and antithrombotic therapy must be discussed with surgeon
  - STEMI – primary PCI is an option but patient may require Plavix afterwards for stent protection
Case 4- post-op NSTEMI

- Other meds – statin; ACE inhibitor
  - Patient may be on these already; if not, they should be started while in hospital
  - Check LFTs prior to giving the statin

- Post-MI
  - Monitor for complications (CHF, acute renal failure)
  - Telemetry x 48 hrs

- Risk stratify

- Follow up Echo/cath (get cardiology/medicine to see 😊)
Case 4 – bottom line(s)

1. Post-op MI’s present in a variety of ways, often without ischemic symptoms

2. Acute management includes standard anti-anginal, beta-blocker, and reperfusion consideration....BUT

3. Bleeding risk must be considered on a case by case basis
Case 5 – same patient, different EKG
Case 5 – ECG clues
Coronary Anatomy

LAD – V1-V6
RCA – II, III, AVF
Cx – I, AVL, V5, V6

<table>
<thead>
<tr>
<th>I - Lateral</th>
<th>aVR-</th>
<th>V1 - septal</th>
<th>V4 anterior</th>
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<tbody>
<tr>
<td>II - Inferior</td>
<td>aVL - lateral</td>
<td>V2 - septal</td>
<td>V5 lateral</td>
</tr>
<tr>
<td>III – Inferior</td>
<td>aVF - Inferior</td>
<td>V3 – anterior</td>
<td>V6 lateral</td>
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Case 5 – localization

- **Inferior MI** – II, III, AFV (RCA)
  - 1/3 of cases associated with RV infarct
- **RV MI** – may see only an isolated R in V1 (posterior Q wave); anterior STD (posterior STE)
  - Ask for a 15-lead ECG!
- Symptoms: angina +/- nausea, vomiting
  - Why?
- Exam: hypotension/shock, bradycardia, elevated JVP, TR, clear lung fields
  - What would be typical of a left-sided infarct?
Case 5 – specifics of management

- RV infarct leads to decreased RV compliance and reduced filling $\rightarrow$ decreased LV filling $\rightarrow$ systemic hypotension

- Therefore:

- Fluid resuscitation

- Avoid medications that decrease preload
  - Diuretics
  - Nitrates

- Monitor for AV nodal blocks
  - more common in RV infarcts than with inferior alone
Case 5 – bottom line(s)

1. Inferior infarcts are associated with RV infarcts 1/3 of the time
2. Beware of nitrates and diuretics if patient is hypotensive, bradycardic, and nauseated with a positive troponin
3. Beware of isolated R wave in V1 and
4. Get a 15-lead ECG
What about the positive troponin?

- Elevated troponin – no symptoms or discernable ECG changes
- In the absence of a thrombotic occlusion of a coronary artery.....
  - Tachy/bradyarrhythmias
  - Critical illness – sepsis
  - Cardiac trauma/contusion, including surgery, ablation, defibrillation
  - CHF
  - PE, pulmonary HTN
  - Aortic disease/dissection
  - Renal failure
  - Inflammatory diseases (myocarditis, pericarditis)
  - Burns
  - Vasospasm
Case 6

- 32 F, G2P1, 36 weeks GA, admitted on L&D last night for monitoring d/t progressively elevated BP

- At 6 AM – Code blue on L&D

- This is one of the scariest scenarios many of us encounter – and it’s important to consider in advance in terms of ddx and mgmt
Case 6 – Maternal Cardiac Arrest

DDX

1. Pulmonary: PE, amniotic fluid embolism
2. Cardiac: MI, malignant arrhythmia, valvulopathy, CMP of pregnancy
3. Hemorrhagic: uterine atony, placental abruption or previa, DIC from any cause
4. Infection/sepsis
5. HTN: stroke, pre-eclamptic complications
6. Anaphylaxis
7. Complications of anesthesia
Maternal Cardiac Arrest

First Responder
- Activate maternal cardiac arrest team
- Document time of onset of maternal cardiac arrest
- Place the patient supine
- Start chest compressions as per BLS algorithm; place hands slightly higher on sternum than usual

Subsequent Responders

Maternal Interventions
Treat per BLS and ACLS Algorithms
- Do not delay defibrillation
- Give typical ACLS drugs and doses
- Ventilate with 100% oxygen
- Monitor waveform capnography and CPR quality
- Provide post–cardiac arrest care as appropriate

Maternal Modifications
- Start IV above the diaphragm
- Assess for hypovolemia and give fluid bolus when required
- Anticipate difficult airway; experienced provider preferred for advanced airway placement
- If patient receiving IV/IO magnesium prearrest, stop magnesium and give IV/IO calcium chloride 10 mL in 10% solution, or calcium gluconate 30 mL in 10% solution
- Continue all maternal resuscitative interventions (CPR, positioning, defibrillation, drugs, and fluids) during and after cesarean section

Obstetric Interventions for Patient With an Obviously Gravid Uterus*
- Perform manual left uterine displacement (LUD)—displace uterus to the patient’s left to relieve aortocaval compression
- Remove both internal and external fetal monitors if present

Obstetric and neonatal teams should immediately prepare for possible emergency cesarean section
- If no ROSC by 4 minutes of resuscitative efforts, consider performing immediate emergency cesarean section
- Aim for delivery within 5 minutes of onset of resuscitative efforts

*An obviously gravid uterus is a uterus that is deemed clinically to be sufficiently large to cause aortocaval compression

Search for and Treat Possible Contributing Factors (BEAU-CHOPS)
- Bleeding/DIC
- Embolism: coronary/pulmonary/amniotic fluid embolism
- Anesthetic complications
- Uterine atony
- Cardiac disease (MI/ischemia/aortic dissection/ cardiomyopathy)
- Hypertension/preeclampsia/eclampsia
- Other: differential diagnosis of standard ACLS guidelines
- Placenta abruptio/previa
- Sepsis

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Case 6 – Maternal Cardiac Arrest

- **Maternal:**
  - CPR as usual (hands higher on sternum)
  - **Don’t delay defibrillation**
  - **No changes to ACLS drugs or doses**
  - **Anticipate difficult airway**
  - IV access above diaphragm
  - If patient receiving magnesium, **stop Mg and give calcium**

- **Obstetrical**
  - No LLD – manual left uterine displacement
  - Remove fetal monitors
  - Emergent C/S if no ROSC by four minutes
  - Aim for delivery within five minutes
Case 6 – bottom line

1. For maternal arrests, understand the modifications to the usual ACLS protocols
2. Anticipate difficult airway
3. Aorto-caval compression is a very real threat to maternal circulation – manual displacement has replaced LLD positioning.
Case 7

- 57 M POD 1 lap chole
- You are called b/c he is short of breath and his sats have dropped to 95% on 4L (previously 100% on RA).

Differential?
1. Atelectasis
2. Acute MI/CHF
3. PE
4. Bronchospasm
5. Pneumonia
6. Undiagnosed sleep apnea
Case 7 – Acute SOB post-op

Broad differential – but you can narrow it down!

- Historical: acuity; associated symptoms; days post surgery; type of surgical procedure
- PMH: comorbidities
- Current medications?
- Physical exam: oxygen sats; BP, HR; JVP; crackles; new murmurs; leg swelling; petechial rash
- Labs: cardiac biomarkers
- Chest XR, ECG
That’s it!

☐ Any questions?

☐ Please email me if I can help clarify anything further....

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Suggested resources

- [http://ecg.bidmc.harvard.edu/maven/mavenmain.asp](http://ecg.bidmc.harvard.edu/maven/mavenmain.asp)

Other references used:

- Management of Perioperative Myocardial Infarction in Noncardiac Surgical Patients* CHEST August 2006 vol. 130 no. 2 584-596
- Up To Date