Management of the Critically Ill Patient who Presents after Recent Coronary Artery Bypass Surgery

Key Article

Montrief T, Koyfman A, Long B. Coronary artery bypass graft surgery complications: A review for emergency clinicians. Am J Emerg Med. 2018; [Epub – Ahead of Print]

Introduction

- Over 200,000 Coronary artery bypass graft (CABG) surgeries are performed each year in the US.
- National guidelines and reporting pressures have resulted in post-operative protocol implementation aimed to reduce overall ICU and hospital length of stay.
- It has been estimated that approximately 10-20% of patients require hospital readmission within 30 days of discharge.
- Complications can include technical/surgical site complications, vascular, infectious, neurologic, amongst many others.
- The 3 most common: post-operative infection, congestive heart failure, and pain.
    - Non-specific complications include pneumonia (usually due to prolonged atelectasis from chest wall pain and reduced tidal volume), DVT, atrial fibrillation, delayed stroke, and new renal dysfunction.
- Important caveat(s):
    - As with most post-operative patients, it's important to involve the patient's CT surgeon early during the course of care. They want to be involved! A simple discussion that includes your concerns and impression early in the patient course will often go a long way.
    - It's important to know if there were any perioperative complications as these may critically influence your differential and work-up!

Specific complications

- Sternal wound infections: 2 types
    - Superficial sternal wound infections
        - Involve skin, subcutaneous tissue, or pec fascia – no bony or mediastinal involvement
        - Occur in up to 8% of patients
        - Relatively low morbidity/mortality
        - Can often be treated with local I&D by surgical team, antibiotics
    - Deep sternal wound infections: rare but serious complication
        - Occur in 1-2% of patients, patients with diabetes have a significantly increased risk
        - Mortality: as high as 30%
        - Clinical diagnosis, but often identified in patients with sternal instability, fever with purulent drainage from the mediastinum or positive cultures from surgical site.

        - Treatment: obtain sternal wound cultures, plan for OR debridement, washout, antibiotics
    - **How to differentiate:** CT of chest with IV contrast
    - Common organisms: MSSA (28%), pseudomonas (18%), MRSA (15%), Enterobacter species (7%).
    - Antibiotics: Vancomycin, broad-spectrum beta-lactam, consider double coverage for pseudomonas.

- Coronary artery bypass graft occlusion
    - Type of surgery is important!
        - Saphenous vein grafts are commonly used, but more frequently seeing right and left internal mammary artery grafts, radial grafts due to improved patency rates.
        - Try to find out the coronary artery target if possible (LAD/LM graft failure can be particularly high risk)
    - Incidence: Estimated to occur in 5-14% of patients, much more common in vein grafts compared to arterial grafts.
    - Ask about medication compliance
        - Patients will often be prescribed daily aspirin (81-325mg/day) and in some cases Plavix if allergic to ASA or if they had an off-pump bypass in which they will be on dual antiplatelet therapy for 1-year.
        - Not taking daily aspirin increases occlusion rate by > 50% at 30 days!
    - EKG
        - Interpretation is *exactly the same* as those with native coronary arteries
        - Look for ST depressions in reciprocal leads
        - Beware of STE mimics
            - Pericarditis: Although post-operative pericarditis ST-elevations can be seen up to 3 weeks after surgery
            - LV aneurysm
    - Early echocardiography for regional wall motion abnormalities
    - In the event of a true occlusion – pt should go immediately to cath lab and treat as a STEMI

- Pericardial effusion and tamponade
    - The can't miss diagnosis in a post-cardiac surgery patient
    - Patients are at high risk for delayed effusion, which can be the result of pericardial inflammation, anticoagulation, or unrecognized slow mediastinal bleed.
    - Pericardial effusions present in up to 80% of patients after surgery, but most are small and clinically inconsequential.
    - Most patients will represent with signs and symptoms that often manifest with low cardiac output:
        - dyspnea (shortness of breath with clear breath sounds!), fatigue, chest pain, nausea/vomiting
        - Signs: tachycardia, hypotension, increased JVD
    - Early cardiac ultrasound is critical, looking for right atrial/ventricular diastolic collapse, LV diastolic collapse PLUS IVC distention.
        - **PEARL**: sometimes effusion may *not* be circumferential – look carefully for a local clot causing inflow obstruction. If there is a high clinical suspicion,

consider an early formal transthoracic echo, transesophageal echocardiogram, or CT scan.
        - **One Additional US Pearl:** If doing a RUSH exam with ultrasound, beware of interpreting a, "lack of lung sliding" as a pneumothorax. These patients will often have pleural adhesions after open heart surgery, and will no longer have the visceral/parietal pleural sliding of someone who has not had thoracic surgery.
    - **Timing is critical:** In the hemodynamically unstable patient within 7 days after surgery, current guidelines recommend early *resternotomy* in the patient suffering cardiac arrest.
        - While the emergency physician may not be comfortable performing this procedure, this highlights the importance of early CT surgeon involvement.
        - Tamponade should be high on the differential in this patient population.

Take home points

- Critically ill patients after cardiac surgery are both diagnostic and therapeutic challenges, as the etiology can be from a number of causes that include obstructive, cardiogenic, vasoplegic, or obstructive shock.
- Critical physical exam components include evaluating the sternum and other surgical sites for infection, signs of heart failure, and early point-of-care ultrasound to evaluate for pericardial disease, pulmonary embolism, regional wall motion abnormalities, or left sided heart failure.
- Aside from the usual strategy for patients presenting with undifferentiated shock, careful attention should be made toward ruling out pericardial tamponade, graft occlusion, and surgical site infection.
- **Early consultation with the cardiac surgeon who performed the surgery can provide valuable perioperative information, particularly if the surgery was within the last few months.**