References:

CorePendium: Acute Coronary Syndromes

Electrocardiographic diagnosis of acute coronary occlusion myocardial infarction in ventricular paced rhythm using the modified Sgarbossa criteria
Dodd KW, Zvosec DL, Hart MA, et al. Ann Emerg Med. 2021 Oct;78(4):517-529. doi:10.1016/j.annemergmed.2021.03.036. PMID: 34172301

EMA 2021 October Abstract 6: Diagnosis of MI in Ventricular Paced Rhythm: Sgarbossa Criteria

EMA 2016 April Abstract 3: Validation Of The Modified Sgarbossa Criteria For Acute Coronary Occlusion In The Setting Of Left Bundle Branch Block: A Retrospective Case-control Study

Cardiac Transplant Challenges

David Gatz and Anand Swaminathan

- Anatomic changes after transplant
  - When a heart is transplanted, essential vascular components are reconnected but nervous system components are not.
  - Efferent nerve disruption:
    - Lack of parasympathetic vagal fibers
      - Resting heart rate will normally be elevated (80-110 bpm).
      - Vagal maneuvers will not work.
      - Heart will have increased sensitivity to certain medications (eg, adenosine).
    - Lack of sympathetic fibers: Heart will not have the same stress-induced augmentation of sinoatrial (SA) node automaticity (ie, may not see tachycardia when patient is sick).
  - Afferent nerve disruption: patient will not experience typical anginal symptoms when having myocardial ischemia.
- Listener question: In post-cardiac transplant patients, how will acute coronary syndrome (ACS) present given the lack of afferent nerve signals?
  - It is important to key in to atypical symptoms: fatigue, shortness of breath, any exertional symptoms.
  - Reinnervation

        - Occurs in about 20% of post-transplant patients
        - Can occur as early as 3 months but typically around 2 years post-transplant
        - Reinnervation is not uniform; tends to be patchy
- ECG post-transplant
    - There are a few expected changes:
        - Rate is typically faster (80-110 bpm).
        - Rhythm should be sinus. In older procedures, there could be 2 SA nodes competing for conduction.
        - Premature ventricular contractions (PVCs) are common and benign.
        - Dysrhythmias such as atrial fibrillation or bradycardia are concerning for rejection.
        - Axis is variable; it depends on how the heart fits in the chest.
        - Intervals: right bundle branch block (RBBB) is common.
    - Ischemic changes should follow the typical patterns we see in nontransplant patients.
- Immunomodulating medications
    - Immunosuppression occurs in a couple of stages.
        - Initial induction:
            - Intensive course begins perioperatively and aggressively alters immune response.
            - About 50% of cardiac transplant patients will get initial induction.
        - Maintenance:
            - Maintenance is typically a 3-drug regimen that is eventually weaned to a 2-drug regimen.
            - Calcineurin inhibitor + antimetabolite + a tapering dose of corticosteroids.
            - Steroids are often weaned around 12 months post-transplant.
    - Infectious complications
        - It is always important to keep a high suspicion for occult infection in this population. They may not mount a fever or show leukocytosis.
        - Increased risk for typical infections: pneumonia, sepsis, urinary tract infection, etc.
        - Increased risk for opportunistic infections: Pneumocystis jiroveci pneumonia (PJP), Cytomegalovirus (CMV), or fungal infections.
        - Transplant medicine has made some impressive gains in the world of opportunistic infections due to use of prophylactic medications.

- Exactly what meds and for how long your patient is on will vary, based on
  - The recipient
  - The donor
  - Potentially, where you practice
- There are 3 major post-transplant infection windows:
  - 0-30 days
    - Nosocomial infections predominate
    - Central-line associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), ventilator-associated pneumonia (VAP), and surgical site infections (SSI)
  - 1-6 months:
    - Opportunistic infections predominate: tuberculosis, CMB, Epstein-Barr virus (EBV), fungal infections, parasitic infections (depending on where you practice).
  - 6+ months
    - Community pathogens predominate (eg, community-acquired pneumonia, respiratory syncytial virus).
    - Patient still at risk for opportunistic infections
- CMV
  - CMV tends to be the most prevalent opportunistic infection.
  - It can be a new infection or, because it is a latent herpesvirus, it can reactivate after transplant (especially if there is a mismatch of donor +/recipient -).
  - Causes "-itis": enteritis (with diarrhea), pneumonitis, and a generalized syndrome tend to be the most common.
  - Fortunately, the incidence and timing of CMV has been greatly affected by universal prophylaxis.

- Rejection
  - While we should always be thinking about rejection, we'll rarely make the diagnosis in the ED (requires biopsy).
  - We cannot afford to miss any signs of allograft dysfunction. In a cardiac recipient, this can have a variety of presentations:
    - Any exertional symptoms
    - Peripheral edema
    - New dysrhythmias

- If a patient makes it past the first year without rejection, they are markedly less likely to ever experience rejection.
- Importance of immunomodulating medications:
  - Cardiac transplant recipients are typically not HLA matched.
  - As a result, missing even a dose or two can have a significant impact on rejection.
  - If a patient has missed medications for any reason, discuss the use of short-course, high-dose steroids with the transplant team.

Pediatric Transplant Patients

Ilene Claudius, Tim Ruttan, and Brittany DeFabio

- Approach to fever in a child with a history of transplant:
  - Fever can be an indicator of infection or rejection.
  - If septic, treat like you would anyone else.
  - If not septic, think about the timeline after the transplant:
    - <1 month: surgical, nosocomial, or donor-derived infection?
    - 1-6 months: the patient is still very immunocompromised and at risk for opportunistic infection (eg, PJP, histoplasmosis, coccidiomycosis) and will need more specialized testing as an inpatient.
    - >6 months: immunosuppression will be tapered and the patient will start to be at risk for infections like everyone else.
- Be aware that kids on immunosuppressant medications may not mount a leukocytosis or even manifest an elevated C-reactive protein, which could be falsely reassuring, so sending cultures and giving antibiotics would still be advised.
- Specific types of solid organ transplants and considerations:
  - Renal
    - Patients can have recurrence of their primary disease that caused them to get the transplant in the first place, so it is important to screen for renal failure.
    - Small changes in creatinine can be very significant in these kids, so take a careful look back at their historical values; even if it's a minor increase, talk to the transplant team.
    - Urinary tract infections are common (with equal incidence among males and females) and they will require treatment; if they have pyelonephritis, they get IV antibiotics and are admitted.