

The EM Educator Series

The EM Educator Series: Bradycardia

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Case 1: A 75-year-old female presents 4 hours after ingesting several metoprolol doses accidentally. She feels lightheaded and slightly confused. HR is 42, with a blood pressure of 81/44.

Case 2: A 43-year-old male with ESRD on hemodialysis presents after an episode of syncope. He feels short of breath and tired, but he denies other symptoms. He has missed two sessions of hemodialysis. His heart rate is 55, with a blood pressure of 122/73.

Questions for Learners:

1. What are the different etiologies of bradycardia?
2. What is the approach to evaluating these conditions associated with bradycardia in the ED?
3. What is the ED management of bradycardia?

Suggested Resources:

- Articles
 - [emDocs](#)
 - [Emergency Medicine Cases](#)
 - [First 10 EM](#)
 - [IBCC](#)
 - [EMRAP HD – Placing a Transvenous Pacer](#)
- Journal Articles
 - [EM Clinics of North America – Rhythm Disturbances](#)
 - [EM Clinics of North America – Bradycardia and AV blocks](#)

Answers for Learners:

1. What are the different etiologies of bradycardia?

The Big 4 immediate life-threatening causes of bradycardia
<ol style="list-style-type: none">1. Hyperkalemia2. Cardiac ischemia3. Toxicological the "Brady Bunch" beta blockers, CCB and digoxin4. CNS assault (Cushing's): deep symmetric TWI in anterior leads
The Lesser 4 causes of bradycardia
<ol style="list-style-type: none">1. Hypothermia2. Myxedema coma3. Infection: myocarditis/endocarditis/lyme carditis/travel bugs (dengue, malaria, typhoid)/legionnaire's4. Sleep apnea
Special groups
<ol style="list-style-type: none">1. Post cardiac/valve surgery2. Ruptured abdominal viscus/ectopic: paradoxical bradycardia from vagal response

BRADI mnemonic for causes of bradycardia

- **BRASH**/hyperkalemia
 - Isolated hyperkalemia
 - BRASH syndrome (Bradycardia, Renal failure, AV node blockade, Shock and Hyperkalemia)
- **Reduced vital signs**
 - Hypoxia
 - Hypoglycemia
 - Hypothermia +/- hypothyroid
- **Acute coronary occlusion**
 - Inferior MI: nodal ischemia and vagal response, self-limiting or responds to atropine
 - Anterior MI: infranodal ischemia, often requires pacing
- **Drugs**: withdraw if stable, reverse if unstable
 - Beta-blockers
 - Calcium channel blockers
 - Digoxin
- Intracranial pressure, Infection (Lyme, endocarditis): treat underlying

2. What is the approach to evaluating these conditions associated with bradycardia in the ED?

Take home points on 4-step approach to bradycardia

- Be cautious with your history and physical exam to not miss occult bradycardic shock
- Bradycardia alone rarely causes instability, with the exception of progressive bradycardia, which is a sign of pre-arrest
- Determine if symptoms are causing bradycardia (vasovagal) or if bradycardia is causing symptoms
- Identify location of problem – which will determine whether urgent pacing is required or not
 1. Is the QRS narrow? Indicating proximal (SA/AV node disease); Is the QRS wide? Proximal or distal (His Bundle disease)
 2. Assess rhythm prior to bradycardia: sinus brady more likely to be proximal, sinus tachycardia more likely to be distal disease
- Junctional bradycardia is most commonly caused by toxicity from AV node blockers, post valve surgery and inferior MI
- Tachy-brady syndrome occurs in the setting of elderly patient with paroxysmal afib; do not treat these patients with AV node blockers
- Torsades can occur in the setting of bradycardia with AV block, and these runs of polymorphic VT can degenerate into Vfib
- Concurrently rule out secondary causes of bradycardia by considering the “Big 4 life threats” and “Lesser 4” causes

3. What is the ED management of bradycardia?

