BRADYARRHYTHMIA

(Last updated 07/22/2019 Reviewed by: Jalal Soleimani MD)

PRESENTING COMPLAINT: chest pain, shortness of breath, fatigue

FINDINGS

- **A** Check airway (for foreign body especially in pediatric patients)
- **B** ↑ RR, increased work of breathing
- **C** ↓/↑ BP, ↓ HR; heart block
- **D** Variable altered
- **E** N/A
- **L<sub>PC</sub>** CBC, electrolytes, cardiac markers, TSH, toxicology, pulse oximetry (↓ Spo2)
- **U<sub>PC</sub>** Rule out tamponade, pneumothorax

*V (verbal), P (pain), U (unconsciousness), D (delirious)*

**U<sub>PC</sub>** (point of care ultrasound)  **L<sub>PC</sub>** (point of care labs)

OTHER HISTORY

- Dizziness, fainting, syncope, impaired effort tolerance, heart failure
- **Predisposing conditions**
  - Medications: Beta-blockers, calcium channel blockers, antipsychotics
  - Acute myocardial infarction, sick sinus syndrome, ↑ vagal tone (e.g. athletes) of vagal stimulation (suctioning), ↑ intracranial pressure, hypothyroidism, hypothermia, hypoxemia, parasympathomimetic/sympatholytic drugs/toxins (including organophosphates)

OTHER INVESTIGATIONS

- **ECG:** Sinus bradycardia (sinus node dysfunction), V block 1<sup>st</sup> (asymptomatic) or 2<sup>nd</sup> (types I/II) or 3<sup>rd</sup> degrees, long QT syndrome
- **Labs:** Blood count, electrolytes, cardiac markers, TSH, toxicology
- **Monitoring:** Continuous ECG, BP, oxymetry
- **Imaging:** US/ECHO: LV function; rule out tamponade, pneumothorax

THERAPEUTIC INTERVENTIONS

- Follow algorithm:
HR <50 bpm

Is bradycardia symptomatic?  
(Look for one of the following)
- Hypotension
- Altered mental state
- Signs of Shock
- Chest pain or discomfort
- Acute heart failure

Yes

Identify and treat the underlying cause
- Secure airway, give O₂
- Assist breathing if necessary
- Monitor patient (HR, rhythm, blood pressure, RR, SpO₂)
- IV access
- 12 lead ECG

Give atropine

If unsuccessful, TC pacing

Alternative consider:
- Dopamine  
  - Dose: 2-10 mcg/kg/min
- Epinephrine  
  - Dose: 2-10 mcg/min
- If BB or CCB toxicity possible, give glucagon and/or calcium

If unsuccessful, consider:
- Expert consult
- Transvenous pacing

Transcutaneous pacing
- Initially: 0.5 mg, IV push
- Could be repeated in every 3-5 mg
- Max dose: 3mg

- Place the pads
  - Remove excessive hair if needed
  - Clean the skin
  - Position the pads (most common is anterior-anterior, but might be placed in anterior-posterior position)
- Attach the leads of the monitor
- Set pacing rate
- Set pacing output (mA): Start with minimal setting.
  - First increase the output until electrical capture occurs.
  - Then decrease to the lowest level that still maintains capture.
• Stop any offending medications
• If symptomatic (hypotension/signs of shock, altered mental status, chest pain):
  o Give Atropine 0.5 mg iv bolus every 3-5 minutes, max 3mg
  o If atropine ineffective: Transcutaneous pacing; Alternatively, Dopamine/Epinephrine infusion
• If ineffective: consider transvenous pacing (pacing Swan-Ganz catheter may be the quickest)
• If asymptomatic, monitor and observe
• Treat shock if needed and prepare for potential cardiac arrest
• Consider calcium, glucagon, intralipid, high dose insulin/glucose if beta-blocker or calcium channel blocker overdose
• Treat promptly: Electrolyte disturbance (hypokalemia, hypomagnesemia, hypocalcemia), hypovolemia, hypoxia, acidosis, hypoglycemia, hypothermia, myocardial ischemia/infarction, hypothyroidism (myxedema)
• Consult: Cardiology

ONGOING TREATMENT
• Consider permanent pacemaker placement
• Consider electrophysiological studies
• Full investigation and treatment of possible causes if found

CAUTION
• Prolonged QT interval with bradycardia predisposes to Torsades the Pointes (polymorphic VT)

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