

Unstable Bradycardia – Pacemaker Insertion

Section 1: Case Summary

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| Scenario Title: | Unstable Bradycardia - Pacemaker Insertion |
| Keywords: | Syncope, third-degree heart block, bradycardia |
| Brief Description of Case: | Rural ED with limited resources. Elderly patient with syncope. Found to be in third degree heart block. Unstable requiring pacing. Initial management includes ACLS approach with transcutaneous pacing. Upon stabilization the objective is placement of a transvenous pacemaker for transport to a higher level of care for permanent pacemaker insertion. |

| Goals and Objectives | |
|----------------------------------|--|
| Educational Goal: | 1. Approach to unstable bradycardia |
| Objectives: (Medical and CRM) | 1. ACLS bradycardia management 2. Technical aspects to starting transcutaneous and transvenous pacing |
| EPAs Assessed: | ACLS approach to bradycardia, recognizing the need for pacing and description of technical aspects (transcutaneous & transvenous), coordinating transfer for permanent pacemaker insertion |

| Learners, Setting and Personnel | | | |
|-------------------------------------|---|---|---------------------------------|
| Target Learners: | <input type="checkbox"/> Junior Learners | <input checked="" type="checkbox"/> Senior Learners | <input type="checkbox"/> Staff |
| | <input type="checkbox"/> Physicians | <input type="checkbox"/> Nurses | <input type="checkbox"/> RTs |
| | <input type="checkbox"/> Inter-professional | | |
| | <input type="checkbox"/> Other Learners: | | |
| Location: | <input checked="" type="checkbox"/> Sim Lab | <input type="checkbox"/> In Situ | <input type="checkbox"/> Other: |
| Recommended Number of Facilitators: | Instructors: 1-2 | | |
| | Confederates: 1 | | |
| | Sim Techs: 1 | | |

| Scenario Development | |
|-------------------------------|--------------------------|
| Date of Development: | 2020 |
| Scenario Developer(s): | Dr. Charles Stringer |
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| Last Revision Date: | |
| Revised By: | |
| Version Number: | |



Unstable Bradycardia – Pacemaker Insertion

Section 5: Scenario Progression

| Scenario States, Modifiers and Triggers | | | | |
|---|--|---|--|-------------------|
| Patient State/Vitals | Patient Status | Learner Actions, Modifiers & Triggers to Move to Next State | | Facilitator Notes |
| 1. Baseline State Rhythm: 3 rd degree block HR: 32 BP: 78/50 RR: 18 O ₂ SAT: %100 T: 36.4°C GCS: 15 Glucose: 6 | Alert, mild confusion, feeling tired and 'not right' | <u>Expected Learner Actions</u> <input type="checkbox"/> Obtained a focused history/exam <input type="checkbox"/> Obtain 12-lead ECG <input type="checkbox"/> Obtain large bore IV access <input type="checkbox"/> Send labs (inc. troponin, electrolytes, TSH) <input type="checkbox"/> Initiate fluid bolus <input type="checkbox"/> Trial atropine 0.5mg IV <input type="checkbox"/> Trial epinephrine infusion <input type="checkbox"/> Place pacer pads on patient | <u>Modifiers</u> <i>Changes to patient condition based on learner action</i> -Fluids -> no change -Atropine -> no effect -Epinephrine infusion -> delay to availability (minimal effect) <u>Triggers</u> <i>For progression to next state</i> -Atropine failure -> 2. Worsening Hypotension | |
| 2. Worsening Hypotension – ACLS bradycardia approach HR: 24 BP: 68/42 | | <u>Expected Learner Actions</u> <input type="checkbox"/> Initiate transcutaneous pacing. Explain the process (Appendix C) <input type="checkbox"/> Initiate sedation <input type="checkbox"/> Intubation as deep sedation required (no predictors of difficulty) | <u>Modifiers</u> -Pacing (105mA due to large body habitus) -> requires sedation -Sedation -> requires intubation (straightforward intubation) <u>Triggers</u> -Intubation -> 3. Preparation for transport | |
| 3. Preparation for transport – transvenous pacemaker placement HR 80 (paced) | | <u>Expected Learner Actions</u> <input type="checkbox"/> Communicate with accepting physician from regional hospital for permanent PCM insertion | <u>Modifiers</u> -Calls regional cardiologist -> accepts but requests transvenous PCM insertion <u>Triggers</u> | |



Unstable Bradycardia – Pacemaker Insertion

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| BP: 130/70 | | <input type="checkbox"/> Transvenous pacemaker insertion. Explain process (Appendix C) | -Asks for transvenous pacing guidance -> Sim facilitator provides (Appendix C) | |
|------------|--|--|--|--|



Appendix C: Facilitator Cheat Sheet & Debriefing Tips

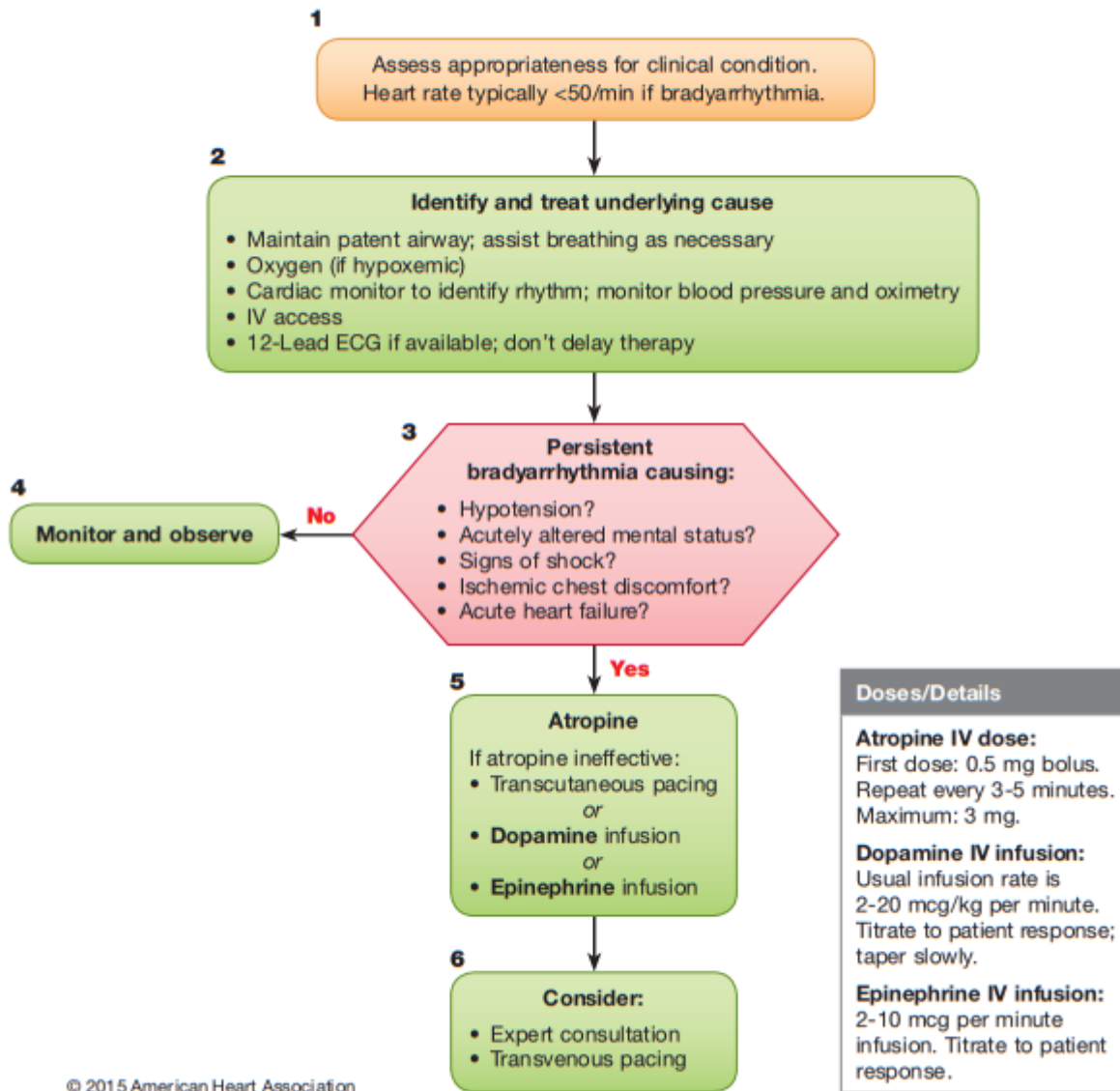
Include key errors to watch for and common challenges with the case. List issues expected to be part of the debriefing discussion. Supplemental information regarding any relevant pathophysiology, guidelines, or management information that may be reviewed during debriefing should be provided for facilitators to have as a reference.

ACLS bradycardia algorithm

Unstable Bradycardia – Pacemaker Insertion

1. Review the AHA bradycardia algorithm:

Adult Bradycardia With a Pulse Algorithm



Transcutaneous Pacing Sequence:

1. Attach pads
2. Connect to defibrillator/pacemaker
3. Set defibrillator to **pacing mode**
4. Set **Rate** (80BPM)



Unstable Bradycardia – Pacemaker Insertion

5. Set **Current** and confirm capture
 - a. Start at 5mA (milliamp)
 - b. Look for electrical capture
 - c. Feel for mechanical capture
 - d. Increase current (~5mA increments) until electrical and mechanical capture
 - e. Set current 10mA (~20%) above level of capture
6. Ensure adequate sedation

Transvenous Pacemaker Insertion (<https://www.youtube.com/watch?v=00-T8PcbStE>)

1. Equipment collection
 - a. Sterile setup
 - b. Ultrasound
 - c. CORDIS central line kit with appropriate flushes and securement equipment
 - d. Pacemaker equipment
 - i. Pace Generator (ensure power)
 - ii. Pacer balloon catheter with two electrical wires attached
 - iii. Pacer wire adapters or wire connecting cable (to attach pacer catheter wires to pacer generator)
2. Site selection: (RIJ or L subclavian most direct)
 - a. R IJ > L subclavian (preferred site for permanent pacemaker)
3. Ensure patient on cardiac monitor
4. Obtain IJ access with CORDIS
5. Confirm Pacer catheter balloon works and attach wire adapters
6. Hand sterile wire ends with adapters OR sterile connecting cable to non-sterile colleague to attach to pacer generator
7. Insert pacer catheter into cordis through attached CORDIS sterile sheath (ensure correct orientation)
8. Have non-sterile colleague set pacing generator to 80BPM, 5mA
9. Hold transcutaneous pacing if able (to inform electrical capture on monitor transvenously)
10. Advance deflated balloon through attached CORDIS sheath to 30cm (3 lines) then inflate balloon
11. Watch cardiac monitor for QRS widening/STE pattern (Electrical capture)
12. Confirm mechanical capture (palpation/pulse ox)
13. Deflate balloon, lock associated stop cock, pull sterile sleeve over catheter (locks into pacing wire)
14. Turn down current until loss of capture then increase just above for safe margin
15. Secure CORDIS and sterile sheath
16. Trouble shooting tips
 - a. Deflate balloon, back out pacer catheter, rotate and re-advance to 30cm and re-inflate balloon
 - b. May need to decrease sensitivity to zero on pacer generator if picking up intrinsic rate/interference.

References

1. AHA Guidelines, 2015.
<https://ahajournals.org/doi/10.1161/CIR.0000000000000261>

