Cardiac Review Sinus Rhythms

Jennifer Cheung, MSN, RN, CCRN

1

Sinus Rhythm Review

SINUS TACHYCARDIA RHYTHM

RATE: 100 to 160 bpm

RHYTHM: Regular and initiated in the Sinoatrial node

P WAVES: Regular, precedes each QRS complex

PR / QRS

- **PR interval** shortens as the rate increases
- **QRS Interval** less than 0.12 seconds (normal)

Definition: a rapid heart rate from an increase in the automaticity of the sinus node in response to a stimuli.

INTERVENTION

GOOD RHYTHM

2

Sinus Rhythm Review

SINUS TACHYCARDIA RHYTHM

To determine the highest rate of sinus tachycardia in relation to age, use the following equation

- **200 beats per minute minus patient's age in years**

Can be useful in judging whether the sinus tachycardia falls in the expected range

Example: Patient is 40 years old presenting with sinus tachycardia of 140

- **200 beats per minute minus 40 years age = 160 beats per minute maximum**

Patient has not reached his or her maximum tachycardia

INTERVENTION

GOOD RHYTHM

3

Sinus Rhythm Review

SINUS TACHYCARDIA CAUSES

- Hypoxemia
- Shock
- Pulmonary embolism
- Anemia
- Heart Failure
- Hypovolemia
  - **If there is a compromise in stroke volume, the heart rate will increase (heart rate and stroke volume has an inverse relationship)**
- Myocardial infarction
- Hyperthyroidism
- Stress, Pain, Fever
- Medication effect: atropine, epinephrine, digitalis toxicity, caffeine, or drugs such as cocaine

Can be normal in some adults and most children

GOOD RHYTHM

4

Sinus Rhythm Review

SINUS TACHYCARDIA INTERVENTIONS

Treatment involves identifying the underlying cause and correcting the contributing factors

If cardiac function is poor, cardiac output can be dependent on the compensatory tachycardia. Returning the heart rate to normal can be detrimental to patient outcomes.

INTERVENTION

GOOD RHYTHM

5

Sinus Rhythm Review

SINUS ARRHYTHMIA RHYTHM

RATE: 60 to 100 bpm

RHYTHM: Irregular and initiated in the Sinoatrial node

P WAVES: Regular, precedes each QRS complex

PR / QRS

- **PR interval** 0.12 to 0.20 seconds (normal)
- **QRS Interval** less than 0.12 seconds (normal)

Definition: Impulse generated in the Sinoatrial node at irregular intervals due to effects on the vagus nerve caused by respirations

INTERVENTION

GOOD RHYTHM

6

Sinus Rhythm Review

SINUS ARRHYTHMIA CAUSES

- Myocardial infarction
- Sick sinus syndrome
- Chronic lung disease
- Digitalis toxicity
- Increased intracranial pressure (ICP)

Can be normal in well-conditioned adults and children

GOOD RHYTHM

7

Sinus Rhythm Review

SINUS ARRHYTHMIA INTERVENTIONS

Treatment interventions are based on symptomatic and hemodynamic stability. If treatment is necessary, treatment is based on sinus bradycardia.

- Atropine Sulfate
- Transcutaneous Pacing
- Dopamine
- Epinephrine

INTERVENTION

GOOD RHYTHM

8

Sinus Rhythm Review

SINUS ARRHYTHMIA INTERVENTIONS

ATROPINE

- First drug of choice for symptomatic sinus bradycardia
- Could be beneficial is AV nodal block is present: not effective for type II 2nd degree block or 3rd degree AV block

ATROPINE DOSING

- 0.5 mg IV every 3 to 5 minutes as needed, do not exceed 0.04 mg/kg (**Maximum 3 mg**)

ATROPINE CONSIDERATIONS

- Can increase myocardial oxygen demands. Be cautious when myocardial ischemia and hypoxia are present.
- **Atropine may cause paradoxical slowing. Be prepared to pace!**

9

Sinus Rhythm Review

SINUS ARRHYTHMIA INTERVENTIONS

TRANSCUTAENOUS PACING

- For unstable bradycardia (< 50 bpm) with compromised hemodynamics (hypotension, acute altered mental status, shock, ischemic chest discomfort, acute heart failure)

TRANSCUTANEOUS PACE FOR

- Symptomatic sinus node dysfunction
- Type II 2nd Degree Heart Block
- 3rd Degree Heart Block
- New Bundle Branch Block
- Not for agonal rhythms or cardiac arrests

TRANSCUTANEOUS PRECAUTIONS

- Conscious paced patients may require analgesics for pacing discomfort
- Avoid palpating carotid pulses to confirm capture (electric impulses cause muscle jerking that may mimic a pulse)

10

Sinus Rhythm Review

SINUS ARRHYTHMIA INTERVENTIONS

TRANSCUTAENOUS PACING SET UP

- Position the pacing pads on the chest as instructed by the packaging
- TURN ON THE PACER
- Set the demand rate to 80 bpm or per physician order
- Set the current (mA) output
  - Increase current starting with minimum settings until electrical capture is consistent (wide QRS and T wave after each pacer spike- ventricular paced)
    - **Common current ranges 50 - 80 mA**

11

Sinus Rhythm Review

SINUS ARRHYTHMIA INTERVENTIONS

DOPAMINE

- Second drug of choice for symptomatic sinus bradycardia
- Used for hypotension (systolic less than 100 mm Hg) with signs and symptoms of shock
- **IMPORTANT: Never give medication IV push! Provide via IV infusion.**

DOPAMINE DOSING

- Infusion rate: 2 to 20 mcg/kg per minute
- Titrate based on patient's hemodynamics (blood pressure) slowly

DOPAMINE CONSIDERATIONS

- Need to correct hypovolemia with adequate fluid replacement prior to starting dopamine
- Use cautiously with cardiogenic shock with CHF
- May cause tachyarrhythmias and excessive vasoconstriction
- Do not mix with sodium bicarbonate (can inactivate dopamine due to alkaline solution)

12

Sinus Rhythm Review

SINUS ARRHYTHMIA INTERVENTIONS

EPINEPHRINE

- Alternative drug of choice for symptomatic sinus bradycardia in place of dopamine
- Used when pacing, atropine fails, and severe hypotension.

EPINEPHRINE DOSING

- Infusion rate: 2 to 10 mcg per minute INFUSION
- Titrate based on patient's hemodynamics (blood pressure) slowly

EPINEPHRINE CONSIDERATIONS

- Raising blood pressure with increasing heart rate could cause angina, myocardial ischemia, and increase oxygen demand
- High doses does not improve survival and may contribute to post resuscitation myocardial dysfunction with poor neurological outcomes
- High does could be required for poison and drug-induced shock

13