



# **Clinical Significance and Treatment of Dysrhythmias**

# Assessing the Patient

- Questions to ask:
  - Is the patient symptomatic?
  - Does the patient need immediate treatment?
  - How aggressive does the treatment need to be?
  - Should pharmacologic or electrical treatment be used?



# Stable vs. Unstable

## ○ Treatment for unstable patients:

- Electrical therapy
- Transcutaneous pacing
- Cardioversion
- Defibrillation



## ○ Treatment for stable patients:

- Pharmacologic agents

# Stable vs. Unstable

- Signs and symptoms of instability:
  - Decreased cardiac output
  - Chest pain
  - Shortness of breath
  - Hypotension
  - CHF
  - Pulmonary edema



# Treating the Patient

- Must decide what modality to use



# Electrical Therapy

- Cardioversion and defibrillation
  - Fundamental goal
  - Primary differences
    - Defibrillation is unsynchronized
      - Reserved for life-threatening conditions
    - Cardioversion is synchronized
      - Used when there is underlying organized rhythm





# Electrical Therapy

- Sedation

- Cardioversion is painful and vascular access is required
  - Usually requires higher doses than transcutaneous pacing

- Transcutaneous pacing

- Usually effective for all symptomatic bradycardias
  - Contraindication
  - May also be used for Torsades de Pointes

# Pharmacologic Therapy

## ○ Atropine Sulfate

- Is a parasympatholytic
- Increases HR and conduction velocity
- Should never be administered slowly
- Usually effective for:
  - Sinus bradycardia
  - Sinus arrest / Sinus exit block
  - Second degree AV block, type I
  - If the QRS is narrow, second degree 2:1 and advanced AV block and third degree AV block



# Pharmacologic Therapy

## ○ Atropine Sulfate

### ○ Ineffective for:

- Second degree, type II AV block

- If wide QRS, second degree 2:1 and advanced AV block and third degree AV block

- Treatment of bradycardia in heart transplant patients

- Use with caution in acute MI patients

# Pharmacologic Therapy

## ○ Vasopressors

### ○ Definition

○ Increases CO by increasing HR and strength of cardiac contraction

### ○ Types:

○ Epinephrine

○ Vasopressin

○ Dopamine

○ Norepinephrine

○ Dobutamine

○ Isoproterenol

# **Pharmacologic Therapy**

## **○ Epinephrine**

- Considerations**

- Stimulates heart muscle directly**

- May result in too fast a HR**

- Can cause irritability**

- Can cause PVCs, V Tach, or V Fib to occur**

- Should be administered via a diluted infusion**

# Pharmacologic Therapy

- Vasopressin

- Nonadrenergic peripheral vasoconstrictor
- Equivalent to epinephrine in certain conditions

- Dopamine

- Naturally occurring precursor of norepinephrine in body
- Considered for treatment of symptomatic bradycardias
- Must use caution when administering

# Pharmacologic Therapy

## ○ Norepinephrine

- Naturally occurring potent vasoconstrictor and inotropic agent
- May be effective for patients with severe hypotension
- Contraindicated in hypovolemic patients
- May increase myocardial O<sub>2</sub> requirements

## ○ Dobutamine

- Useful for treatment of severe systolic heart failure and reducing pulmonary edema

# Pharmacologic Therapy

## ○ Antidysrhythmics

### ○ Types:

○ Adenosine

○ Amiodarone

○ Lidocaine

○ Procainamide

○ Magnesium

○ Ibutilide



# Pharmacologic Therapy

## ○ Adenosine

- Briefly depresses AV node and sinus node activity

- Indicated for:

  - SVT

- Contraindications:

  - Atrial flutter

  - A Fib

  - Atrial or ventricular tachycardias

# Pharmacologic Therapy

## ○ Amiodarone

- Affects sodium, potassium, and calcium channels

- Indicated in:

  - Tachycardias

  - Cardiac Arrest

- Adverse effects:

  - Hypotension

  - Bradycardia

# Pharmacologic Therapy

## ○ Lidocaine

- Little scientific evidence to support use

- Toxic reactions and side effects:

  - Slurred speech

  - Altered consciousness

  - Muscle twitching

  - Seizures

  - Bradycardia

# Pharmacologic Therapy

## ○ Procainamide

- Suppresses atrial and ventricular dysrhythmias
- Used for V Tach, A Fib, Atrial Flutter

## ○ Magnesium

- Electrolyte
- Cofactor in neurochemical transmission and muscular excitability

# Pharmacologic Therapy

- Ibutilide
  - Short-acting
  - Prolongs action potential duration
  - Increases refractory period of myocardium
  - Used in:
    - A Fib
    - Atrial flutter
  - Has minimal effects on BP and HR
  - Relatively high incidence of ventricular dysrhythmia

# Pharmacologic Therapy

- Calcium Channel Blockers
  - Diltiazem and Verapamil
    - Slow conduction
    - Increase conduction time through AV node
    - Can be used in:
      - SVT
      - Stable, narrow-complex, ectopic focus tachycardias
      - A Fib
      - Atrial flutter



# Treatment Modalities

## ○ Bradycardias

### ○ Includes:

- Sinus bradycardia

- Sinus arrest/sinus exit block

- 2<sup>nd</sup> degree AV block, Type I

- 2<sup>nd</sup> degree 2:1 and Advanced AV block with narrow QRS

- 3<sup>rd</sup> degree AV block with narrow QRS

# Treatment Modalities

- Bradycardias

- Treatment:

- Oxygen

- Atropine sulfate AND/OR transcutaneous pacing

- Dopamine or epinephrine infusion

- Transvenous pacemaker

# Treatment Modalities

- Heart blocks

- Includes:

- 2<sup>nd</sup> degree type II AV block

- 2<sup>nd</sup> degree 2:1 and Advanced AV block with wide QRS

- 3<sup>rd</sup> degree AV block with wide QRS

- Treatment:

- Oxygen

- Transcutaneous pacing

- Dopamine or epinephrine infusion

- Transvenous pacemaker

# Treatment Modalities

- Escape rhythms

- Includes:

- Junctional escape rhythm

- Ventricular escape rhythm

- Treatment:

- Oxygen

- Transcutaneous pacing

- Dopamine or epinephrine infusion

# Treatment Modalities

- Sinus tachycardia and atrial tachycardia with block
  - Treatment:
    - No specific treatment
    - Treat underlying cause
    - Discontinue any responsible drugs

# Treatment Modalities

- **Narrow QRS tachycardia of unknown origin with pulse**
  - **Treatment:**
    - **Oxygen**
    - **Vagal maneuvers**
    - **Adenosine**
    - **Determine if dysrhythmia is:**
      - **Paroxysmal SVT (PSVT)**
      - **Atrial tachycardia without block**
      - **Junctional tachycardia**
      - **Atrial flutter/fibrillation**



# Treatment Modalities

- Atrial tachycardia without block
  - Treatment:
    - Oxygen
    - Diltiazem or beta-blocker or amiodarone
- PSVT with narrow QRS
  - Treatment:
    - Oxygen
    - Vagal maneuvers
    - Adenosine, diltiazem, or beta-blocker
    - Digoxin
    - Cardioversion

# Treatment Modalities

- Junctional tachycardia

- Treatment:

- Oxygen

- Amiodarone or beta-blocker

- Atrial flutter/atrial fibrillation

- Treatment to control HR:

- Oxygen

- Beta-blocker or diltiazem

- Digoxin

# Treatment Modalities

- Atrial fibrillation < 48 hours
  - Treatment to convert the rhythm:
    - Oxygen
    - Ibutilide, amiodarone, or procainamide
    - Cardioversion
- Atrial fibrillation > 48 hours or of unknown duration
  - Treatment to convert the rhythm:
    - Oxygen
    - Delay cardioversion until patient is anticoagulated and atrial thrombi excluded
    - Cardioversion and amiodarone if patient unstable

# Treatment Modalities

- Wide QRS Tachycardia of unknown origin with pulse
  - Treatment to convert rhythm:
    - Oxygen
    - Cardioversion
    - Adenosine or amiodarone
- Monomorphic V tach with pulse
  - Treatment to convert rhythm:
    - Oxygen
    - Cardioversion
    - Amiodarone, lidocaine, or procainamide

# Treatment Modalities

- Polymorphic V tach with pulse and normal baseline QT interval
  - Treatment to convert rhythm:
    - Oxygen
    - Correct any electrolyte imbalance
    - Cardioversion
    - Beta-blocker
    - Amiodarone, lidocaine, or procainamide

# Treatment Modalities

- Polymorphic V tach with pulse and prolonged baseline QT interval torsades de pointes with pulse
  - Treatment to convert rhythm:
    - Oxygen
    - Correct any electrolyte imbalance
    - Magnesium sulfate
    - Transcutaneous overdrive pacing and beta-blocker
    - Defibrillation
    - Discontinue amiodarone, procainamide, beta-blockers, or agents prolonging QT interval



# Treatment Modalities

- PACs and PJsCs

- Treatment:

- Discontinue stimulants and sympathomimetic drugs

- Withhold digitalis

- Digibind if digitalis toxicity confirmed

# Treatment Modalities

## ○ PVCs

### ○ Treatment:

○ Oxygen

○ Identify and correct any underlying causes of PVCs

### ○ Consider one of following:

○ Beta-blocker

○ Amiodarone

○ Lidocaine

○ Procainamide

# Treatment Modalities

- V Fib/pulseless V Tach
  - Unmonitored/monitored cardiac arrest:
    - CPR
    - Defibrillation
    - Vasopressin or epinephrine
    - Amiodarone
    - Magnesium sulfate

# Treatment Modalities

- Asystole

- Unmonitored/monitored cardiac arrest:

- CPR

- Vasopressin or epinephrine

- Pulseless electrical activity

- Unmonitored/monitored cardiac arrest:

- CPR

- Vasopressin or epinephrine

- Treat underlying cause if known

# Drugs Used to Treat Dysrhythmias

Drug	Class
Adenosine (Adenocard)	Antidysrhythmic
Amiodarone (Cordarone)	Antidysrhythmic
Atropine sulfate	Anticholinergic
Beta-blockers: Atenolol (Tenormin) Esmolol HCL (Brevibloc) Metoprolol (Toprol, Lopressor)	Beta-adrenergic blocking agent
Diazepam (Valium)	Tranquilizer, amnesiac, sedative
Digoxin (Lanoxin)	Antidysrhythmic, inotropic agent, digitalis glycoside
Diltiazem (Cardizem)	Calcium channel blocker

# Drugs Used to Treat Dysrhythmias

Drug	Class
Dobutamine (Dobutrex)	Adrenergic agent
Dopamine (Intropin)	Adrenergic agent
Epinephrine (Adrenalin Chloride)	Adrenergic agent
Isbutilide (Corvert)	Antidysrhythmic
Lidocaine (Xylocaine)	Antidysrhythmic
Magnesium sulfate	Electrolyte
Midazolam (Versed)	Sedative, tranquilizer, amnesiac
Morphine sulfate	Narcotic, analgesic
Nitroglycerin (Nitrostat, Nitrol, Tridil, etc.)	Antianginal agent, vasodilator

# Drugs Used to Treat Dysrhythmias

Drug	Class
Norepinephrine (Levophed)	Adrenergic agent
Procainamide (Pronestyl)	Antidysrhythmic
Vasopressin	Vasoconstrictor



# Reference

- Wesley, K. (2011). *Huszar's Basic Dysrhythmias and Acute Coronary Syndromes: Interpretation and Management, 4th Edition*. St. Louis: Elsevier.

