

Cardiac Pharmacology: Intravenous Agents indications & Utilizations

Nancy E. Stone PhD
ACNP ANP CCRN

Medication Groups

- **Antiarrhythmics**
- **Vasopressors**
- **Inotropics**
- **Rate control antiarrhythmics**
- **Vasodilators**
- **Others**



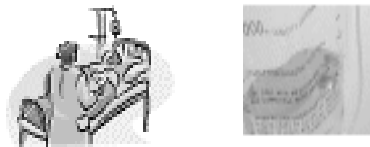
Antiarrhythmics

Class	Channel Effect	Repolarization Time	Medication
1A	Sodium block, inhibitory effect	Prolongs	Quinidine Pronestyl Disopyramide
1B	Sodium block, inhibitory effect	Shortens	Lidocaine Phenytoin Mexiletine Tocainide
1C	Sodium Block, inhibitory effect	Unchanged	Flecainide Propafenone

Antiarrhythmics

Class	Channel Effects	Repolarization Time	Medication
II	Phase IV: depolarizing current; calcium channel	Unchanged	Beta-blockers; Sotalol has class III effects also
III	Repolarizing K ⁺ currents	Markedly prolongs	Amiodarone, Sotalol, Bretylium
IV	AV nodal Ca ⁺ block	Unchanged	Verpamil Diltiazem
IV-like	K ⁺ channel openers: "hyper"	Unchanged	Adenosine

Specific Antiarrhythmics



Amiodarone: Class III

- Loading: 150 mg/ 100 cc D5W to be administered over 10 minutes
- Infusion: 1 mg/ min for 6 hours, then reduce to 0.5 mg/ min x 18 hours
- Prolongs action potentials in cardiac fibers, depresses conduction velocity & slows AV conduction @ AV node, has some beta & alpha blockade effects

Amiodarone: Class III

- **Contraindicated:** Sinus bradycardia, 2nd & 3rd degree heart blocks
- **EKG:** be aware of conduction delays (prolonging or shortening PR intervals & QT prolongation)
- *May cause transient hypotension with bolus dose*
- *May elevate PT if on Coumadin*
- *Caution with co administration of Phenytoin & Digoxin*

Pronestyl: Class 1A

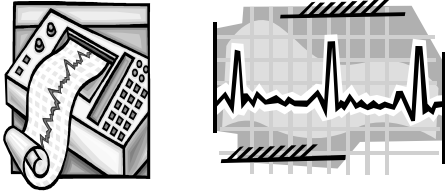
- **Bolus:** Ranges 250 mg to 1 GM (rate of administration: 20 mg per min; requires reduced dosages for renal impairment)
- **Infusion:** 1-4 mg/ min
- **Slows rate, slows conduction, prolongs refractory period**
- **Contraindicated:** 2nd & 3rd degree heart block, prolonged QT interval
- **EKG:** Be aware of conduction delays: prolong or shortening of PR interval; QT prolongation

Lidocaine: Class II B

- Bolus: 1- 1.5 mg/ kg IVP
- Infusion: 1- 4 mg/ min

- Decreases ventricular excitability without depressing the force of ventricular contractions by increasing the stimulation threshold of the ventricle during diastole

Rate Control Antiarrhythmics



Cardizem (Diltiazem): Class IV

- Bolus: 5 mg up to 20 mg SLOWLY (typical dose 5- 10 mg IV)
- Infusion: 5 mg – 15 mg/ Hr- based on patient response
- Inhibits influx of Calcium ion through channels resulting in slow conduction through AV node, prolongs refractory period, & decreases ventricular rate

Cardizem (Diltiazem)

- **EKG:** Be aware of development of conduction delays
- **Contraindicated** in WPW, short PR syndrome, 2nd & 3rd degree HB, Hypotension, sick sinus syndrome

Labetalol (Trandate) Class II

- **Bolus:** 20 mg IV
- MR @ 40 -80 mg @ 10 minute intervals
- **AHA recommendation is 10 mg IV over 1 -2 minutes**
- **Infusion:** start @ 2 mg/min: adjust to BP response to 300 mg for severe HTN
- Combined alpha & beta blocking antihypertensive agent
- Rapid onset of action

Brevibloc Class II

- Dosing varies on Rx: SVT vs. HTN

SVT: Usual dose; 100 mcg/ kg

- Loading dose: 500 mcg/ kg/ min over 1 minute
- Infusion range 50 to 200 mcg/ kg/ min

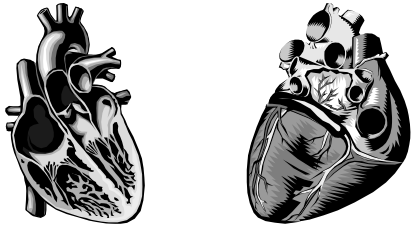
Brevibloc: Class II

HTN: 1 mg/ kg over 30 seconds (usual 80 mg)

Infusion: 150- 300 mcg/ kg/ min

- **Ultra short acting beta- blocker. Half life is 9 minutes & recovery from beta-blockade occurs in thirty minutes**

Vasopressors



Levophed (Norepinephrine)

- **Infusion** 1- 20 mcg/ min
- **Weight based:** 0.01-0.09 mcg/ kg/ min
- Levo-isomer of norepinephrine making it a sympathomimetic drug that primarily is a vasoconstrictor (alpha adrenergic action) & some inotropic effects (beta adrenergic action)

Phenylephrine (Neo- Synephrine)

- **Infusion:** 10 mcg/ min- 200 mcg/ min
- **Weight based:** 0.1-5.0 mcg/ kg/ min
- Acts on alpha- adrenergic receptors, causes vasoconstriction
- Renal vessel constriction will occur

Vasodilators



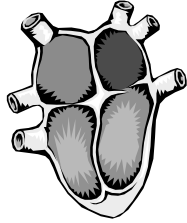
Nitroglycerine (Tridil)

- **Infusion:** 5 mcg/ min & adjust to patient response
- **Weight based:** 0.5 to 4.0 mcg/ kg/ min
- Vascular smooth muscle relaxant & vasodilator (effecting both arterial & venous vasculature)
- Important to understand WHY NTG is used: BP control, reduce preload, angina, radial artery conduit pre/ post op

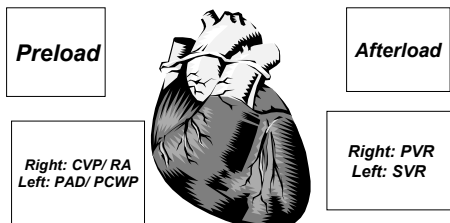
Nipride (Nitroprusside Sodium)

- Infusion: adjusted to patients BP response & desired MAP goal. Maximum dosing is 5 mcg/ kg/ min
- Dose: 0.25- 5.0 mcg/ kg/ min
- POTENT & RAPID antihypertensive drug!!
- Monitor: Continuous BP & adjust PRN to patients parameters

Intropics



Contractility



Contractility

- **Preload:** The distended force that stretches the ventricular muscle immediately before electrical excitation & contraction
- **Afterload:** This is the force that opposes ventricular ejection

Epinephrine (Adrenalin Chloride)

- **Infusion:** 1- 10 mcg/ min
- **Weight- based:** 0.01- 0.09 mcg/ kg/ min

- **Sympathomimetic drug (catecholamine)**
- **A POTENT** cardiac stimulant (positive inotropic effect), vasoconstrictor, increases heart rate, (positive chronotropic effect), & bronchial smooth muscle relaxant

Epinephrine

- Monitor: cardiac output function
- Effects on HR, BP, & filling pressures will be affected

- **As a sympathomimetic agent monitor for hyperglycemia**

Dobutamine (Dobutrex)

- **Infusion:** 2.5- 10 mcg/ kg/ min
- **Beta- adrenergic stimulating (B1 > B2 > alpha)**

- A positive inotropic agent
- Monitor: Cardiac output
- Effects HR, BP, & filling pressures

Milrinone (Primacor)

- **Bolus:** 0.05 mg/ kg (over 10 minutes)
- **Dosing:** 0.375 mcg/ kg/ min
- **Positive inotropic effect & reduces afterload** & preload on vascular smooth muscle
- Little effect on HR & myocardial oxygen consumption
- Dose adjusted for renal impairment

Others



Nesiritide

- **Bolus:** 2 mcg/ kg IV
- **Infusion:** 0.01 mcg/ kg/ min
- **Hemodynamics:** Reduces afterload & preload, no tachcardia
- **Coronary arteries:** Vasodilates
- **Neurohormonal:** Decreases endothelian, inhibits RAA action, decreases norepinephrine
- **Renal:** Diuresis, increases filtration

Vasopressin

- Dosing: 1.2 u/ hr – 3 u/ hr (max dosing 6 u/ hr)
- Potent vasoconstrictor/ hormone
- Good effect in supporting vasodilatory hypotension for pericardiotomy or septic shock states unresponsive to high Levophed doages

Pharmacologic Agents

- What is the therapeutic effect/ management goal of the agent prescribed?
- What is the evidence- based medicine recommend for this treatment strategy ?
- What type (if any) of specialty monitoring will the patient require? (telemetry, 12 lead EKG), drug levels, et al.)

Pharmacologic Agents

- Are there any other drug reactions needed to be considered?
- Compatibility with other agents/ IV access addressed?
- Know standardized dosing regimens & titration
- Plan how to transition agent to a PO form when stable

Pharmacologic Agents

- Always consider the pathophysiology of the patients condition & treat underlying etiology
