

ACLS PHARMACOLOGY

2011 Guidelines

ADENOSINE

Indications:

Narrow complex tachycardias or wide complex tachycardias that may be supraventricular in nature. It is effective in treating 90% of the reentry arrhythmias.

Mechanism of action:

Slows conduction at the AV node and inhibits reentry.

Dosage:

Rapid IV push of 6mgs and can be followed by IV push of 12 mgs if unsuccessful and can be followed by an additional 12mg in 5 minutes.

Additional notes:

Establish IV as proximal as possible as adenosine has a very short half-life and may be metabolized before it reaches the heart (especially in a hypotensive patient). Does not convert tachycardias due to atrial fibrillation and flutter and should not be used for the two rhythms. Safe to use during pregnancy and may require higher doses if with elevated blood levels of theophylline or caffeine. **Not to be used in SVT with irregular rhythm (atrial fibrillation).**

AMIODARONE

Indications:

Refractory ventricular fibrillation and ventricular tachycardia (with and without pulses). May be used in supraventricular tachycardia as well.

Mechanism of action:

Alpha and beta adrenergic blocking properties. It also has multiple effects on sodium, potassium, and calcium channels.

Dosage:

Pulseless- 300mgs IV push, can be given as a second dose of 150mgs in 3-5 minutes.
Tachy arrhythmias - 150mg infused over 10 minutes.

Additional notes:

In short term survival, amiodarone has shown benefits over lidocaine and is now considered the anti arrhythmic of choice.

ATROPINE

Indications:

Administered for symptomatic bradycardias and narrow complex heart blocks. **No longer recommended for bradycardia PEA or asystole.** It is also used for organophosphate exposure or poisoning.

Mechanism of action:

Parasympathetic blocker therefore increases the heart rate by blocking vagal activity.

Dosage:

Bradycardia with a pulse dosage is: 0.5-1mg and for cardiac arrest the dosage is: 1mg. May be repeated every 3-5 minutes until a maximum of 3mg has been administered.

Additional notes:

Some theorize that it may exacerbate a bradycardia in a patient with a wide complex very slow heart block.

EPINEPHRINE

Indications:

Pulseless ventricular tachycardia, ventricular fibrillation, asystole, and pulseless electrical activity. For all cardiac arrest rhythms epinephrine is given in the bolus form)
Symptomatic bradycardia or heart block with bradycardia refractory to atropine (IV infusion)

Mechanism of action:

Alpha, beta 1 and beta 2: causes peripheral vasoconstriction, increases the heart rate and force of contractions (thereby increase oxygen demand), and dilates bronchiole tree.

Dosage:

Bolus: 0.5-1mg IV push for cardiac arrest repeated every 3-5 minutes, no maximum dose
IV infusion: 1mg added to 250cc of saline and administered at 2-10micrograms/minute

Additional notes:

Caution when used in cardiac patients or those with compromised coronary blood vessels as an increase in cardiac oxygen demands may precipitate an acute coronary syndrome (ACS)

CALCIUM CHLORIDE

Indications:

Hyperkalemia and overdose on calcium channel blockers

Mechanism of action:

Calcium facilitates muscle cell contractions

Dosage:

4mg/kg slow IV push and higher doses may be needed with calcium channel blocker overdoses.

Additional notes:

No longer used for the treatment of PEA (EMD)

DOPAMINE

Indications:

Is the drug of choice for cardiogenic shock and used for complete heart block if atropine is unsuccessful or if QRS complexes are wide and slow.

Mechanism of action:

Dosage:

2- 20 micrograms/kg/minute and typically start at a dose of 5 mcg/kg/min. In low doses, (2-5 mcg/kg/min), renal effects occur, at 5-10 beta effects, and above 10mcg/kg/min peripheral vasoconstriction occurs from the alpha effects.

LIDOCAINE

Indications:

Significant ventricular ectopy, ventricular tachycardia and post resuscitation from cardiac ischemia. It may be used before intubation to minimize gag reflex.

Mechanism of action:

Inhibits phase four of ventricular repolarization therefore it suppresses ventricular ectopy and increases the threshold to ventricular fibrillation.

Dosage:

1-1.5mg/kg IV bolus

Additional notes:

Amiodarone has become the medication of choice for most arrhythmias and lidocaine should be used only when amiodarone is not available. Not be used in bradycardic patients and reduce subsequent doses in patients with liver failure.

MAGNESIUM SULFATE

Indications:

Drug of choice for Torsades de Pointes and may be used in refractory ventricular fibrillation and tachycardia. May also be used for patients with bronchiole constriction and is the medication of choice for seizures caused by eclampsia.

Mechanism of action:

Neuromuscular relaxer and may shorten long Q-T syndrome.

Dosage:

1-2gms over 2-3 minutes for non cardiac arrest and 1-2gms slow IV bolus for an arrest. If post arrest reveals long Q-T syndrome, then administer 1-2gms over 5-20 minutes.

Additional notes:

May be used in conjunction with other therapies in MI and malnourished patients and is used for hypomagnesemia.

MORPHINE SULFATE

Indications:

Cardiac chest pain and cardiac related pulmonary edema

Mechanism of action:

Narcotic analgesic; reduces pain and cardiac workload. Venous dilator may be advantageous in heart failure with pulmonary edema.

Dosage:

2mg increments until desired effects are achieved.

NITROGLYCERINE

Indications:

Angina, acute coronary syndrome (ACS), and cardiac related pulmonary edema.

Mechanisms of actions:

Coronary artery (and cerebral) dilator. Causes some venous dilation therefore it reduces cardiac preload and workload on the heart.

Dosage:

0.4mg sublingual, and can be repeated twice as long as no contraindications exist. IV nitro has been proven to be effective in the ischemic patient and is the preferred route, as it can be titrated for tighter control.

Additional notes:

Very good drug in the presence of an ACS patient as it may cause collateral vascular dilation surrounding the ischemic tissue and reducing the size of the infarction. Not to be used in hypotensive patients or those that present with a drop of greater than 30mmHg systolic pressure from baseline after the first dose. Additional contraindications are those that have right ventricular infarctions and patients taking phosphodiesterase inhibitors (Viagra, Levitra, and Cialis).

PROCAINAMIDE

Indications:

Refractory ventricular tachycardia or ventricular ectopy and can be used in ventricular fibrillation however requires long administrative time that is usually not tolerated while a patient is fibrillating.

Mechanisms of action:

Suppresses ventricular irritability and ectopy

Dosage:

20-30 mg/minute until: 1) ventricular rhythm converts, or 2) hypotension ensues, or 3) the QRS widens by greater than 50%, or 4) 17mg/kg or approximately one gram has been given.

SODIUM BICARBONATE

Indications:

Used to elevate blood pH in a state of acidosis. May be used in cardiac arrest with acidosis due to other etiologies. Also indicated for overdoses of tricyclic antidepressants or Phenobarbital or indicated for hyperkalemia.

Additional notes:

Support for the airway and circulation is the most appropriate approach to managing serum acidosis, not sodium bicarbonate. Be sure to flush the IV line after administration of other medications prior to giving bicarbonate, as it will precipitate when mixed with other medications.