

Intensive Care Nursery House Staff Manual

Neonatal Cardiac Arrhythmias

INTRODUCTION: Identification and treatment of arrhythmias in newborns is challenging and differs from older children, and the natural history of arrhythmias presenting in the neonatal period is often dramatically different.

METHODS OF DIAGNOSIS AND THERAPY: For management of arrhythmias, consult Cardiology team.

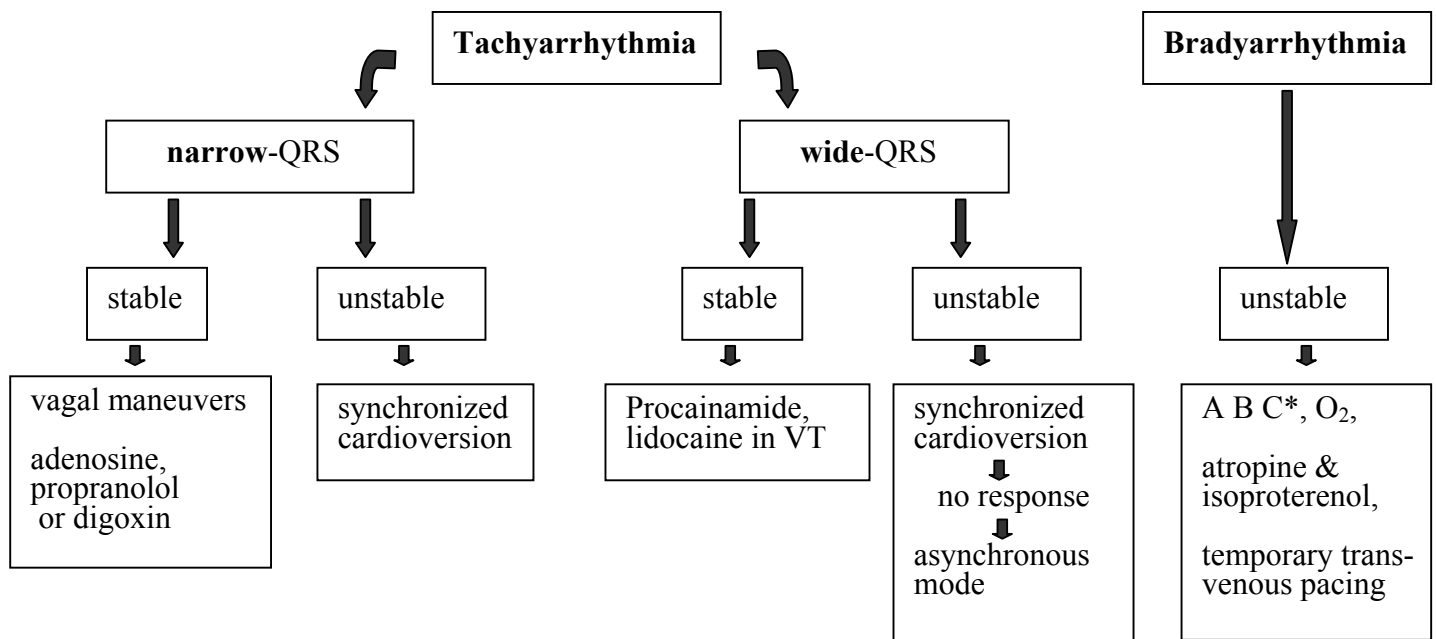
1. Diagnostic methods:

- 15 lead electrocardiogram (standard 12 lead plus V3R, V4R, V7)
- Heart rate determination (ECG strip, count number of QRS complexes in 6 sec x 10)
- Blood pressure (intra-arterial or indirect)

2. Treatment: Electrical (See below for drug therapy)

- Artificial pacing :
 - Temporary transvenous pacing
 - Esophageal pacing
- Cardioversion:
 - Setting: 0.5 - 2.0 Joules/kg
 - Mode: **synchronous** for narrow QRS; **asynchronous** for ventricular fibrillation



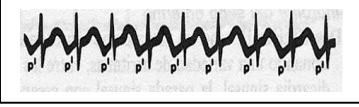
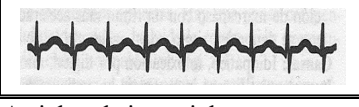
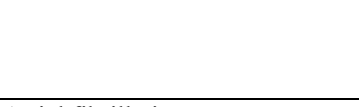
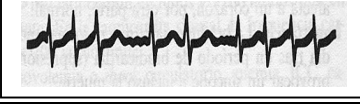
IMMEDIATE MANAGEMENT OF ARRHYTHMIAS:



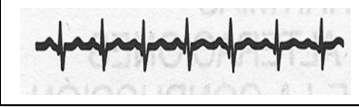


*A B C, airway, breathing, circulation

A. Tachy-arrhythmias with narrow QRS:


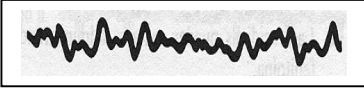
I. Reentry tachycardias

Diagnosis	Findings on ECG	Treatment
Atrial flutter 	-"Sawtooth" flutter waves -AV block does not terminate atrial rhythm -Atrial rate up to 500 in newborns -Variable AV conduction common	- Unstable: esophageal pacing or electrical cardioversion - Stable: digoxin, propranolol, or digoxin + procainamide
Accessory pathway mediated tachycardia (WPW) 	-P follows QRS, typically on upstroke of T -Superior or rightward P wave axis -AV block always terminates tachycardia -Typically terminates with P wave -After termination, WPW have pre-excitation	- Unstable: esophageal pacing or electrical cardioversion - Stable: vagal maneuvers, adenosine, propranolol or digoxin
Permanent form of junctional reciprocating tachycardia (PJRT) 	-Incessant - P wave precedes QRS -Inverted P waves in II, III, AVF -AV block always terminates tachycardia -May terminate with QRS or P wave -No pre-excitation after termination	- Stable: vagal maneuvers, adenosine, propranolol or digoxin - No response: procainamide or flecainide
Atrioventricular node reentry 	-P usually not visible, superimposed on QRS -AV block usually terminates tachycardia.	
Atrial and sinoatrial reentry 	-P present, precedes next QRS -Terminates with QRS rather than P -AV block does not terminate atrial rhythm -P axis may be superior or inferior	- Unstable: electrical cardioversion - Stable: propranolol, procainamide or amiodarone
Atrial fibrillation 	-"Irregularly irregular" -No two RR intervals exactly the same -P waves difficult to see, bizarre and chaotic	- Unstable: electrical cardioversion - Stable: digoxin + procainamide

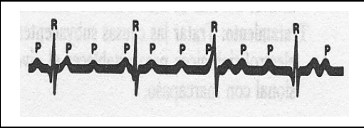
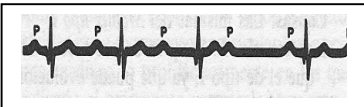
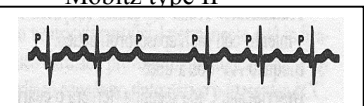
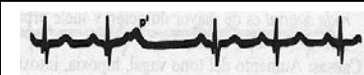
II. Increased automaticity

Sinus tachycardia 	-Normal P wave axis -P waves precede QRS -Due to extrinsic factor such as heart failure, fever, anemia, catecholamines, theophylline	-Treat causative extrinsic factor
Atrial ectopic tachycardia 	-Incessant -Abnormal P axis which predicts location of focus -P wave precedes QRS -Continues in presence of AV block	- Unstable: IV amiodarone - Stable: propranolol, sotalol or amiodarone, or digoxin + procainamide.
Junctional ectopic tachycardia 	-Incessant -Usually with atrio-ventricular dissociation and slower atrial than ventricular rate. -Capture beats with no fusion.	- Unstable: cooling, IV amiodarone - Stable: propranolol, sotalol or amiodarone

B. Tachy-arrhythmias with wide QRS:

Diagnosis	Findings on ECG	Treatment
Ventricular tachycardia (VT) 	-Often with AV dissociation -Capture beats with narrower QRS than other beats; fusion beats	- Unstable: electrical cardioversion - Stable: lidocaine, procainamide
Ventricular fibrillation 	-Complete chaotic rhythm -Rapid and irregular rhythm	(1) asynchronous cardioversion 2j/kg (2) asynchronous cardioversion 2j/kg (3) asynchronous cardioversion 4j/kg (4) lidocaine + asynch. cardioversion.
SVT with pre-existing bundle branch block	-QRS morphology similar to that in sinus rhythm -QRS morphology is that of right or left bundle branch block	- Unstable: esophageal pacing or electrical cardioversion - Stable: vagal maneuvers, adenosine, propranolol or digoxin
Antidromic SVT in WPW	-QRS morphology similar to pre-excited sinus rhythm, but wider -Never with AV dissociation	-No response: procainamide or flecainide

C. Bradycardias:

Diagnosis	Findings on ECG	Treatment
Sinus bradycardia	-Slow atrial rate with normal P waves -1:1 conduction -Due to underlying causes such as hypoxia, acidosis, increased intracranial pressure, abdominal distension, hypoglycemia, hypothermia, digoxin, propranolol	-Vigorous resuscitation and supportive care -A B C -O ₂ -Treat underlying causes
Atrioventricular block Complete atrioventricular block 	-Atrioventricular dissociation -Regular R-R intervals -Regular P-P intervals -Atrial rate > ventricular rate -P which occur after T have no effect on R-R interval -Infants of maternal lupus	- Unstable: A B C O ₂ Atropine, isoproterenol infusion Temporary trans-venous pacing - Stable: Treat underlying causes
2 nd degree atrioventricular block - Mobitz type I (Wenckebach) 	-Progressive PR interval prolongation followed by a blocked beat -Usually indicates block in the AV node	-Permanent pacemaker in AV block with ventricular rate < 55 (newborn)
- Mobitz type II 	- No characteristic PR prolongation as seen in type I. - Usually not reversible with medications. - Type II has worse prognosis than type I.	
Sinus exit block	- Sinus P waves intermittently disappear due to block of impulses leaving the node.	
Premature atrial contractions 	-Premature P wave superimposed on the previous T wave, deforming it	-Usually does not need treatment.