

## 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.

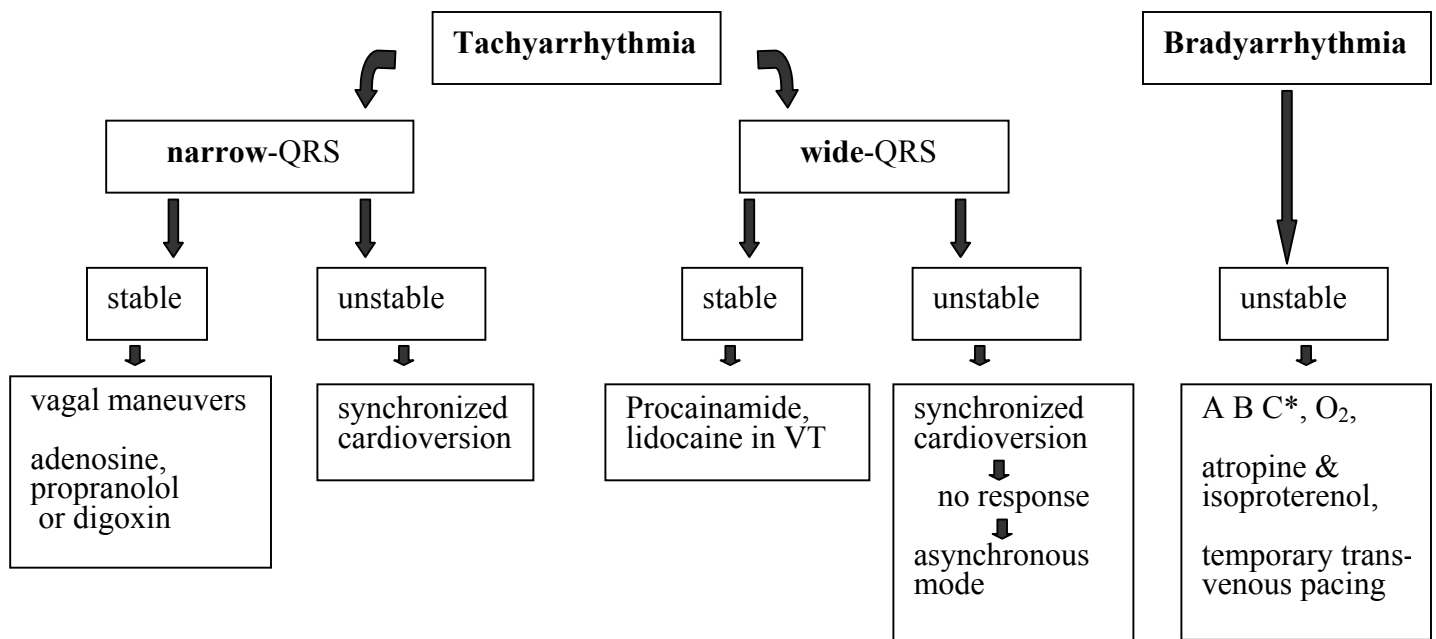
### 1. Diagnostic methods:

- 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



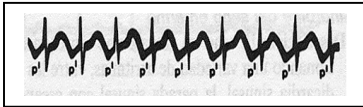
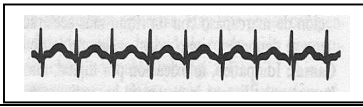

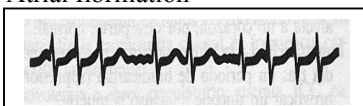
### IMMEDIATE MANAGEMENT OF ARRHYTHMIAS:



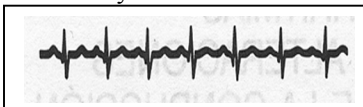
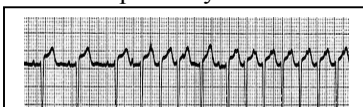
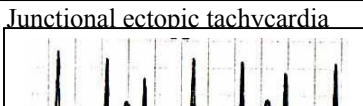
\*A B C, airway, breathing, circulation

**A. Tachy-arrhythmias with narrow QRS:**


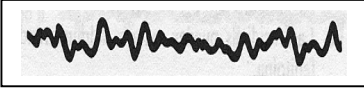
**I. Reentry tachycardias**

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	- <b>Unstable:</b> esophageal pacing or electrical cardioversion - <b>Stable:</b> 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	- <b>Unstable:</b> esophageal pacing or electrical cardioversion - <b>Stable:</b> 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	- <b>Stable:</b> vagal maneuvers, adenosine, propranolol or digoxin - <b>No response:</b> 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	- <b>Unstable:</b> electrical cardioversion - <b>Stable:</b> propranolol, procainamide or amiodarone
Atrial fibrillation 	-"Irregularly irregular" -No two RR intervals exactly the same -P waves difficult to see, bizarre and chaotic	- <b>Unstable:</b> electrical cardioversion - <b>Stable:</b> digoxin + procainamide

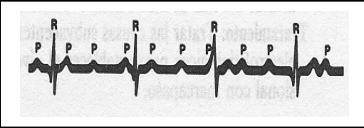
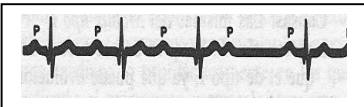
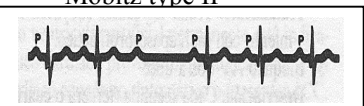
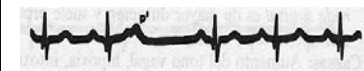
**II. Increased automaticity**

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	- <b>Unstable:</b> IV amiodarone - <b>Stable:</b> 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.	- <b>Unstable:</b> cooling, IV amiodarone - <b>Stable:</b> propranolol, sotalol or amiodarone

**B. Tachy-arrhythmias with wide QRS:**

<b>Diagnosis</b>	<b>Findings on ECG</b>	<b>Treatment</b>
Ventricular tachycardia (VT) 	-Often with AV dissociation -Capture beats with narrower QRS than other beats; fusion beats	- <b>Unstable:</b> electrical cardioversion - <b>Stable:</b> 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	- <b>Unstable:</b> esophageal pacing or electrical cardioversion - <b>Stable:</b> 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:**

<b>Diagnosis</b>	<b>Findings on ECG</b>	<b>Treatment</b>
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 <sub>2</sub> -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	- <b>Unstable:</b> A B C O <sub>2</sub> Atropine, isoproterenol infusion Temporary trans-venous pacing - <b>Stable:</b> Treat underlying causes
2 <sup>nd</sup> 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.