

CARDIAC ARRITHMIAS

DYSRHYTHMIAS

A normal sinus rhythm is the usual heart rhythm that begins in the Sino atrial (SA) node, is between 60 and 100 beats/min, and has normal intervals and no aberrant or ectopic beats. Dysrhythmias are disorders of the heart rhythm.

ETIOLOGY, RISK FACTORS AND PATHOPHYSIOLOGY OF DYSRHYTHMIAS

It results from the disturbances in three major mechanisms:

1. Automaticity
2. Conduction
3. Reentry of impulses

DISTURBANCES IN AUTOMATICITY RISK FACTORS

- Myocardial ischemia
- Decreased left ventricular function
- Valvular heart disease
- Electrolyte imbalance
- Hypoxia
- Digitalis toxicity
- Administration of atropine

DISTURBANCES IN CONDUCTION RISK FACTORS

- Myocardial ischemia
- Valvular heart disease/ valvular surgery
- Inflammation of AV node

- Electrolyte imbalances
- Digitalis toxicity
- Beta blocking agents
- Myocardial infarction (especially inferior)

REENTRY OF IMPULSES RISK FACTORS

- Myocardial ischemia
- Action of anti dysrhythmic medications
- Myocardial fibrosis

Bundle branch block

PATHOPHYSIOLOGY

Due to etiological factors



The significance of all dysrhythmias is their effect on cardiac output and therefore cerebral and vascular perfusion.

$$CO=SV*HR$$



During normal sinus rhythm

The atria contract to fill and stretch the ventricle with about 30% more blood.



This process (atrial kick) increases the amount of blood (SV) in the ventricles before contractility



This increases CO by 30% NOTE: when the impulses originates below the SA node or more than one area fires in the atria to originate a beat (eg: atrial fibrillation/atrial flutter)

Loss of atrial kick CO falls (30%)

CLINICAL MANIFESTATION AND DIAGNOSTIC EVALUATION OF DYSRHYTHMIAS

- ✓ Palpitations
- ✓ Dizziness
- ✓ Presyncope/syncope
- ✓ Pallor
- ✓ Diaphoresis
- ✓ Altered mentation (restlessness and agitation to lethargy and coma)
- ✓ Shortness of breath
- ✓ Chest pain
- ✓ Orthopnea
- ✓ Paroxysmal nocturnal dyspnea
- ✓ Hypotension
- ✓ Sluggish capillary refill
- ✓ Swelling of the extremities
- ✓ Decreased urine output

DIAGNOSTIC EVALUATION :

History collection

- ✓ History: regarding onset, duration, associated manifestations, aggravating factors and relieving factors.
- ✓ Past medical history including CVD risk factors analysis.
- ✓ Past health history and hospitalization

- ✓ Surgical history, allergy, medications, dietary habits, social habits (tobacco, alcohol) and family history

Physical examination

- ✓ Auscultation of heart for abnormal heart tones, slow or fast rate, irregularity, murmur
- ✓ ECG 7) Holter monitors
- ✓ Continuously record cardiac rhythm for 24 hours

Event monitors For those clients who do not experience dysrhythmia within 24 hours period of recording, event monitors are available

Invasive electrophysiologic studies

It involves the positioning of a multipolar catheter electrode into the venous system, placing the electrode at various sites along the atria, ventricles, His bundles, bundle branches, accessory pathways and other structures to record electrical activity

TYPES OF DYSRHYTHMIAS

Rhythms originating in sinoatrial (SA) node

- Sinus bradycardia
- Sinus tachycardia
- Sinus arrest

Rhythm originating in Atria

- Atrial flutter
- Atrial fibrillation
- Paroxysmal supraventricular tachycardia
- Premature atrial contraction

Rhythm originating in the atrioventricular junction

Premature junctional complex

- Junctional escape rhythm
- Junctional tachycardia

Rhythm originating in ventricles

- Premature ventricular contraction
- Ventricular fibrillation
- Ventricular tachycardia

Rhythms originating in sinoatrial (sa) node

sinusbradycardia

A heart rhythm is initiated in the sinoatrial node at a rate of less than 60 beats per minute

Treatment :

Atropine (an anticholinergic drug)

Pacemaker therapy

sinus tachycardia

A heart rhythm is initiated in the sinoatrial node at a rate greater than 100 beats per minute

Treatment

It is based on underlying causes

- Treating hypovolemia should resolve any associated

tachycardia.

- In certain situations adenosine and beta- adrenergic blockers used to decrease the heart rate

sinus arrest

Sinus node automaticity is decreased and impulses are not formed when expected. This results in the absence of P wave, the QRS complex and no electrical activity for 3 seconds

Treatment

Atropine, 0.5 to 1 mg IV, may increase the rate. • Pacemaker therapy

RHYTHMS ORIGINATING IN ATRIA

atrial flutter

- It is single atrial ectopic focus firing at a rate of 250 to 350 beats per minute resulting in a ventricular response that is slower, usually a multiple of the atrial rate
- P waves are replaced by flutter waves that take on a “sawtooth appearance.”

treatment

- Calcium channel blocker
- Beta adrenergic blockers
- Cardioversion

atrial fibrillation

- It is an abnormal rhythm originating from a multiple ectopic focus in the atrium.
- It is the disorganized twitching of the atria at a rate greater than 350 beats per minutes.

treatment

- Calcium channel blocker (eg: diltiazem)
- Beta adrenergic blockers (eg: metoprolol)
- Digoxin
- Amiodarone

- cardioversion

PAROXYSMAL SUPRAVENTRICULAR TACHYCARDIA

- It is a dysrhythmia originating in an ectopic focus anywhere above the bifurcation of the bundle of His.

treatment

- Beta adrenergic blockers

RHYTHMS ORIGINATING IN THE ATRIOVENTRICULAR JUNCTION

Premature junctional complex

It occurs when an ectopic beat originates from a site in the atrioventricular junction outside of the normal cardiac cycle.

treatment - No treatment necessary

1) Junctional escape rhythm

It occurs when the atrial rate is slow, usually less than 30 beats per minute, and the atrioventricular node assumes responsibility for pacing the heart at a rate of 35 to 60 beats per minute.

2) Junctional tachycardia

It occurs when the atrioventricular node becomes irritable and “overrides” the sinus impulses, becoming the primary pacemaker at a rate of greater than 60 beats per minutes.

treatment

If a patient has symptoms with an escape junctional rhythm atropine can be used.

In accelerated junctional rhythm and junctional tachycardia

Beta adrenergic blockers

Calcium channel blockers

Amiodarone are used for rate control

Cardioversion should not be used

rhythms originating in ventricles

1) premature ventricular contractions

It is an ectopic beat originating from a site in the ventricles outside of the normal cardiac cycle.

Treatment

- ✓ Beta adrenergic blockers
- ✓ Procainamide
- ✓ Amiodarone or lidocaine

2) ventricular fibrillation

If a premature ventricular contraction falls on a T wave, it may precipitate ventricular fibrillation.

Treatment

Immediate initiation of CPR and advanced cardiac life support measures with the use of the defibrillation and definite drug therapy

3) Ventricular tachycardia

It occurs when there are three or more consecutive premature ventricular contractions.

Treatment

- ✓ Hemodynamically stable ventricular tachycardia (with pulse) : Amiodarone, Lidocaine
- ✓ Hemodynamically unstable ventricular tachycardia (with pulse): cardioversion
- ✓ Pulseless ventricular tachycardia: defibrillation

COMPLICATIONS OF DYSRHYTHMIAS

- Cognitive impairment and dementia. ...

- Heart failure. ...
- Stroke. ...
- Sudden cardiac arrest. ...
- Sudden infant death syndrome (SIDS). ...
- Worsening **arrhythmia**.