



FACULTY OF NURSING SCIENCES

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HEART BLOGK

OBJECTIVES

- At the end of the class students will be able to:
- Define heart block
- Identify the causes of heart block
- Classify the types of heart block with its ECG characteristics
- Understand the management of heart block
- Analyze the complications of heart block
- Understand the nursing management

INTRODUCTION

The electrical signal moves down through the heart to the AV node (electrical relay station), that is located in the center of the heart between the atria and ventricles. From the AV node, the electrical current travels to the ventricles so that the ventricles contract and pump blood out to the body. The electrical signal that controls the heartbeat is partially or completely blocked from reaching the ventricles.

DEFINITION

Heart block is a disturbance of impulse conduction that can be permanent or transient owing to anatomical or functional impairment.

This is the inhibition or failure of the electrical impulses generated in the SA node to be conducted through the conduction system to the ventricles . This can occur because of an abnormality of conduction velocity or complete refractoriness in the conduction system .

Causes

- Medications like digitalis, calcium channel blockers and beta-blockers
- Lyme disease
- Myocardial ischemia and infarction
- Valvular disorders
- Cardiomyopathy
- Endocarditis or myocarditis.
- Increased vagal tone

TYPES OF HEART BLOCK

1. First degree AV block
2. Second degree AV block
 - i. Mobitz type I or Wenkebach
 - ii. Mobitz types II AV block
3. Third degree AV block

First degree AV block



Second degree AV block (Mobitz I or Wenkebach)



Second degree AV block (Mobitz II)



Second degree AV block (2:1 block)



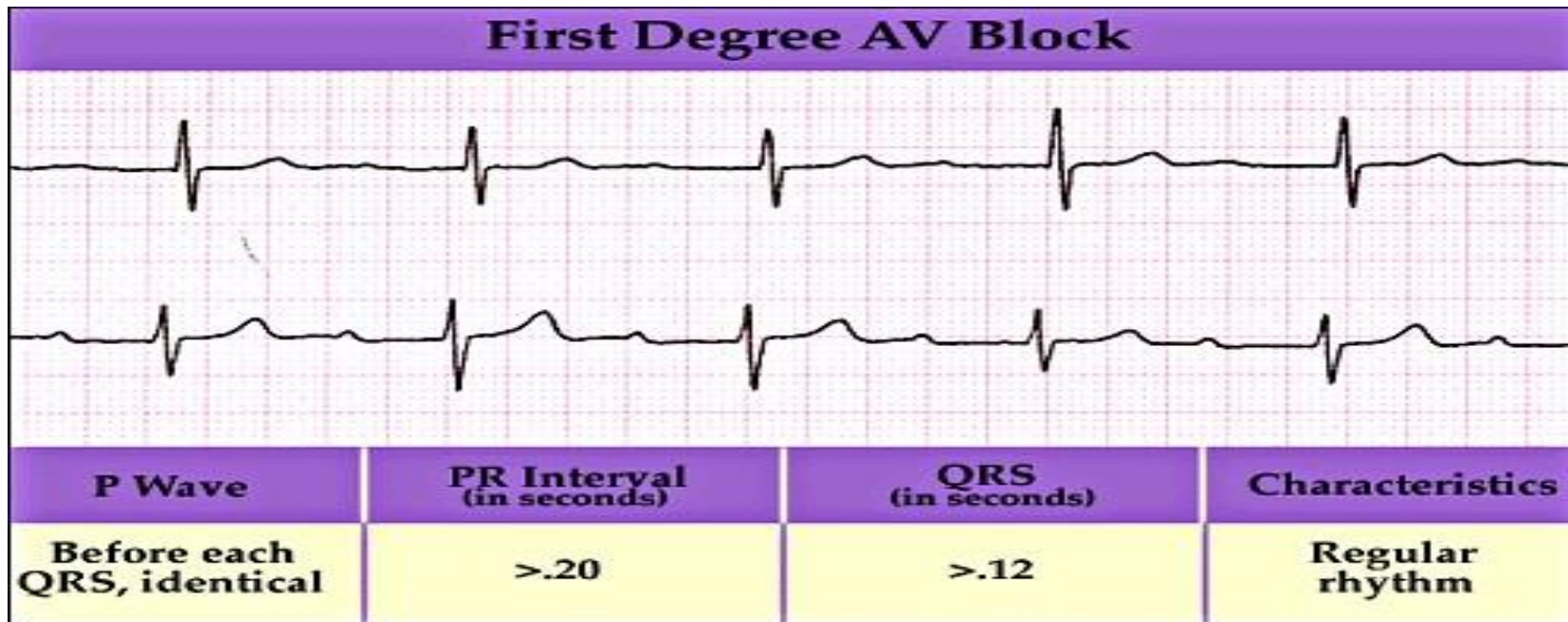
Third degree AV block with junctional escape



FIRST-DEGREE AV BLOCK

First-degree AV block occurs when all the atrial impulses are conducted through the AV node into the ventricles at a rate slower than normal

ECG characteristics



FIRST-DEGREE AV BLOCK CONTD...

ECG characteristics:

Ventricular and atrial rate	Depends on the underlying rhythm
Ventricular and atrial rhythm	Depends on the underlying rhythm
QRS shape and duration	Usually normal, but may be abnormal
P wave	In front of the QRS complex; shows sinus rhythm, regular shape
PR interval	Greater than 0.20 seconds; PR interval measurement is constant
P:QRS ratio	1:1

SECOND-DEGREE AV BLOCK, TYPE I (WENCKEBACH)

Occurs when there is a repeating pattern in which all but one of a series of atrial impulses are conducted through the AV node into the ventricles (eg, every four of five atrial impulses are conducted).

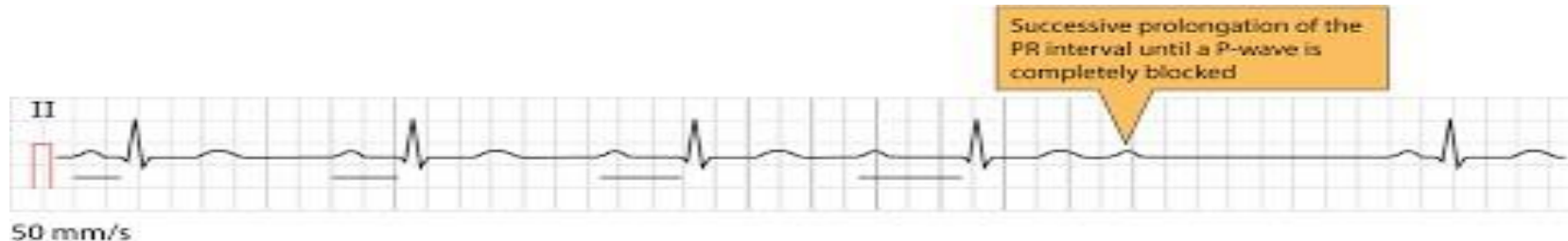
ECG characteristics:

- ✓ Ventricular and atrial rate: Depends on the underlying rhythm
- ✓ Ventricular and atrial rhythm: Atrial rhythm is regular, but ventricular rhythm may be irregular

CONTD....

ECG characteristics:

- ✓ QRS shape and duration: Usually normal but may be abnormal
- ✓ P wave: In front of the QRS complex; shape depends on underlying rhythm
- ✓ PR interval: Prolongation of PR interval until P wave is blocked
- ✓ P:QRS ratio: 3:2, 4:3, 5:4, and so forth



SECOND-DEGREE AV BLOCK, TYPE II (MOBITZ II HEART BLOCK)

Occurs when only some of the atrial impulses are conducted through the AV node into the ventricles.

ECG characteristics :

- ✓ Ventricular and atrial rate: Depends on the underlying rhythm
- ✓ Ventricular and atrial rhythm: The PP interval normal sinus rhythm. The RR interval is usually regular but may be irregular
- ✓ QRS shape and duration: Usually abnormal but may be normal

CONTD....

ECG characteristics:

- ✓ P wave: In front of the QRS complex
- ✓ PR interval: PR interval is constant for those P waves just before QRS complexes
- ✓ P:QRS ratio: 2:1, 3:1, 4:1, 5:1, and so forth

Second Degree AV Block Mobitz Type 2



THIRD-DEGREE AV BLOCK

Occurs when no atrial impulse is conducted through the AV node into the ventricles. (Complete heart block)

Mechanism of third-degree AV block:

- Two impulses stimulate the heart (called as AV dissociation)
- One stimulates the ventricles (junctional or ventricular escape rhythm), represented by the QRS complex
- The other stimulates the atria (sinus rhythm or atrial fibrillation), represented by the P wave.
- P waves may be seen, but the atrial electrical activity is not conducted down into the ventricles to cause the QRS complex, the ventricular electrical activity.

THIRD-DEGREE AV BLOCK CONTD...

ECG characteristics:

- ✓ Ventricular and atrial rate: Depends on the escape rhythm and underlying atrial rhythm
- ✓ Ventricular and atrial rhythm: PP interval and RR interval is regular, but the PP interval is not equal to the RR interval
- ✓ QRS shape and duration: Normal with junctional rhythm, abnormal with idioventricular rhythm

CONTD....

ECG characteristics:

- ✓ PR interval: Very irregular
- ✓ P:QRS ratio: More P waves than QRS complexes
- ✓ P wave: Depends on underlying rhythm

3° AV Block

Atria and Ventricles are depolarizing independently

No association between atria & ventricles



TYPES OF INFRA – HISIAN BLOCK

Left bundle branch block

✓ Left anterior fascicular block

✓ Left posterior fascicular block

Right bundle branch block

LEFT BUNDLE BRANCH BLOCK :

Definition :

- ❑ In this condition activation of the left ventricle ,Is delayed which results in the left ventricle contracting later than the right ventricle .

Causes :

- Aortic stenosis
- Dilated cardio myopathy
- Acute myocardial infarction
- Coronary artery disease
- Aortic regurgitation

❑ ***ECG characteristics***

- ✓ Heart rhythm – supra ventricular origin
- ✓ QRS duration \geq 120 ms.

❑ ***Classification :***

- ✓ Left anterior fascicular block – partial block of the left bundle branch .
- ✓ Left posterior Fascicular block – block in the bifurcation of the left bundle branch .

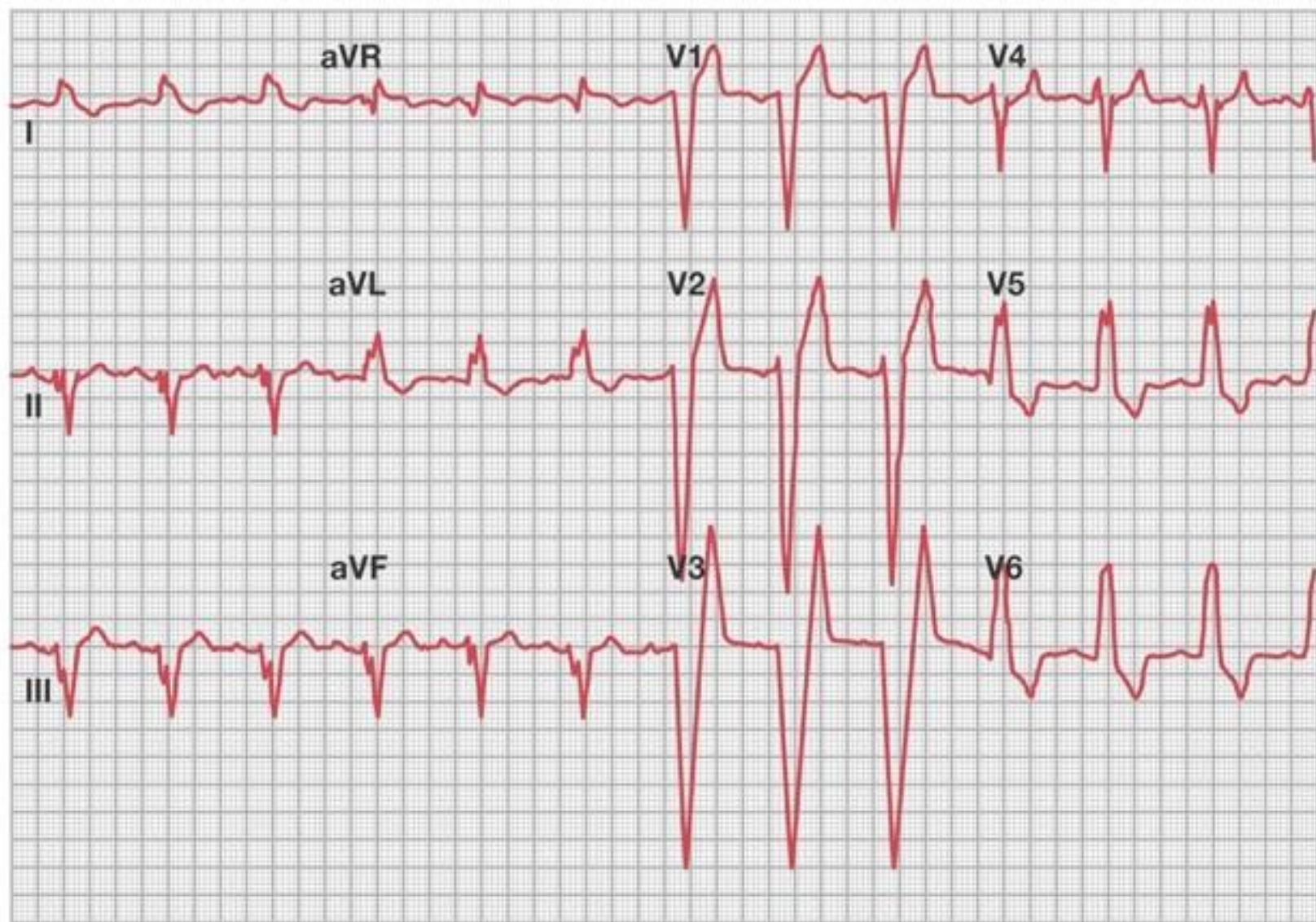
Management :

- ✓ Complete cardiac evaluation.
- ✓ Pacemaker.

Left Bundle Branch Block



P Wave	PR Interval (in seconds)	QRS (in seconds)	Characteristics
Before each QRS, identical	.12 to .20	$\geq .12$	RR' in V5



RIGHT BUNDLE BRANCH BLOCK

Definition :

- In this the right ventricle is not directly activated by impulses travelling through the right bundle branch .

ECG changes :

- Heart rhythm – originate above the ventricles
- QRS duration - >100 ms or > 120 ms

Right Bundle Branch Block



P Wave	PR Interval (in seconds)	QRS (in seconds)	Characteristics
Before each QRS, identical	.12 to .20	>.12	RSR' in V1

FASCICULAR BLOCKS

Anterior fascicular block

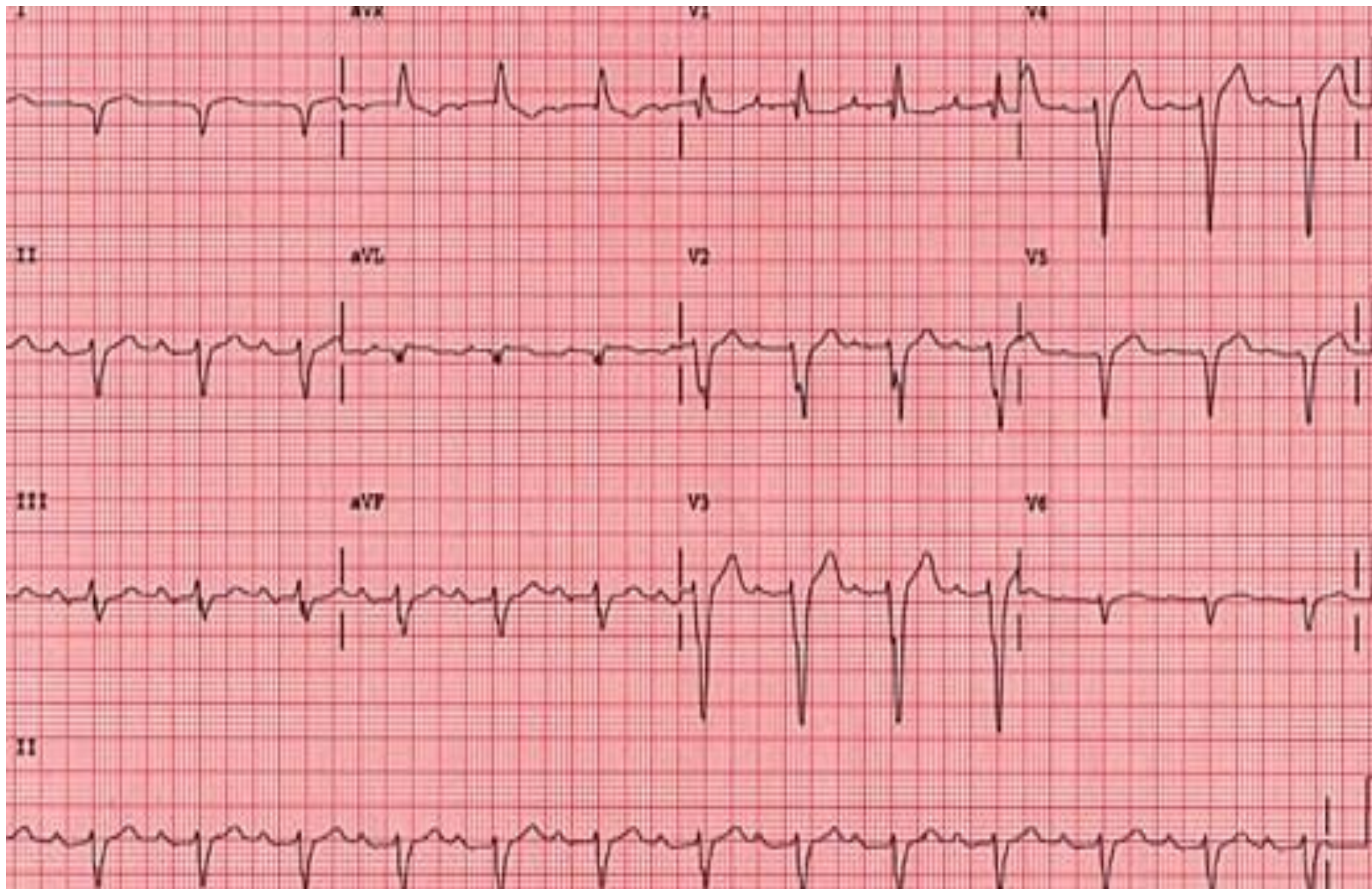
- ✓ a small Q wave in lead I and an S in lead III (Q1S3).
- ✓ The QRS will be slightly prolonged (0.1 - 0.12 sec).

Posterior fascicular block

- ✓ an S in lead I and an Q in lead III (S1Q3).
- ✓ The QRS will be slightly prolonged (0.1 - 0.12 sec).



Anterior fascicular block



Posterior fascicular block

CLINICAL MANIFESTATIONS

- ❖ Slow heart rate
- ❖ Irregular heart rate
- ❖ Arrhythmias
- ❖ In case of severe block ;
- ❖ Breathlessness
- ❖ Breathlessness with exertion
- ❖ Breathlessness caused by fever
- ❖ Dizziness

- ❖ Fainting
- ❖ Fatigue
- ❖ Heart block
- ❖ Chest pain
- ❖ Shortness of breath
- ❖ Seizures
- ❖ Light headedness
- ❖ Weakness

Diagnostic evaluation

- Blood test ECG
- Echocardiogram
- 24 hour heart monitor
- Electrophysiology
- Holter monitor
- Event monitor
- Exercise stress test

PACE MAKER THERAPY

- ***Definition :***

It is an electronic that provides electrical stimuli to the heart muscle .pacemaker are usually used when a patient has a slower than normal impulse formation or a conduction disturbances that cause symptoms .

Types :

- ✓ Temporary
- ✓ permanent

TEMPORARY PACE MAKER

Indications :

- Surgery and post operative recovery
- Cardiac catheterization
- Coronary angioplasty
- Before implantation of permanent pace maker
- After open heart surgery
- Acute anterior MI with 2 nd degree or 3 rd degree or bundle branch block .
- Acute inferior MI with symptomatic bradycardia and AV block .
- Ventricular tachycardia .
- Atrial flutter .
- Brady arrhythmias and tachy arrhythmias .

TYPES OF TEMPORARY PACEMAKER

- ❑ Transcutaneous [external] cardiac pacing .
- ❑ Trans venous pacing
- ❑ Trans thoracic pacing
- ❑ Trans esophageal pacing

PACING

- ❖ It is a non invasive and delivers electricity from the external power source .[usually part of external defibrillator] .
- ❖ This causes the depolarization of excitable myocardial myocardial tissue by pulsed electrical current conducted through the chest wall, between electrodes adherent to the skin .

TRANSCUTANEOUS CARDIAC PACING



TRANSVENOUS

PACING

- An intravenous catheter electrode is positioned endocardially , via subclavian or external jugular venous route, and this is then connected to an external generator by a lead connector .

Types :

- Bipolar electrodes – both anode and cathode are intra thoracic .
- Unipolar – anode is extra thoracic .

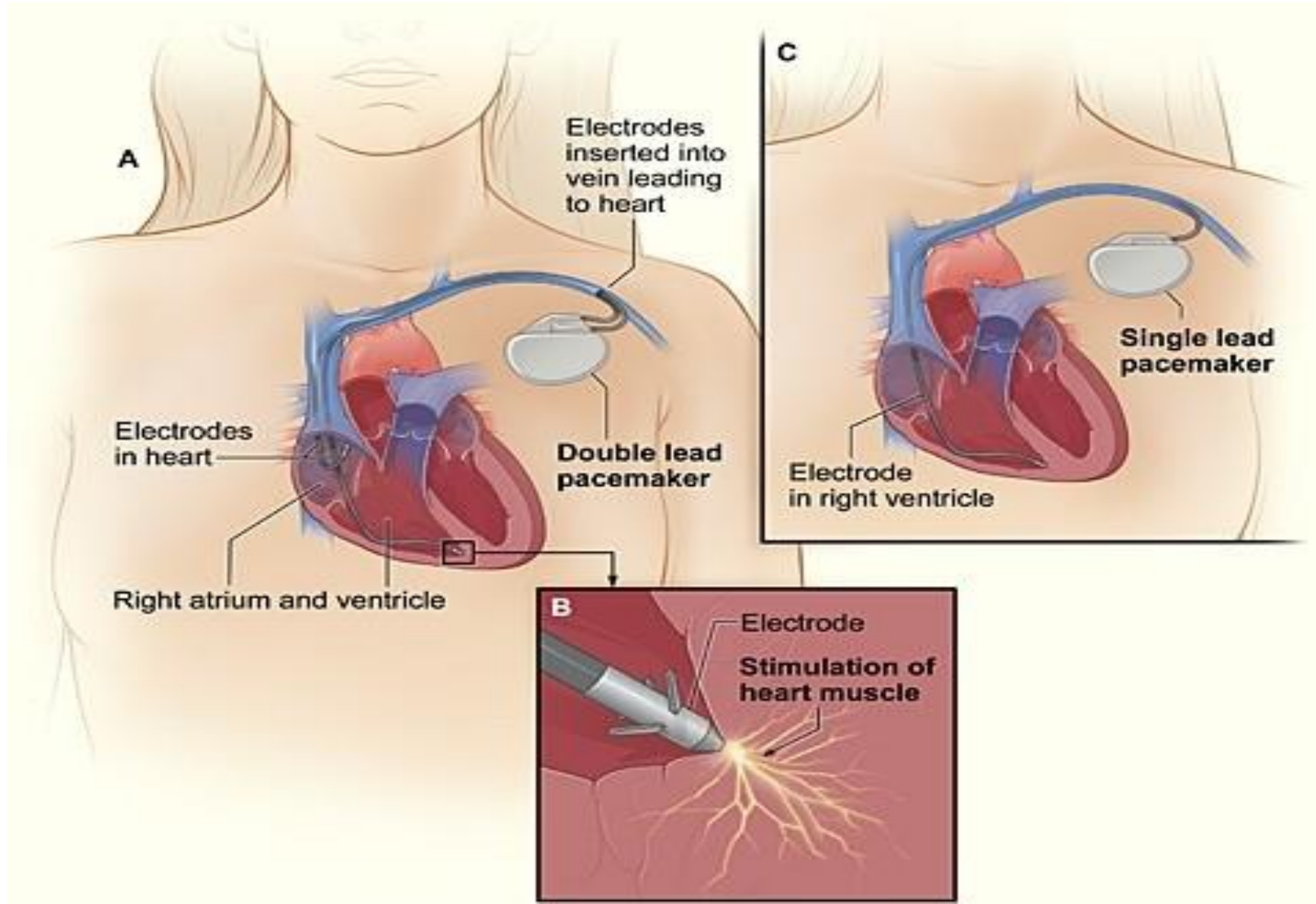
INSERTION SITE

- Right external jugular vein
- Left subclavian vein
- Femoral vein
- Brachial vein

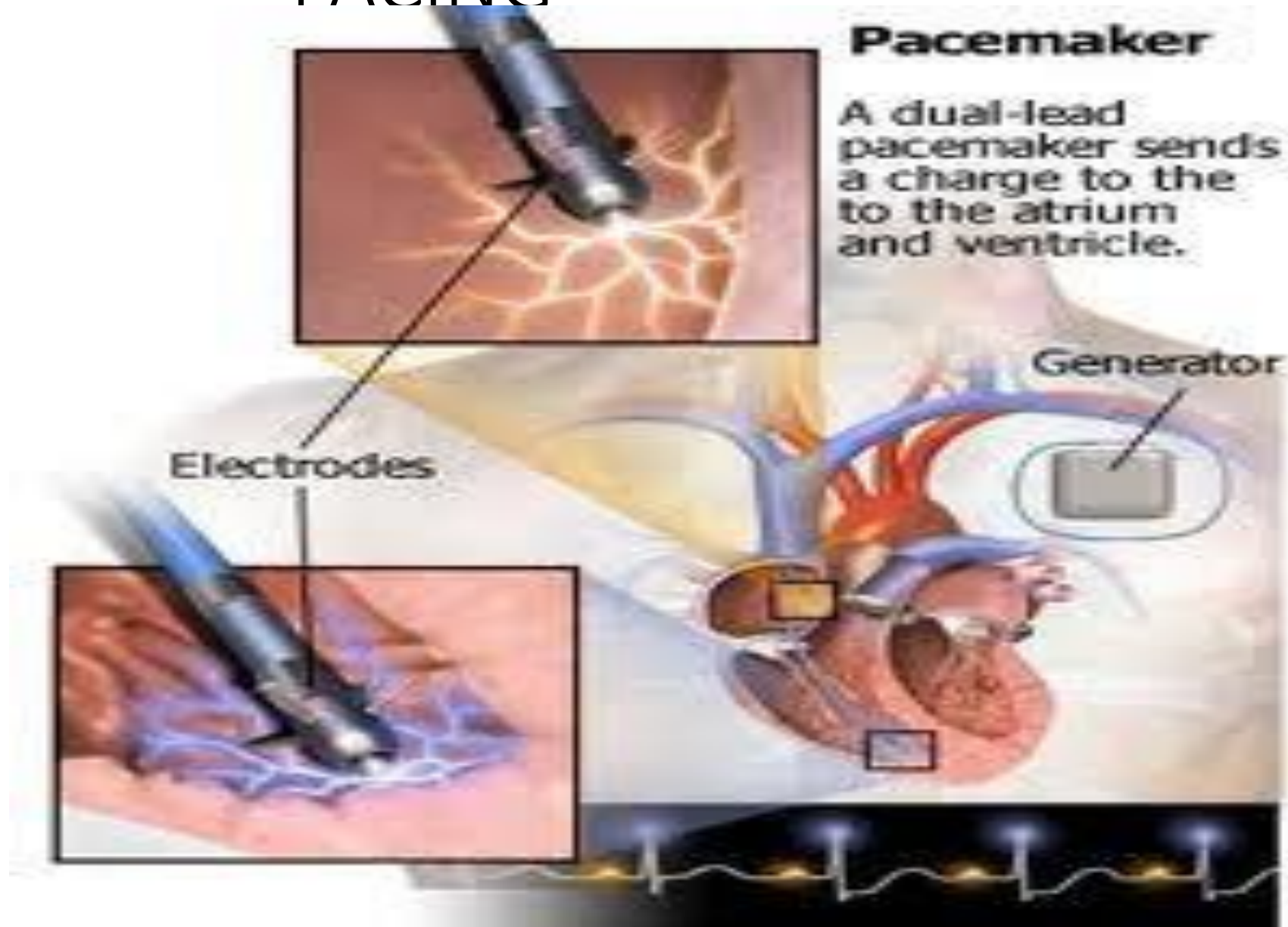
Position :

- Right ventricular apex [VVI pacing]
- Right atrial appendage [AAI pacing]
- Both in case of dual chamber [DDD pacing]

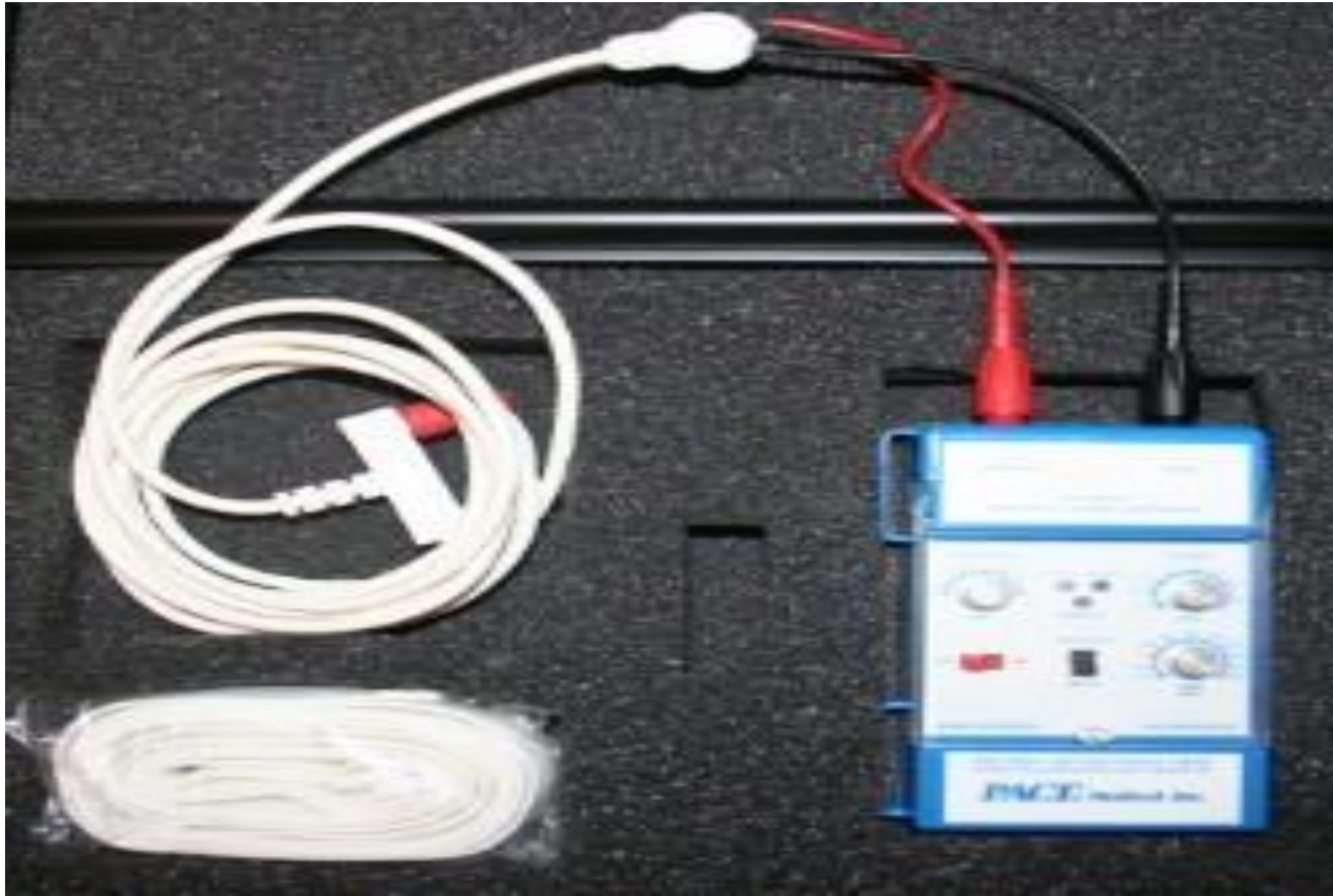
TRANSVENOUS PACING



TRANSVENOUS PACING



EXTERENAL GENERATOR



EXTERENAL GENERATOR



COMPLICATIONS

- ❑ Haemo or pneumothorax

- ❑ Rupture of major blood vessels

- ❑ Perforation of right ventricle

- ❑ VT or VF

MANAGEMENT OF HEART BLOCK

Asymptomatic patients:

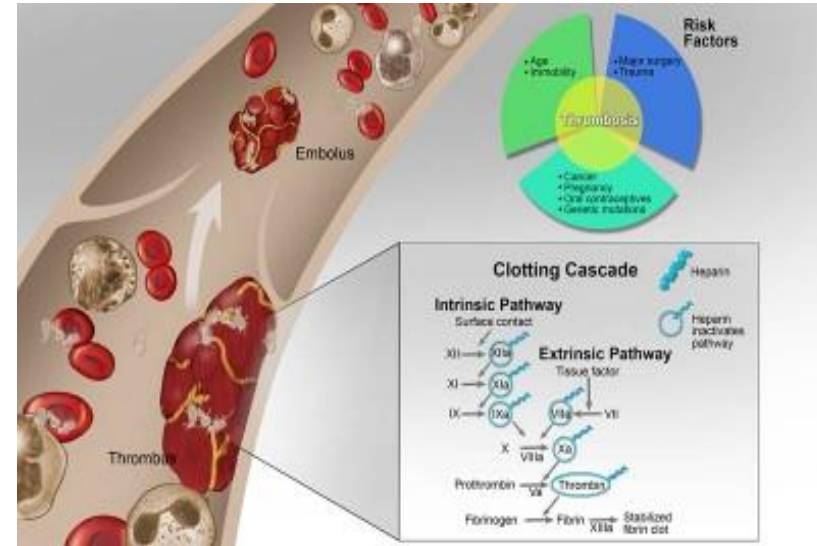
Decreasing or eliminating the cause for such as withholding the medication

Symptomatic patients:

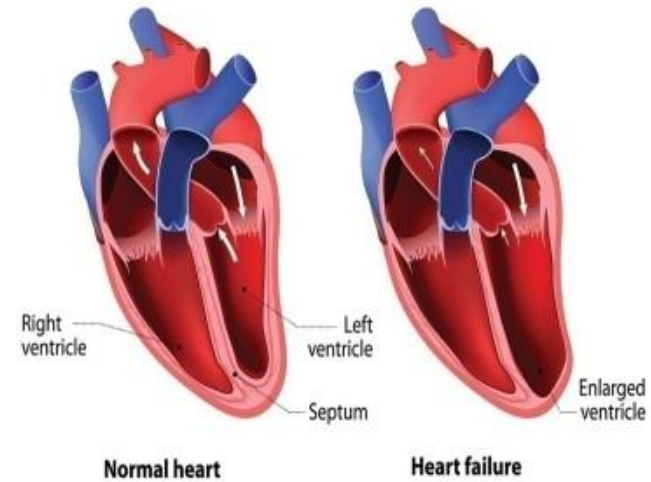
- Drugs such as atropine, epinephrine, isoproterenol, and dopamine is a temporary measure to increase HR and Support BP until temporary pacing is initiated
- Temporary transcutaneous pacing may be started for advanced AV block, with an acute MI
- If the block persists permanent pacemaker

COMPLICATIONS

- Cardiac arrest
- Heart failure
- Thromboembolic event



HEART FAILURE



NURSING INTERVENTIONS

- Evaluates the patient's blood pressure, pulse rate and rhythm, rate and depth of respirations, and breath sounds to determine the hemodynamic effect.
- Ask about episodes of lightheadedness, dizziness, or fainting as part of the ongoing assessment
- Obtain a 12-lead ECG, continuously monitor the patient for ECG changes (eg, widening of the QRS)
- Connect the patient to a cardiac monitor
- Assesses and observes for the benefits and adverse effects of each medication.

NURSING INTERVENTIONS CONTD....

- Provides assurance of safety and security while maintaining a calm and reassuring attitude.
- Fosters a trusting relationship with the patient.
- Discusses the emotional response and encouraging verbalization of feelings and fears
- Providing supportive or empathetic statements
- Promote a sense of self-management
- Help the patient to identify possible causative, influencing, and alleviating factors (eg, keeping a diary).

Tips for the patient about care of pace maker

- Avoid close or prolonged contact with electrical devices and devices that have strong magnetic fields.
- Notify airport screeners, because it may damage the pace maker
- Certain medical procedures such as MRI, electrocauterization during surgery, and shock-wave lithotripsy can disrupt pacemakers.
- Be careful with physical activity.

CONCLUSION

Heart block is an AV conduction disorder that can manifest in various settings, with varying symptomaticity and severity. The electrocardiogram is a key diagnostic tool for management, and careful interpretation is necessary to institute the correct management.

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