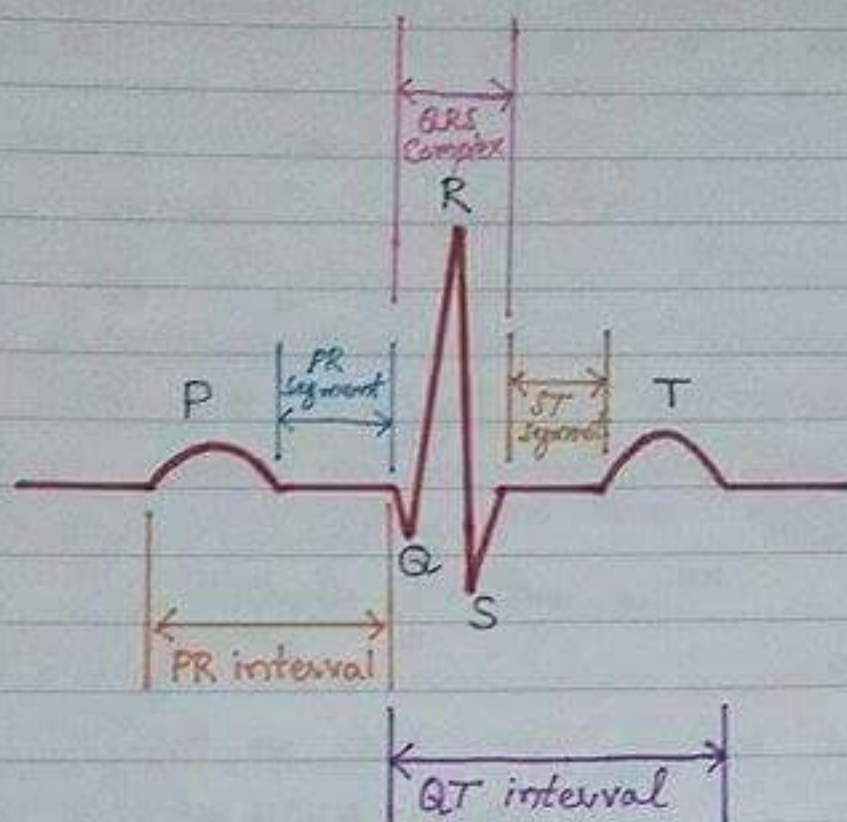


"ECG"

Dr. Ishaq Ali
PGR Paeds SGT H Swat

day / date:

①

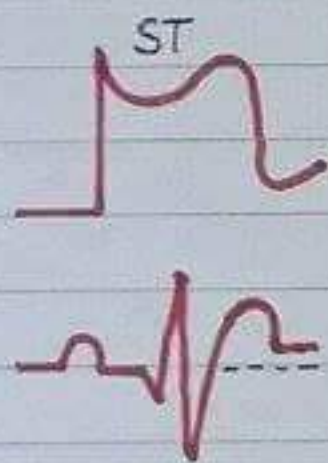


"Normal ECG"

(1) ST Segment Elevation:-

Common Causes:

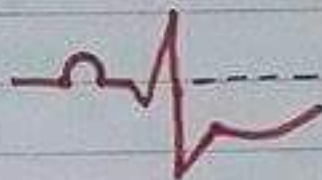
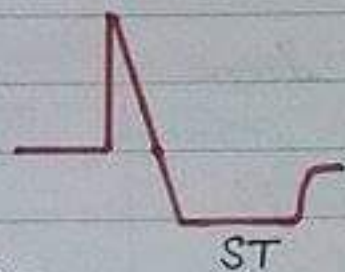
- 1) Transmural (full thickness) MI
i.e STEMI.
- 2) Prinzmetal's Angina
- 3) Acute Pericarditis
- 4) Left ventricular Aneurysm
- 5) Hyperkalemia
- 6) Acute Myocarditis
- 7) Pulmonary Embolism
- 8) Hypothermia
- 9) Blunt trauma to chest, resulting in Cardiac Contusion.



(2) ST Segment Depression:-

Common Causes:

- 1) Myocardial Ischemia (Coronary insufficiency).
- 2) Subendocardial ischemia/infarction - (Non-full thickness) i.e. NSTEMI.
- 3) Unstable Angina, stable Angina.
- 4) Hyperventilation
- 5) Side effect of Digoxin.
- 6) Hypokalemia (also "U" wave)
- 7) Right or Left ventricular hypertrophy
- 8) RBBB, LBBB, WPW
- 9) Tachycardia
- 10) Mitral valve prolapse.



Fb/Nurse-Info

3) ECG Localization of STEMI:-

Infart location	Artery involved	Leads (ST elevation)
Anterior wall	LAD	V1 - V4
Anterolateral	LAD or LCX	V5 - V6
Lateral	LCX	I, aVL
Inferior	RCA	II, III, aVF

* Coronary Artery Occlusion most commonly occurs in the LAD.

Fb/Nurse-Info

"Tachycardias"

(1) Sinus Tachycardia:- Each QRS complex has its own "P" wave but heart rate $> 100/\text{min}$.

Causes: Exercise, fever, thyrotoxicosis, Emotions, Salbutamol (Ventolin), Anemia.

(2) Supraventricular / Atrial Tachycardia:-

Not in ventricles, above ventricle.

P waves absent (When Atria are involved = No P waves)

Normal QRS complexes

R-R interval same (Regular Rhythm)



Well tolerated

Pt is Hemodynamically stable.

Causes: Drugs (Asthma), Caffeine, Alcohol, Smoking, Stress.

Tx: Adenosine
Procainamide
Lidocaine
Amiodarone
Digoxin
Digitalis

Pharmacological

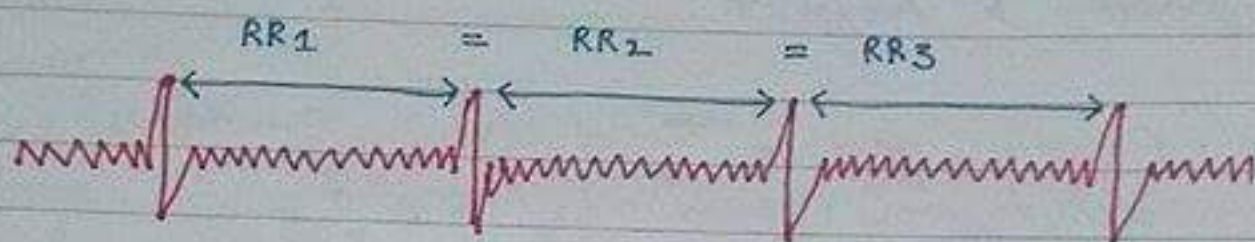
Non-pharmacological

Valsalva Manoeuvre
Carotid Massage
Cough multiple times
Wash face & cold water

(3) Atrial Flutter:- "Saw tooth" appearance with Regular R-R interval.

No P waves

Heart rate = 250-300/min



Causes: Hypertension, CAD, Cardiomyopathy, Diabetes.

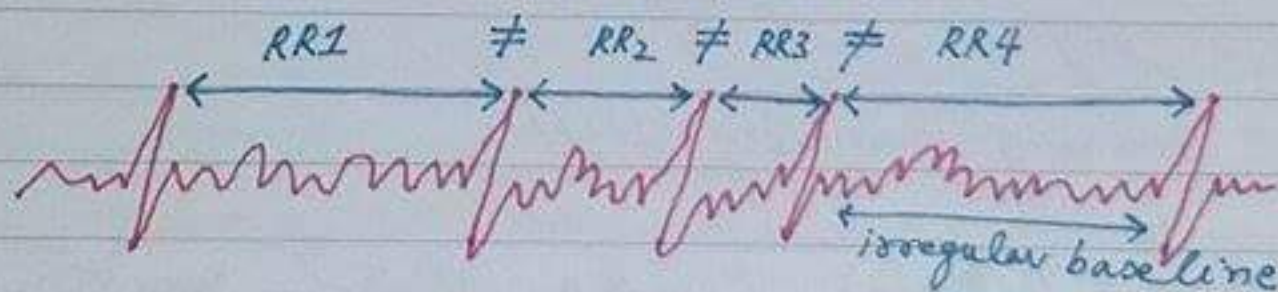
Tx: DC Cardioversion

Treat like AF, Definitive Tx = Catheter ablation.

(4) Atrial fibrillation:- "Saw tooth" appearance, Irregular R-R interval.

No P waves

QRS Complex normal



Palpitations, Breathlessness, Fatigue, ↓ BP
Can lead to thromboembolic episodes, particularly stroke.

Two abnormalities in Radial pulse = Irregularly irregular, pulse deficit.

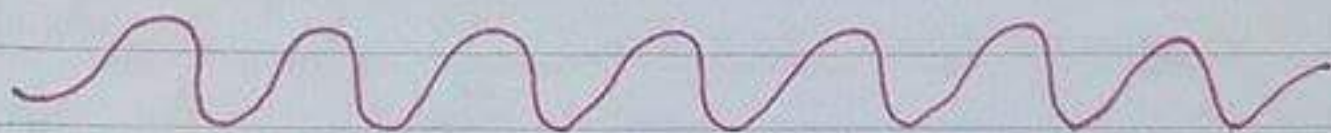
Causes: Mitral Stenosis, thyrotoxicosis, IHD, CHF, Drugs (Adrenaline), Lung diseases (COPD), Cardiomyopathy, HTN, DM.

Tx: Pharmacological = Adenosine (β -blocker)
LMW heparin (Anticoagulant, thrombus in Abia)

Non-Pharmacological = DC cardioversion.

(5) Ventricular Tachycardia :-

Hemodynamically unstable, can cause low BP & may lead to VF, asystole & Sudden death.



Causes: Acute MI, chronic CAD, cardiomyopathy, Hypokalemia, Hypocalcemia.

Tx :- Pharmacological (stable) = Lignocaine
Amiodarone

Non-pharmacological = DC Cardioversion

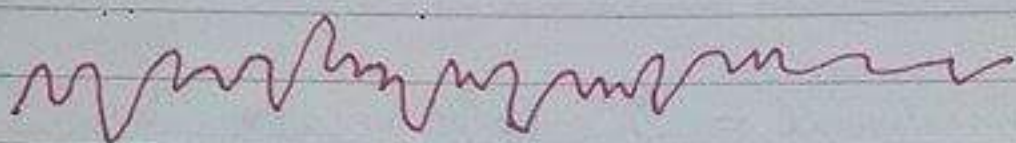
If left untreated, Ventricular Tachycardia will likely lead to Ventricular Fibrillation.

(6) Ventricular Fibrillation:- No identifiable waves.

Fatal Arrhythmia without immediate CPR & defibrillation (Medical emergency).

Pt pulseless, breathless.

Lasts for 2-3 mins.



Causes: MI, Congenital heart disease, Cardiac injury, Cardiomyopathy.

Mx: Apply immediate DC Cardioversion.

"Bradycardias"

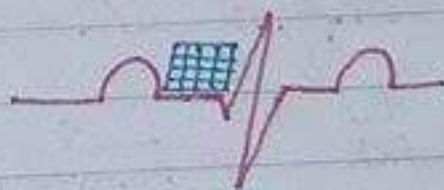
(1) Sinus Bradycardia:- Each QRS complex has its own P wave, but Heart rate $< 60/\text{min}$.

Causes: Drugs (β -blockers, Ca channel blockers)
 Athletes
 Hypothyroidism
 Hypothermia

(2) AV Block:

(A) 1st degree Heart Block:-

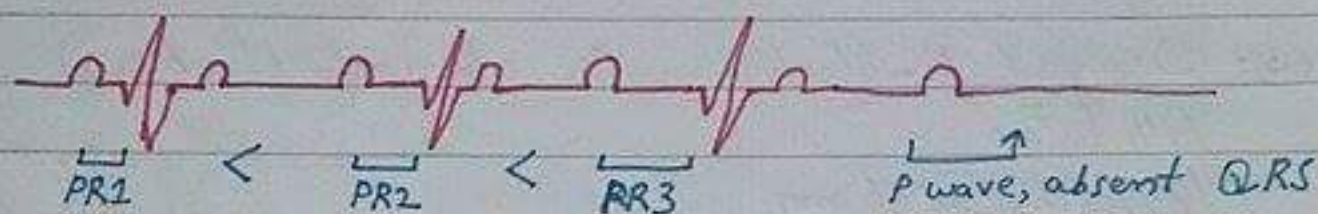
The PR interval is prolonged ($> 200 \text{ msec}$).
 Distance b/w P wave & QRS complex is One Big Square.



Benign & asymptomatic. No Tx required.
 Causes:- Drugs (propranolol)

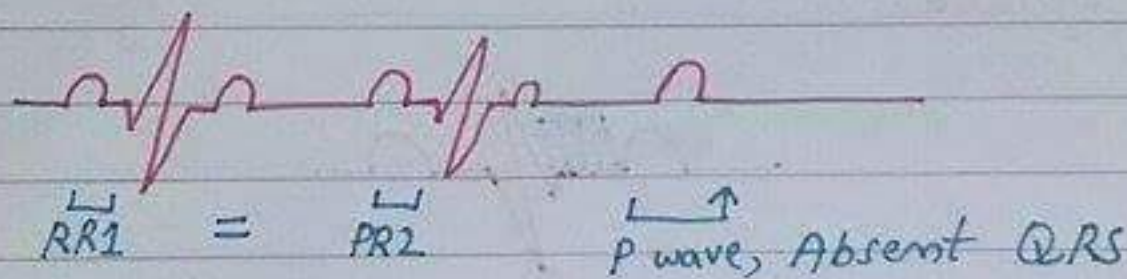
(B) 2nd Degree Heart Block:- Not all P waves are followed by QRS complex.

Mobitz type I (Wenckebach):- Progressive increase in PR interval (P to QRS complex) until a beat is "dropped", i.e. (P wave not followed by QRS complex).



Usually asymptomatic. Mobitz type I worsens $\bar{e}$ Carotid massage & improves $\bar{e}$ Atropine.

Mobitz type II:- PR interval (P to QRS complex) is constant.
"Dropped" beats.



May progress to 3rd degree heart block.
Often Tx $\bar{e}$ pacemaker.
Mobitz type II worsens $\bar{e}$ Atropine & improves $\bar{e}$ Carotid massage.

(C) 3rd degree / Complete heart block :-

No conduction from SA to AV node.

Atria contracts on their own.

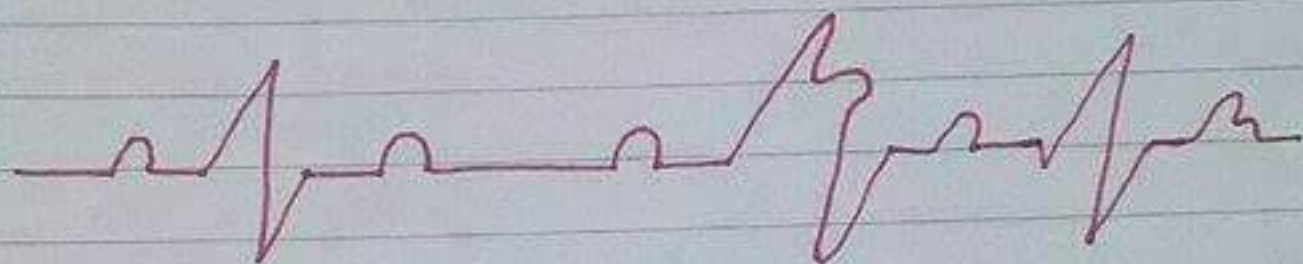
Atria & ventricles beat independently of each other.

30-40 beats/min.

"Canon waves".

Atrial rate > ventricular rate.

Wide QRS, P-P & R-R interval regular.



Mx: Atropine ($\uparrow$ HR)

Temporary pacemaker

In ischemic pt, we don't give Adrenaline because it causes vasoconstriction.



Murmurs

Dr. Iqbal Ali
PGR - Paeds
SGTH Sirvat

day / date: ①

Murmurs:- These are abnormal sounds & produced by turbulence of blood flow across an abnormal valve, septal defect or outflow obstruction, or by red volume or velocity of flow through a normal valve.

Murmurs may occur in a healthy heart. These "Innocent" murmurs occur when stroke volume is red eg:- during pregnancy & in athletes & resting bradycardia or children with fever, & are noted during systole.

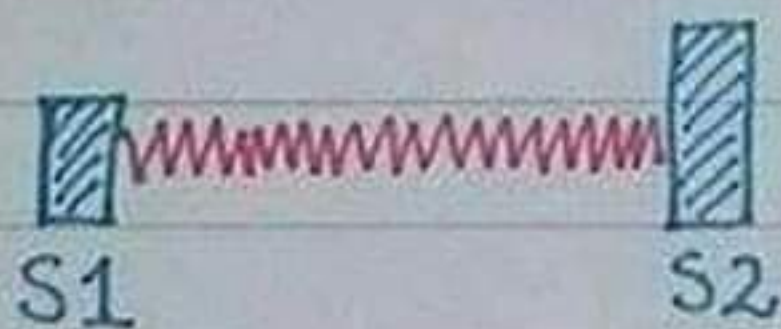
Types of Murmurs:-

(1) Systolic Murmurs:- Occurs during a heart muscle contraction, i.e. in the interval between the 1st & 2nd heart sounds.

They are divided into ejection murmurs (due to blood flow through a narrowed vessel or irregular valve) & Regurgitant Murmurs.

eg:- A) Pansystolic Murmur

Causes: Mitral / Tricuspid Regurgitation
VSD

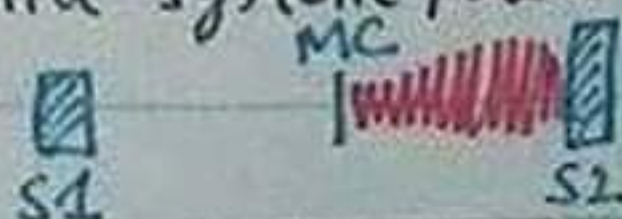


B) Ejection Systolic Murmur

Causes: Aortic / pulmonary stenosis



C) Mid systolic / Late systolic Murmur
cause: Mitral valve prolapse



MC = Mid systolic click

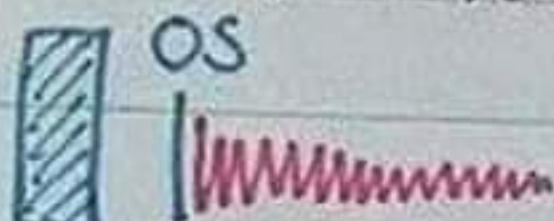
Ad Date: (2)

(2) Diastolic murmurs:- Occurs during heart muscle relaxation i.e after the 2nd heart sound.

Diastolic murmurs are due to a narrowing (stenosis) of the mitral or tricuspid valves or regurgitation of the aortic or pulmonary valves.

eg:- A) Mid-Diastolic murmur


S1

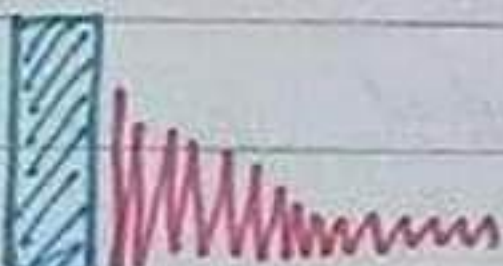

S2

Causes:- Mitral stenosis
Tricuspid stenosis
ASD

OS = opening snap in Mitral - Stenosis

B) Early Diastolic Murmur

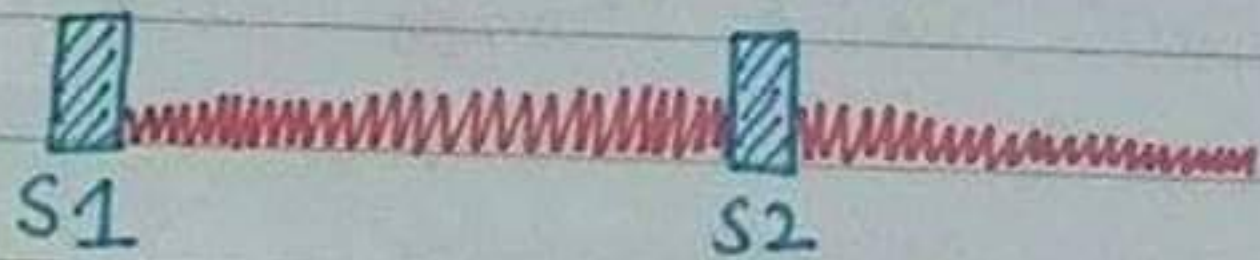

S1


S2

Causes:- Aortic Regurge
pulmonary Regurge

day / date: (3)

(3) Continuous Murmurs:- occurs during systolic & diastolic periods i.e. throughout the cardiac cycle (Machinery murmur).



Characteristics of a Murmur:-

(1) Timing:- Systolic / Diastolic
palpate the carotid artery while auscultating. The murmur which comes with pulsation is systolic & the murmur which alternates with it is diastolic.

1st Heart Sound (S1)

Any sound b/w S1 & S2 is systolic murmur.

2nd Heart Sound (S2)

After S2 or before S1 is Diastolic murmur.

(2) Duration:- eg:- Pansystolic = starts $\bar{e}$ S1 & goes upto / beyond S2.

Ejection systolic = starts slightly after S1 & ends before S2.

Mid-diastolic = in middle of diastole.

Early diastolic = occurs soon after S2.

(3) Radiation:- depends on direction of blood flow.
eg:-

a) Mitral Regurge = Pansystolic Murmur radiating to Axilla

b) Pulmonary stenosis = Ejection systolic murmur radiating to the left shoulder.

c) Aortic stenosis = Ejection systolic murmur radiating to the neck.

day / date: (5)

d) VSD = Pansystolic murmur radiating to the whole precordium.

(4) Character:- Murmurs of stenosis are Rough/Harsh.
Murmurs of Regurge are blowing.

(5) Pitch:- Low / high pitched.

Mitral stenosis = low pitched (best audible $\bar{c}$ bell)
other murmurs = high pitched.

(6) Effect of Respiration:- Right sided SV res. during inspiration while left sided SV res during expiration.

So, murmurs of Right Heart (Tricuspid Regurge, pulmonary stenosis) res in intensity during inspiration while murmurs of left Heart (Mitral Regurge, Aortic stenosis, VSD) res in intensity during expiration.

(7) Effect of posture:- Murmur of Mitral stenosis is best heard in Left lateral position while murmurs of Aortic / pulmonary Regurge are best audible when patient sits up & leans forwards.

day / date: (5)

d) VSD = Pansystolic murmur radiating to the whole precordium.

(4) Character:- Murmurs of stenosis are Rough/Harsh.
Murmurs of Regurge are blowing.

(5) Pitch:- Low / high pitched.

Mitral stenosis = low pitched (best audible $\bar{c}$ bell)
other murmurs = high pitched.

(6) Effect of Respiration:- Right sided SV res. during inspiration while left sided SV res during expiration.

So, murmurs of Right Heart (Tricuspid Regurge, pulmonary stenosis) res in intensity during inspiration while murmurs of left Heart (Mitral Regurge, Aortic stenosis, VSD) res in intensity during expiration.

(7) Effect of posture:- Murmur of Mitral stenosis is best heard in Left lateral position while murmurs of Aortic / pulmonary Regurge are best audible when patient sits up & leans forwards.

(8) Location / site of Max intensity:-

Apex = Mitral Regurge, Mitral stenosis

Tricuspid Area = Tricuspid Regurge (also heard at Right border)

Left sternal edge = Aortic Regurge

(9) Intensity:- Murmurs are graded from Grade I to VI depending on intensity.

Grade	Description
Grade I	Barely Audible (Expert can hear it in optimal condition)
Grade II	Quiet / audible after a few seconds of auscultation
Grade III	Easily audible / Loud murmur without a thrill.
Grade IV	Loud murmur with a thrill (Palpable murmur)
Grade V	very loud + thrill (heard $\bar{e}$ stethoscope slightly off thoracic wall)
Grade VI	Loudest / heard with stethoscope entirely off thoracic wall