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Stage:1st nursing

Part Three

The circulatory system

The term circulatory system refer to the heart and blood while Cardiovascular system refer to the heart and passage that blood run within.

The conduction system of the heart

This system consist of:

1-Sinoatrial node (SA)

1. The node is modified myocytes located in the wall of right atrium and initiates heart beat(**pacemaker**) and determined heart rate .

2- Aterioventricular node(AV)

This node located near atrioventricular valve at the lower end of intratrial septum act as **electro gat way** to ventricle.

3-Atrioventricular bundle(**Hiss bundle**). Path way by which the signal pass to the ventricle

4-Right and left bundle branches: Is division of hiss bundle that enter the intarventricular septum .

5- Purkanji fiber (**nerve like processes**). Raise from the bundle branch and run to the apex and turn upward.

Mechanism of the conduction system of the heart

- 1- Signal initiated from SA node and spread through atria and cause atrial contraction.
- 2- The signal reach AV node in about 50 msec.
- 3- The signal delays at AV node about 100 msec.
- 4-** The signal reach Ventricles via Purkanji fibers and cause ventricle contraction.

Electrocardiogram ECG

The instrument by which we can detect heart events called **electrocardiograph amplifies.**

The moving paper that record the signals called(**ECG or EKG**) **electrocardiogram.**

To detect the events of the heart electrode attached to the wrist , ankle and six locations in chest.

The ECG shows three deflections above the base line of the paper chart.

1-P wave

2-QRS complex

3-T wave

P wave: This wave produced by atrium **depolarization** and cause atrial **systole** after 100 msec P wave during PQ segment.

QRS complex:

Q : The downward deflection

R:Tall sharp peak

S: final down deflection

QRS cause ventricles **depolarization** and then ventricles systole and Atrial **diastole** occur during this period.

T wave: Indicate depolarization of ventricles before ventricles **diastole.**

Diagnosis of abnormal ECG

Enlarge P wave	—————>	Atrial hypertrophy (Mitral valve stenosis)
Missing P wave	—————>	SA node damage
Two or more P wave	—————>	Heart block
Enlarge Q wave	—————>	Myocardial infarction
Enlarge R wave	—————>	Ventricle hypertrophy
Abnormal T wave	—————>	Hyperkalemia

The heart sound

Listening to sound made by the body is called **Auscultation**, the heart generates two or three sound described as **Lubb – dupp**.

- 1- S1 (first heart sound) is louder and longer due to the Atrioventricular valves (AV).
- 2- S2 (Second heart sound) is softer and sharper due to the closure of Semilunar valves.
- 3- S3 (Third sound) is rarely heard in older than 30 but normal in children and adolescents. Due to transition from filling to empty.

Cardiac cycle

All the events of cardiac cycle are completed in less than 1 second

1- Ventricular filling, in this phase

a- atrial systole

b- Each ventricle contains 130 ml called **end-diastolic volume (EDV)**.

2- Isovolumetric contraction

a- Atrial diastole

b- Ventricle systole

c- S1 Occurs.

3- Ventricle ejection

a- Ejection of blood **Ventricle systole**

b- pressure peaks at 120 mm/Hg and ventricle contains 130 ml

c- Each ventricle ejects 70 ml called **stroke volume (SV)**

d- the remaining blood 60 ml **called end-systolic volume(ESV).**

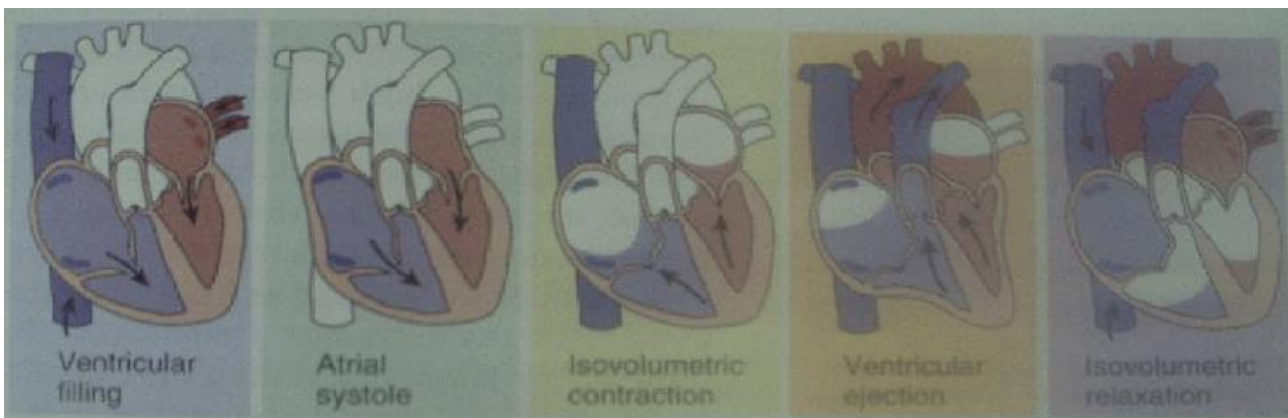
4-Isovolumetric relaxation

a- **Ventricle diastole**

b- Close of semilunar valves

d-S2 occur.

Events of cardiac cycle



Heart rate

Heart rate can be measured by palpation of pulse in superficial artery , in new born about 120 bpm in young adult male about 64-72 bpm and in female 72-80 bpm.

Tachycardia ,heart rate above 100bpm and due to stress, drugs ,fever and heart diseases.

Bradycardia heart rate below 60 bpm sueto sleeping and hypothermia(low temperature).

Cardiac output(CO)

Cardiac output is the amount of blood that ejected by ventricles in a minute.

$$CO=HR(\text{Heart rate}) \times SV(\text{Stroke volume}= 70 \text{ ml})$$

*** Cardiac output for a person with 75 bpm

$$CO=75 \times 70= 5.250 \text{ ml}$$

Hemodynamic

Is the physical principle of blood flow which based on pressure and resistance of blood.

Blood pressure Bp is the force of blood against vessel wall.

Blood resistance Is blood encounter in the vessels as it move away from heart like Blood viscosity ,vessel length and radius of blood vessel (vasoconstriction and dilatation.

Blood pressure BP records by **Sphygmomanometer**

1-The systolic pressure: the peak arterial pressure during ventricular systole about 120 mm/Hg in person ages (20 -20) year old

2-diastolic pressure : the minimum arterial pressure between heart beat about 80 mm/Hg.

*** **Note/** the difference between systole and diastole pressure called ***pulse pressure***

Hypertension Is the chronic resting BP higher than 140/90. And called the ***Silent killer*** as a result of cardiovascular disease.

Hypotension Is chronic lower resting of BP may caused by blood loss ,dehydration, anemia or other factors,

Hypertension often Treated with Angiotensin converting enzyme(ACE) inhibitors

Hormonal regulation of blood pressure

Renin Aldosterone Angiotensin system

