ASSESSMENT OF CARDIOVASCULAR SYSTEM

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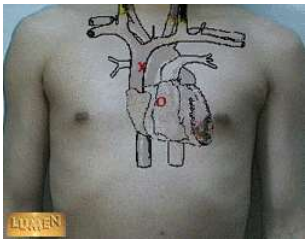
Topographical Landmarks of the Heart

* Precordium- area on anterior chest that covers heart and great vessels



Topographical Landmarks

* Each area corresponds to one of the hearts 4 valves.
  * Aortic area - 2nd ICS to right of sternum (closure of the aortic valve loudest here).
  * Pulmonary area - 2nd ICS to left of sternum (closure of the pulmonary valve loudest here).
  * Tricuspid - 5th ICS left of sternal border (closure of tricuspid valve).
  * Mitral - 5th ICS left of the sternum just medial to MCL (closure of mitral valve).

Physical Examination

* Steps:
  * Subjective data.
  * Objective data.
  * Inspection: general appearance, precordium.
  * Palpation: peripheral pulses, apical impulse.
  * Percussion.
  * Auscultation: heart sounds, murmurs.
  * Summary checklist.

Assessment: Subjective data

1. Chest pain	5. Fatigue	9. Past cardiac history
2. Dyspnea	6. Cyanosis or pallor	10. Family cardiac history
3. Orthopnea	7. Edema	11. Personal habits (cardiac risk factors)
4. Cough	8. Nocturia	

Assessment: Subjective

- Personal and family **history**
- **Diet** history: 24 hr. sample diet Opportunity for teaching food selection and preparation
- **Socioeconomic status** – ability to purchase proper foods, medicines. Employment and its effects on health?
- **Cigarette smoking** : # packs /day and also # years smoked PACK YEARS

History taking.

- Past cardiac history:
  - ! Last ECG, stress ECG, serum chilesterol measurements, other heart tests?
- Family cardiac history:
  - Family history of hypertension, diabetes, heart problems, coronary artery disease (CAD), sudden death at younger age?
- Personal habits (cardiac risk factors): nutrition, smoking, alcohol, exercise, drugs.

Assessment: Subjective

- **Physical Activity/Inactivity** – 30 minutes daily of moderate exercise recommended on most days (Healthy People 2010)
- **Obesity** – associated with HTN, hyperlipidemia, and diabetes and all contribute to CV disease.
- **Current Health Problems** – describe health concerns.

Assessment: Subjective

- **Chest pain:** or discomfort, a symptom of cardiac disease, can result from ischemic heart disease, pericarditis and aortic dissection.
- Chest pain: can also be due to non- cardiac causes; pleurisy, pulmonary embolus, hiatal hernia and anxiety musculoskeletal strain, GERD

Assessment- Chest Pain

- Onset
- Duration
- Frequency
- Precipitating factors / Relieving factors
- Location
- Radiation
- Quality
- Intensity

Chest pa

Angina – an important cardiac symptom.
"Clenched fist" sign is characteristic of angina.

- Onset, location, character, aggravating and/or relieving factors
- Character: crashing, stabbing, burning, vise-like.
- Associated symptoms: sweating, ashen gray or pale skin, shortness of breath, nausea or vomiting, racing of heart, heart skips beat.

Assessment: Subjective

- **Paroxysmal Nocturnal Dyspnea** – client has been recumbent for several hours, increase in venous return leads to pulmonary congestion.
- **Fatigue**- resulting from decreased cardiac output is usually worse in evening. Ask pt. if can they perform same activities as a year ago

Assessment: Subjective

- **Palpitations**- fluttering or unpleasant awareness of heartbeat. Non- cardiac- causes- fatigue, caffeine, nicotine, alcohol
- **Weight gain**- a sudden increase in wt. of 2.2 pounds (1 kg) can be result of accumulation of fluid (1L) in interstitial spaces, known as edema.
- **Syncope**- transient loss of consciousness, decrease in perfusion to brain.

Subjective data

- Edema:
  - Swelling of legs or dependent body part due to increased interstitial fluid.
  - Onset, recent change, relation to time of day, relieving factors, associated symptoms.
- Nocturia:
  - Occurs with heart failure in the person who is ambulatory during the day.

Subjective d

Hemoptysis is often a pulmonary problem, but also occurs with mitral stenosis

- Cough: duration, frequency, type, coughing up sputum (color, odor, blood tinged, aggravating and/or relieving factors.
- Fatigue: onset, relation to time of day?
- Cyanosis or pallor: occurs with myocardial infarction or low cardiac output.

Subjective

Paroxysmal nocturnal dyspnea (PND) occurs with heart failure. Classically, the person awakens after 2 hrs. of sleep, arises, and flings open the window with the perception of needing fresh air.

- Dyspnea:
  - Cause, onset, duration, affection by position,
  - Does shortness of breath interfere with activities of daily living?
- Orthopnea:
  - Is the need to assume a more upright position to breathe.
  - Note the exact number of pillows used.

Assessment:Objective
Beginning Inspection

* **General appearance:** Build, skin color, presence of SOB, DOE
* Older age
* **Skin**- color and temperature – look for symmetry in color, temp, any cyanosis
* **Extremities** – assess skin changes, vascular changes, clubbing, capillary filling and edema.
* Neck vein distention

Assessment:Objective

* **BP:** supine – change position 1-2 minutes, check again.
* Normally, systolic drops slightly or remains unchanged and diastolic increases slightly.
* **Carotid & Peripheral pulses** are assessed for:
  - Presence
  - Amplitude
  - Rhythm
  - Rate
  - Equality

Assessment:Objective

* **Precordium Assessment**- area over heart, done by:
* Inspection
* Palpation
* Percussion
* Auscultation

Physical Assessment

* **Inspection**-
* General Inspection:
* Inspect the patient status whether he or she is comfortable at rest or obviously short of breath.
* Inspect the neck for increased jugular venous pressure (JVP)or abnormal waves.
* There are specific signs associated with cardiac illness and abnormality however, during inspection any noticed cutaneous sign should be noted.

INSPECTION

Inspect the hands for:

* Temperature - described as warm or cool, sweaty or dry
* Skin turgor for hydration
* Janeway lesion
* Osler's node
* At the nails Splinter hemorrhage

INSPECTION

Then inspect the precordium for:

* visible pulsations
* apex beat
* masses
* scars
* lesions
* signs of trauma and previous surgery (e.g. median sternotomy)
* permanent Pace Maker

Palpation

* **Palpation of pulses**

The pulses should be palpated for rate, rhythm (regular, irregular) and character (rapid, slow, bounding)

* **Palpation of the precordium**

The valve areas are palpated for abnormal pulsations

* **Palpation of the apex beat**

The apex beat is found approximately in the 5th intercostal space in the mid-clavicular line. It can be impalpable for a variety of reasons including obesity, emphysema, effusion and rarely dextrocardia

Palpation

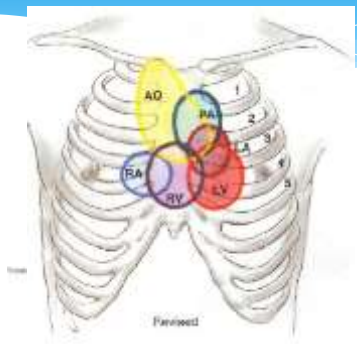
- Peripheral pulses
  - –Strength & equality
    - 0=Absent
    - 1+=Weak, thready
    - 2+=Normal
    - 3+=Full, bounding

Percussion

- Is used to estimate approximately heart borders and configuration.
- Recently is displaced by the chest x-ray or EchoCG.
- Helps to detect heart enlargement

Heart (cardiac) enlargement is due to increased ventricular volume or thickening of heart wall.
Occurs with HTN, CAD, heart failure, cardiomyopathy

Auscultation



Auscultation

- A Z-pattern is recommended.
- Before beginning alert the person for long duration of procedure.
- use the following pattern:
  - Note the rate
  - the rhythm
  - Identify S_1 and S_2
  - Listen for extra heart sounds
  - Listen for murmurs

Cardiovascular: Cardiac Cycle

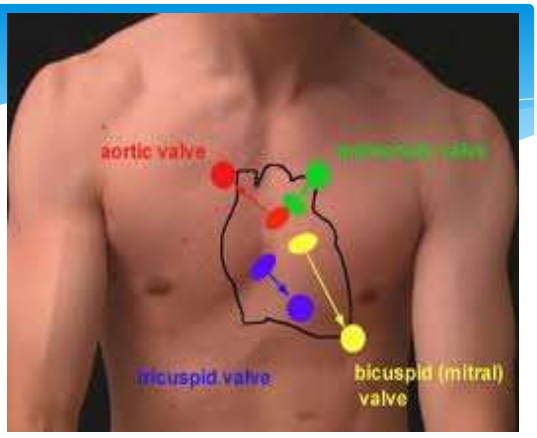
2 phases

- DIASTOLE: AV valves open – passive flow (75% of volume) into relaxed ventricles, then atria contract – active flow of remaining 25% into ventricles
- SYSTOLE : AV valves close, ventricle pressure increases, ventricle contracts, Seminular valves open, blood pumped into pulmonary and systemic arteries

Heart sounds

- **Heart sounds** are the noises generated by the beating heart and the resultant flow of blood through it (specifically, the turbulence created when the heart valves snap shut).
- Stethoscope is used to listen to these sounds using the bell and diaphragm portion.
- **Diaphragm** of stethoscope – **1st** and **2nd** heart sounds and high frequency murmurs. lub-dub
- Use **bell** of stethoscope – low frequency **gallops** and **murmurs**.

- In healthy adults, there are two normal heart sounds often described as a *lub* and a *dub* (or *dup*), that occur in sequence with each heartbeat. These are the **first heart sound** (S_1) and **second heart sound** (S_2), produced by the closing of the AV valves and semilunar valves respectively. In addition to these normal sounds, a variety of other sounds may be present including *heart murmurs*, *adventitious sounds*, and gallop rhythms S_3 and S_4.



S1

- The first heart sound - systolic **S1:**
- forms the "lub" of "lub-dub"
- Signals the closure of AV valves and the beginning of ventricular systole.
- Consists of mitral M1 and tricuspid T1 components.
- Normally M_1 precedes T_1 slightly.
- It is caused by the sudden block of reverse blood flow due to closure of the atrioventricular valves, i.e. tricuspid and mitral (bicuspid), at the beginning of ventricular contraction, or systole
  - loudest at the apex

Intensity of S1

- Loud S1
  - Stiff valve
    - MITRAL STENOSIS
  - Rapid rise in LV pressure
    - Exercise, hyperdynamic state
  - Short PR interval
    - MV wide open when LV pressure starts rising
- Soft S1
  - Very stiff valve
    - Severe MITRAL STENOSIS
  - Decreased energy
    - Failing left ventricle
  - Long PR interval
    - MV has drifted closed and so doesn't move much with LV systol

S2

- The second heart sound - diastolic **S2:**
- forms the "dub" of "lub-dub"
- Consists of aortic A2 and pulmonic P2 components.
- Signals the closure of semilunar valves and the end of systole.
- Normally A_2 precedes P_2 especially during inspiration when a split of S_2 (lub d/dub) can be heard.
- It is caused by the sudden block of reversing blood flow due to closure of the semilunar valves (the aortic valve and pulmonary valve) at the end of ventricular systole, i.e. beginning of ventricular diastole
  - loudest at the base.

Effect of respiration:

MoRe to the Right heart

Less to the Left

- A split S_2 – when the aortic valve closes significantly earlier than the pulmonic valve, you can hear the two components separately.

S3

- Rarely, there may be a third heart sound also called a **protodiastolic gallop, ventricular gallop**
- **"lub-dub-ta"** If new indicates heart failure or volume overload.
- It occurs at the beginning of diastole after S2 and is lower in pitch than S1 or S2 as it is not of valvular origin.
- The third heart sound is a **normal finding** in youth, some trained athletes, and sometimes in pregnancy but if it re-emerges later in life it may signal cardiac problems like a failing left ventricle as in dilated congestive heart failure (CHF).

S4

* The rare fourth heart sound when audible in an adult is called a **presystolic gallop** or **atrial gallop**. This gallop is produced by the sound of blood being forced into a stiff/hypertrophic ventricle.
* It occurs just before the first sound **"ta-lub-dub" (a-stiff-wall)**
* It is a sign of a pathologic state, usually a failing left ventricle, but can also be heard in other conditions such as restrictive cardiomyopathy. The sound occurs just after atrial contraction ("atrial kick") at the end of diastole and immediately before S1.

Murmurs

* *Heart murmurs* are produced by turbulent flow of blood across an abnormal valve, septal defect or outflow obstruction, or by increased volume or velocity of flow through a normal valve.
* Murmurs may occur in healthy heart. These murmurs occur when stroke volume is increased, e.g. during pregnancy, and in athletes with resting bradycardia or children with fever.

Murmurs are classified according to their timing within the cardiac cycle.

* **Systolic** Between S1and S2.
* **Diastolic** Between S2 and S1).
* **Systolic ejection** Begin after the first heart sound, attain a peak during midsystole, and terminate before the second heart sound.
* **Pansystolic or holosystolic** During all of systole.
* **Pandiastolic or holodiastolic** During all of diastole.
* **Prodiastolic** Early diastolic.
* **Presystolic** Late diastolic.
* **Continuous** Continue through all of systole and all or part of diastole.

Auscultation ADVENTITIOUS SOUNDS

* **Pericardial Friction Rubs**- results from inflammation of pericardial membrane.
* **Ejection Click**- Early systole, stiff deformed valve, high pitch, apex, diaphragm.
* **Opening snap** – Immediately after S2 stenotic mitral or tricuspid valve leaflets recoil abruptly during diastole.