Cardiac Examination of Older Adults

—BELMATT—
HEALTHCARE TRAINING

Session Aims and Objectives

Aims

- To evaluate the cardiovascular health status of older patients and identify potential cardiac abnormalities or conditions and assess the risk factors for cardiovascular disease specific to older individuals and determine the impact on their cardiac health.

Objectives

- Perform a comprehensive cardiac assessment, including history-taking, physical examination, and appropriate diagnostic tests, in older patients.
- Identify and assess common cardiovascular risk factors prevalent in older individuals, such as hypertension, dyslipidaemia, diabetes, obesity, and smoking.
- Recognize and interpret cardiac signs and symptoms in older patients, such as chest pain, dyspnoea, palpitations, and oedema.
- Evaluate cardiac function through techniques such as auscultation, blood pressure measurement, assessment of heart sounds, and assessment of peripheral circulation.
- Utilize diagnostic tests, such as electrocardiography (ECG), echocardiography, stress testing, and cardiac biomarkers, to aid in the diagnosis and evaluation of cardiac conditions.

Session Agenda

- Overview of cardiac anatomy
- Pulmonic and systemic circulation
- Role of coronary arteries
- Differences between younger and older patient cardiac assessments
- Examination of the cardiac system
- Risk Factors in Older Patients

Overview of anatomy of the heart

The anatomy of the heart in an older patient generally undergoes certain age-related changes. While the basic structure of the heart remains the same, there are some notable differences compared to younger individuals. Here's an overview of the anatomy of the heart in older patients:

Chamber Size and Wall Thickness:

- Left ventricular hypertrophy: The walls of the left ventricle may become thicker due to prolonged exposure to conditions like hypertension. This can lead to left ventricular hypertrophy, which affects the size and function of the ventricle.
- Dilated atria: The atria, particularly the left atrium, may dilate over time due to age-related changes in cardiac function, chronic pressure overload, or other factors.

Anatomy of Heart in Older Patient

Collateral Circulation

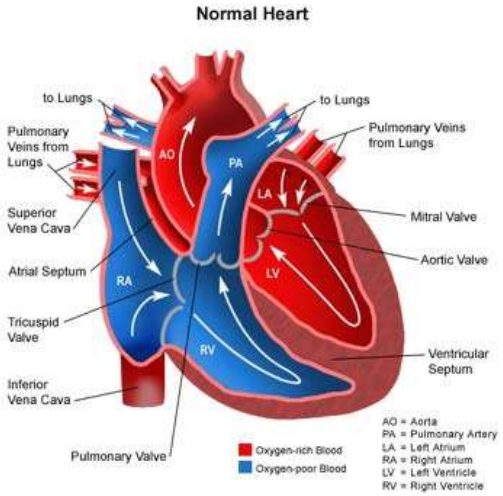
The development of collateral circulation, where new blood vessels form to bypass blocked or narrowed coronary arteries, may occur in response to chronic ischemia. Collateral vessels provide an alternate route for blood flow to the heart muscle and can be more prevalent in older patients with long-standing cardiovascular disease.

Changes in Cardiac Fat and Connective Tissue

With age, there may be an increase in fat deposition around the heart and within the myocardium. Additionally, the connective tissue within the heart may undergo fibrosis or stiffening, affecting the heart's overall structure and function.

ANATOMY

- Structure of the Heart
- Vascular System
- Conduction System



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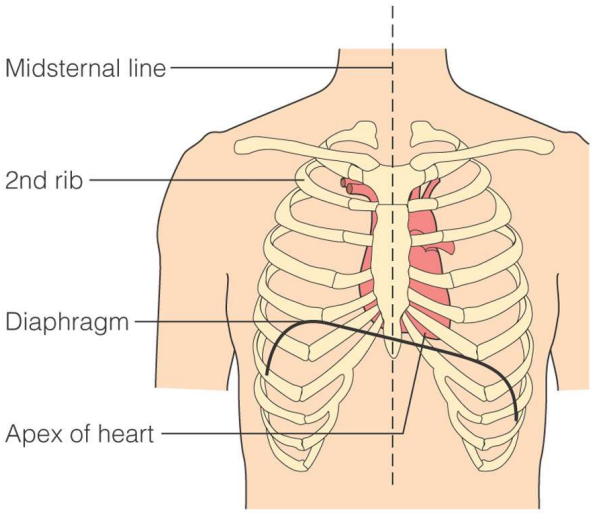
Location of the heart within the chest cavity



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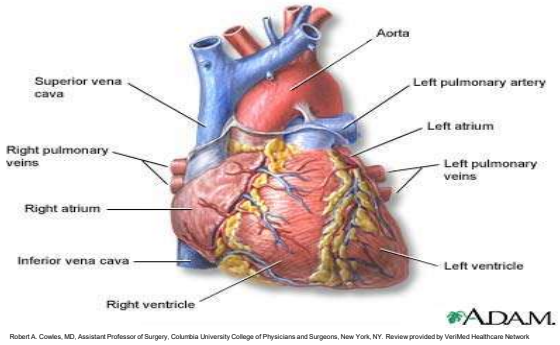
Views of the Heart



Robert A. Cowles, MD, Assistant Professor of Surgery, Columbia University College of Physicians and Surgeons, New York, NY. Review provided by VeriMed Healthcare Network

Atherosclerosis

The coronary arteries, which supply blood to the heart muscle, may develop atherosclerosis, characterized by the buildup of plaque within their walls. This can lead to narrowing or blockages that reduce blood flow and increase the risk of heart disease.

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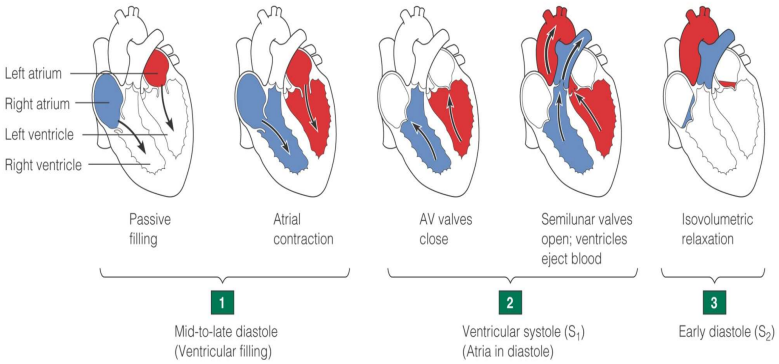
THE CARDIAC CYCLE



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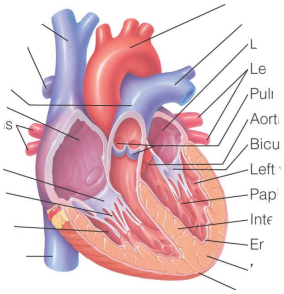
Internal anatomy of the heart

Calcification and stiffening

The heart valves, including the aortic valve and mitral valve, may develop calcification and become stiffer with age. This can affect their proper functioning and lead to conditions such as aortic stenosis or mitral valve regurgitation.



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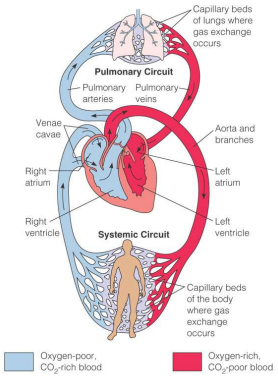
Pulmonary and Systemic Circulation.



The pulmonic circulation carries deoxygenated blood from the heart to the lungs for oxygenation, while the systemic circulation delivers oxygenated blood from the heart to the body's organs and tissues. These two circulatory pathways work in tandem to ensure the exchange of gases, nutrients, and waste products throughout the body, supporting the functioning of various organs and systems.

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Pulmonic Circulation

➢**The pulmonic circulation carries deoxygenated blood from the heart to the lungs and oxygenated blood back to the heart. It involves the following steps:**

- Deoxygenated blood from the body returns to the heart and enters the right atrium through the superior and inferior vena cava.
- The right atrium contracts, pushing the blood into the right ventricle.
- The right ventricle contracts, pumping the deoxygenated blood into the pulmonary artery.
- The pulmonary artery divides into two branches, one for each lung, and transports the deoxygenated blood to the lungs.
- In the lungs, the blood undergoes gas exchange, where carbon dioxide is removed, and oxygen is absorbed.

Systemic Circulation

Oxygenated blood from the left atrium enters the left ventricle.

The left ventricle contracts, pumping the oxygenated blood into the aorta, the largest artery in the body.

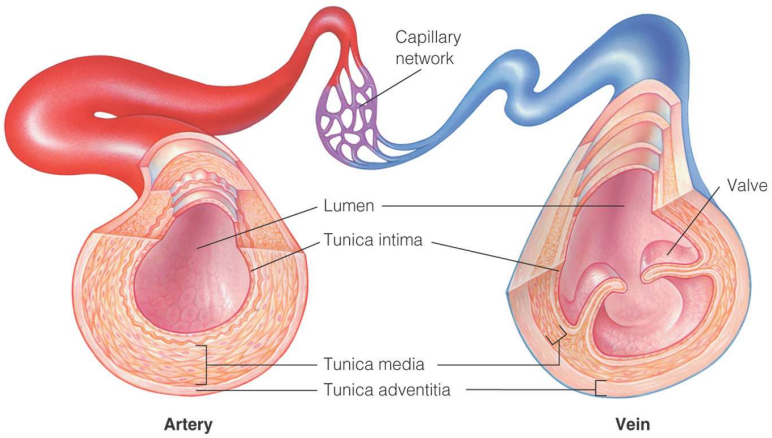
The aorta branches into smaller arteries, which distribute the oxygenated blood to all organs, tissues, and cells throughout the body.

In the systemic capillaries, oxygen and nutrients are delivered to the tissues, while waste products, such as carbon dioxide, are collected.

Deoxygenated blood and waste products are collected by small veins, which merge into larger veins.

The superior and inferior vena cava return the deoxygenated blood back to the right atrium of the heart, starting the pulmonic circulation again

Structure of Arteries, Veins, and Capillaries



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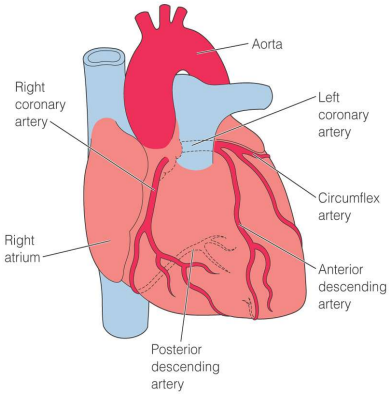
The Coronary Arteries

As individuals age, the coronary arteries, which supply oxygenated blood to the heart muscle, undergo certain changes that can increase the risk of heart disease. Here is a description of the coronary arteries in older patients and a discussion of the causes behind the increased risk of heart disease:



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Coronary Artery Changes in Older Patients

- **Atherosclerosis**

  Atherosclerosis is a common age-related change in the coronary arteries. It involves the gradual buildup of fatty deposits called plaques on the inner walls of the arteries, leading to their narrowing and hardening. Over time, these plaques can restrict blood flow to the heart muscle, resulting in ischemia (insufficient blood supply) and potentially leading to angina or heart attack.

- **Calcification**

  The coronary arteries may also undergo calcification, which refers to the accumulation of calcium deposits within the arterial walls. This calcification can contribute to the stiffening and narrowing of the arteries, further reducing blood flow to the heart.

- **Collateral Circulation**

  As a compensatory mechanism, the body may develop collateral circulation in response to coronary artery disease. Collateral vessels are small blood vessels that form new connections to bypass blocked or narrowed segments of the coronary arteries. However, the development of collateral circulation may be less efficient in older patients, limiting their ability to compensate for reduced blood flow.

Cardiac Conduction System

The cardiac conduction system refers to a specialized network of cells within the heart that generates and coordinates electrical impulses, ensuring the rhythmic contraction and relaxation of the heart muscle. It consists of several components that work together to facilitate the proper sequence of electrical signals throughout the heart. Here is a brief overview of the cardiac conduction system:

1. **Sinoatrial (SA) Node**

   Located in the upper right atrium, the SA node serves as the natural pacemaker of the heart. It initiates the electrical impulses that regulate the heart rate. The impulses generated by the SA node spread through the atria, causing them to contract and push blood into the ventricles.

2. **Atrioventricular (AV) Node**

   Situated in the lower right atrium, near the atrial septum, the AV node acts as a gateway that slows down the electrical signals from the atria before they pass into the ventricles. This delay allows for optimal filling of the ventricles before their contraction.

3. **Bundle of His**

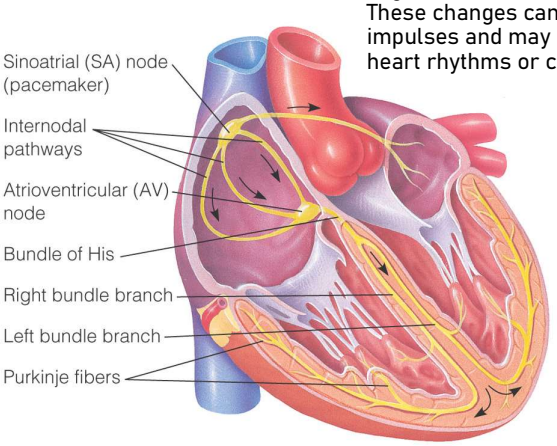
   After passing through the AV node, the electrical impulses travel through a bundle of specialized fibers called the Bundle of His. It divides into two branches: the left bundle branch and the right bundle branch.

4. **Purkinje Fibers**

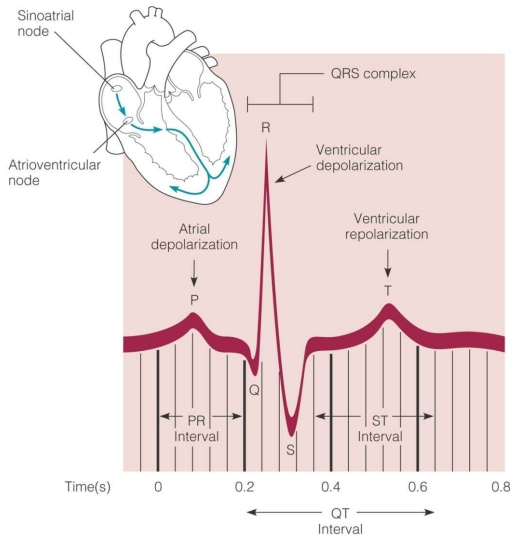
   The bundle branches further divide into smaller fibers known as Purkinje fibers, which spread throughout the ventricles. These fibers rapidly transmit the electrical signals, causing simultaneous contraction of the ventricles from the bottom up.

The Cardiac Conduction System

Age-related changes in the conduction system can occur, such as fibrosis and degeneration of the conducting tissues. These changes can affect the electrical impulses and may lead to abnormal heart rhythms or conduction disorders.



ELECTROCARDIOGRAM WAVE



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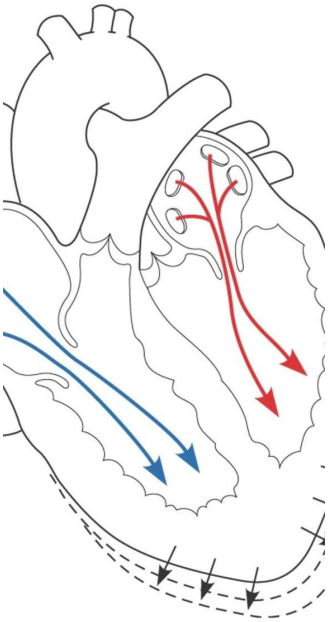
A. Preload is related to the amount of blood and stretching of the ventricular myocardial fibers.
B. Afterload is the pressure that the ventricles must overcome in order to open the aortic and pulmonic valvular cusps.

- By assessing preload and afterload during the cardiac examination of older patients, healthcare professionals can gain valuable information about the heart's filling capacity, contractility, and overall hemodynamic status. These parameters aid in diagnosing and managing conditions such as fluid overload, heart failure, hypertension, or aortic stenosis



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Preload and Afterload

Preload

Preload refers to the volume of blood returning to the heart and filling the ventricles during diastole. In older patients, assessing preload helps determine the adequacy of blood volume and venous return to the heart. Changes in preload can affect cardiac output and indicate conditions such as fluid overload, heart failure, or hypovolemia. Evaluating preload through techniques like jugular venous pressure (JVP) assessment and peripheral edema examination assists in diagnosing and managing these conditions.

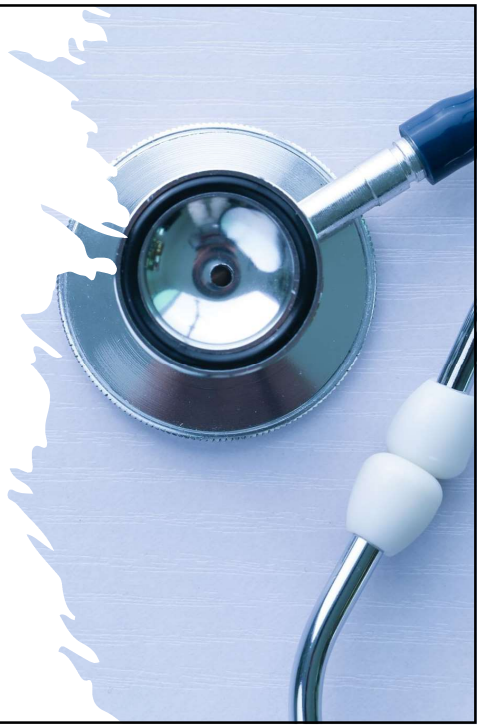
Afterload

Afterload refers to the resistance the heart must overcome to eject blood during systole. It primarily depends on vascular tone and arterial pressure. In older patients, assessing afterload helps evaluate the workload on the heart and the efficiency of ventricular contraction. Increased afterload, seen in conditions like hypertension or aortic stenosis, can lead to left ventricular hypertrophy and reduced cardiac output. Conversely, decreased afterload, as in conditions like severe sepsis or vasodilatory shock, can result in inadequate systemic perfusion. Recognizing the effects of afterload on cardiac function is essential for appropriate management and optimizing cardiovascular health in older patients.

Why perform a cardiac assessment?

- ✓ Early Detection of Cardiovascular Conditions
- ✓ Assessment of Cardiovascular Function.
- ✓ Risk Stratification
- ✓ Evaluation of Treatment Response
- ✓ Comprehensive Health Assessment
- ✓ Patient Education and Empowerment
- ✓ Referral and Collaboration

In summary, cardiac examination in older patients plays a crucial role in the early detection, risk assessment, treatment monitoring, and overall management of cardiovascular conditions. It contributes to improved patient outcomes, enhances quality of life, and supports proactive healthcare interventions tailored to the unique needs of older individuals



Age Related Changes: Structural Changes

Arterial stiffening
Arteries become less elastic and more rigid, leading to increased vascular resistance and higher blood pressure.

Thickening of the arterial walls
The walls of arteries may become thicker, reducing their ability to dilate and accommodate blood flow.

Calcification
Calcium deposits may accumulate in the arterial walls, contributing to further stiffening and reduced vascular compliance.

Increased collagen deposition
The deposition of collagen in the myocardium and blood vessels can lead to fibrosis, compromising the function of the heart and vessels.

Functional Changes

- Reduced cardiac output: The heart's ability to pump blood decreases due to age-related changes in myocardial contractility and relaxation.
- Impaired diastolic function: The heart has a reduced ability to relax during diastole, affecting ventricular filling and leading to diastolic dysfunction.
- Decreased maximum heart rate: The maximum heart rate achievable during physical activity decreases, reducing the heart's ability to respond to increased demands.
- Altered baroreceptor sensitivity: Baroreceptors, which help regulate blood pressure, may become less responsive, leading to decreased ability to maintain blood pressure stability.

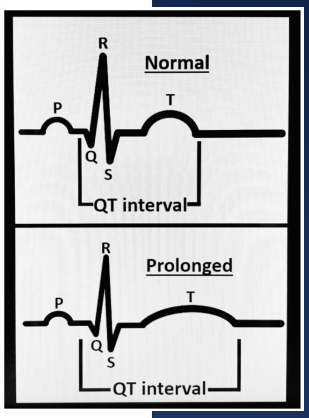
Electrical Changes and Prolonged QT Interval

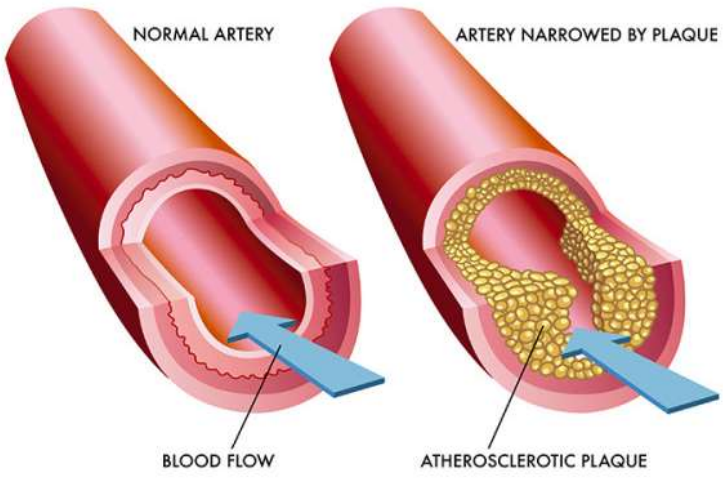
- Increased risk of arrhythmias

Age-related changes in the electrical conduction system of the heart can increase the susceptibility to arrhythmias, such as atrial fibrillation.

- Prolonged QT interval

The duration of the QT interval, which represents the ventricular repolarization phase, may lengthen with age, increasing the risk of arrhythmias.





Atherosclerosis

Progressive build-up of fatty plaques in the arterial walls can occur over time, leading to atherosclerosis. This can result in narrowed and hardened arteries, reducing blood flow to vital organs, including the heart itself.

Reduced Cardiac Reserve

Older individuals may have reduced cardiac reserve, meaning their hearts have limited ability to increase cardiac output during times of increased demand, such as exercise or stress.

It is important to note that these age-related changes are not universal and can be influenced by factors such as genetics, lifestyle, and the presence of comorbidities. Regular monitoring, early detection of cardiovascular conditions, and appropriate management are crucial in optimizing cardiovascular health in older individuals.

Risk Factors for Heart Disease

Accumulated exposure to risk factors

Older individuals may have been exposed to cardiovascular risk factors, such as high blood pressure, high cholesterol levels, smoking, sedentary lifestyle, and poor dietary habits, for a longer duration. This cumulative exposure increases the likelihood of developing heart disease.

Age-related changes in metabolism

Aging is associated with changes in lipid metabolism, glucose regulation, and inflammation, which can contribute to the development and progression of atherosclerosis and other cardiovascular conditions.

Presence of comorbidities

Older patients often have multiple comorbidities, such as diabetes, hypertension, obesity, and chronic kidney disease. These conditions can independently increase the risk of heart disease and exacerbate the effects of age-related changes in the coronary arteries.

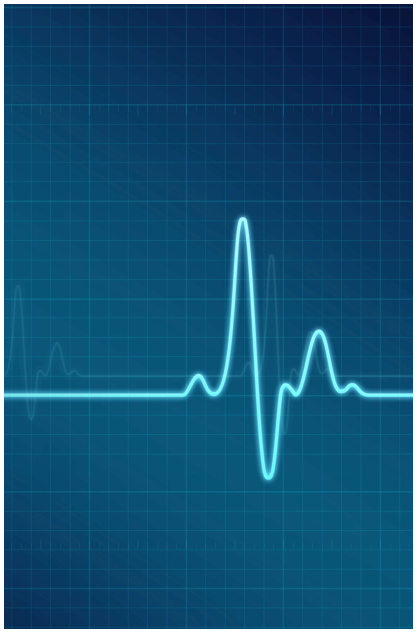
Reduced regenerative capacity

With age, the regenerative capacity of the cardiovascular system decreases, impairing the body's ability to repair damaged arterial walls and restore normal function.

Genetic and epigenetic factors

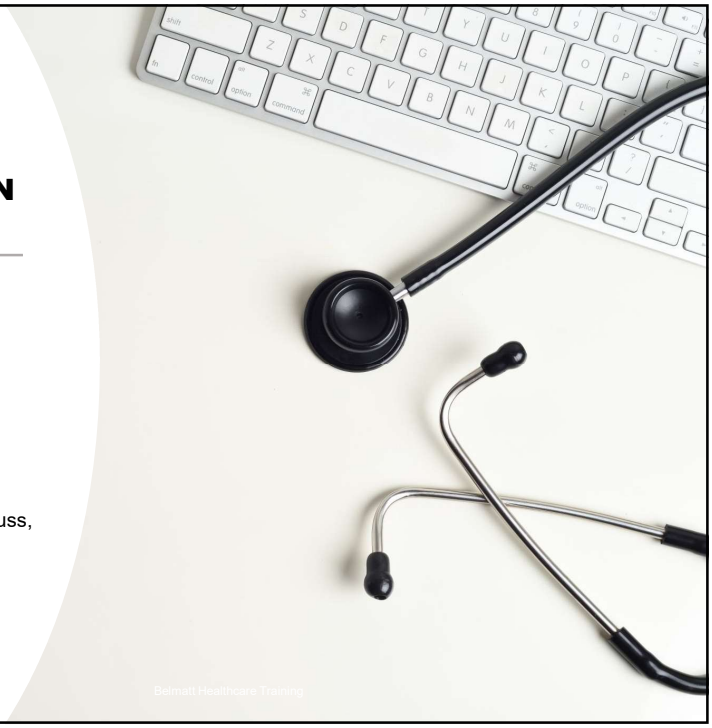
Certain genetic and epigenetic factors may predispose individuals to an increased risk of heart disease as they age.

Examination of the Heart



EXAMINATION

- Position of the patient
- General look
- Start with the hands
- JACCOL
- Inspect, Palpate, Percuss, Auscultate,



Approaching a Cardiac Exam in an Older Patient

Gentle Approach

Older patients may have fragile or sensitive skin, so it is important to approach palpation with gentle and light pressure to avoid discomfort or injury.

Skin Changes

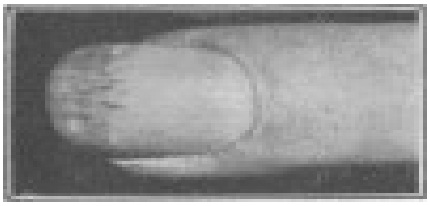
The skin of older patients may exhibit changes such as increased dryness, thinning, or reduced elasticity. These changes can affect the quality of palpation and the perception of underlying structures. Additionally, older patients may have increased skin laxity or excess tissue, which can make it more challenging to identify specific landmarks.

Bony Structure

Age-related changes, such as osteoarthritis or osteoporosis, can affect the skeletal structures, making them more prominent or altering their position. Palpation should take into account these changes to accurately assess the location and quality of cardiac structures.

STARTING WITH A HANDSHAKE

- Splinter haemorrhages
- Clubbing
- Tar Staining
- Radial Pulse



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PALPATING RADIAL PULSE

- Name conditions that affect:
- 1. Rate
- 2.Rhythm
- What is a pulse deficit?
- Why compare left and right?
- Check for collapsing pulse
- Peripheral Pulses: Palpation of peripheral pulses, such as the radial, brachial, or carotid pulses, is important in assessing the quality and regularity of the arterial pulse. Changes in pulse volume or character may indicate underlying cardiovascular conditions.

Jaccol

- **Jaundice**
- **Anaemia**
- **Cyanosis**
- **Clubbing**
- **Oedema**
- **Lymphadenopathy**

Remember malar flush, xanthelasma and corneal arcus

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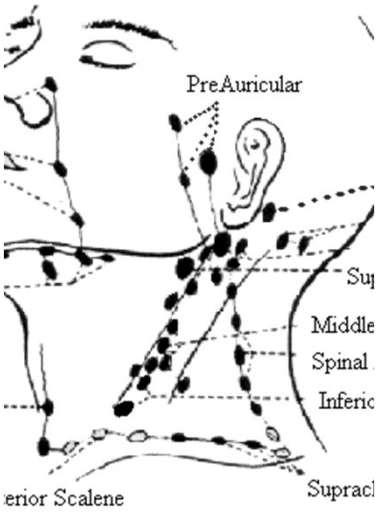
LYMPHADENOPATHY

- Pre auricular
- Post auricular
- Submental
- Cervical chain
- Supraclavicular



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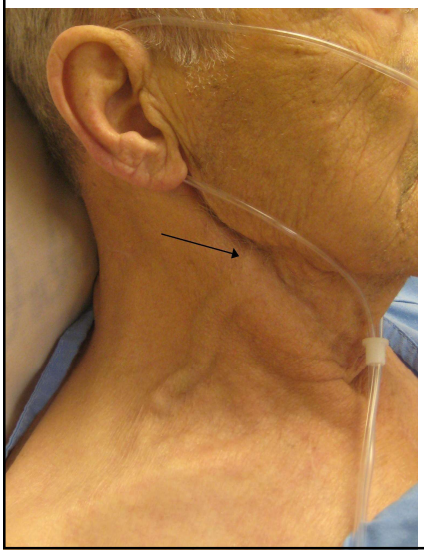
JACCOL

- Jaundice: Jaundice refers to the yellow discoloration of the skin and eyes due to increased levels of bilirubin in the bloodstream. It can indicate liver dysfunction, bile duct obstruction, or certain blood disorders. Jaundice can be a sign of underlying liver diseases, such as hepatitis, cirrhosis, or liver cancer, and may require further investigation.
- Anaemia: Anaemia is characterized by a decrease in the number of red blood cells or haemoglobin levels in the blood. It can be caused by various factors, including nutritional deficiencies, chronic diseases, bone marrow disorders, or bleeding. Anaemia can lead to symptoms such as fatigue, weakness, and shortness of breath, and it is important to identify and address the underlying cause.
- Clubbing: Clubbing refers to the abnormal enlargement and rounding of the fingertips and nails. It is associated with chronic hypoxia and is often observed in conditions such as lung diseases (e.g., chronic obstructive pulmonary disease, interstitial lung disease), congenital heart diseases, or certain gastrointestinal disorders. Clubbing may be an indication of underlying systemic conditions that require further evaluation and management.
- Cyanosis: Cyanosis is the bluish discoloration of the skin, lips, and mucous membranes due to inadequate oxygenation of the blood. It can be a sign of respiratory or cardiovascular problems that lead to reduced oxygen levels in the bloodstream. Cyanosis may be seen in conditions such as chronic lung diseases, heart failure, or congenital heart defects.
- Oedema: Oedema refers to the abnormal accumulation of fluid in the tissues, resulting in swelling. It can be localized or generalized and is often seen in conditions such as heart failure, kidney disease, liver disease, or venous insufficiency. Evaluation of oedema helps identify the underlying cause and guide appropriate management.
- Lymphadenopathy: Lymphadenopathy refers to the enlargement of lymph nodes, which are part of the body's immune system. It can occur in response to infections, inflammation, or malignancies. Assessing lymph nodes for size, tenderness, and consistency can provide valuable information about the presence of underlying infections or lymphatic disorders

Jugular Venous Pressure



- Assessment of Fluid Status
- Diagnosis of Heart Failure
- Identification of Right-Sided Heart Dysfunction
- Differentiation of Causes of Dyspnoea
- Monitoring Response to Treatment
- Prognostic Value

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Examining JVP

- Pt. must be at 30 - 45°. Pt's head tilted upwards and facing away
- Use the internal jugular, not external jugular. External jugular is lateral to SCM and easier to see. Internal jugular is medial/behind the clavicular head of SCM.
- Shine a torch [light] on internal jugular vein at an oblique angle.
- Extend torch out horizontally from highest point of JVP pulsations, use ruler to measure vertical height from sternal notch to torch.
- Height >3cm above sternal angle is pathologic (raised ventricular filling pressure or volume overload often from RHF). Key is **3**cm and **JVP** has **3** letters.
- In normal person, can't see the JVP when pt is at 45°, but can see when pt is flat.
- Optionally: auscultate heart or feel carotid pulse to help identify JVP by its complex waveform

JVP KUSSMAUL SIGN

Place Pt. sitting up at 90°.

JVP becomes more distended during inspiration (classically constrictive pericarditis, currently severe RHF). This is opposite of what happens in normal pt.

Usually negative in cardiac tamponade

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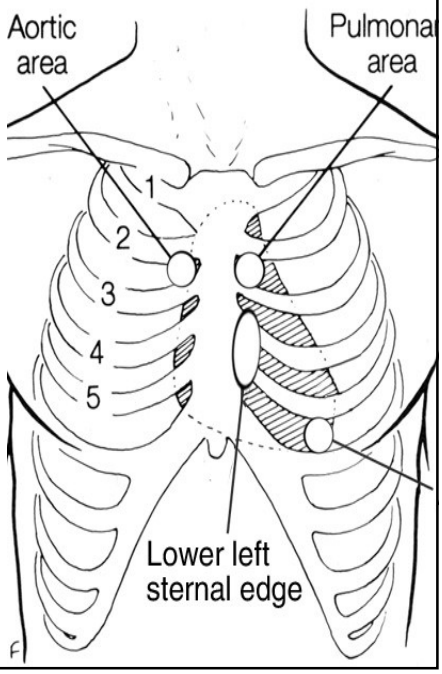
Causes of elevated JVP

- Too much fluid:
- Fluid overload [esp. IV infusion]
- It's clogging up before gets to heart:
- SVC obstruction
- Can't beat it out of the heart fast enough:
- RVF
- Bradycardia
- Constrictive pericarditis
- Pericardial effusion
- Tricuspid stenosis or regurgitation
- Other:
- Hyperdynamic circulation

Palpation of the Praecordium

- 1 Harvey Learner Manual 2 Talley & O'Connor, Clinical Examination 3 Macleod's Clinical Examination

- 4 Mosby's Guide to Physical Examination



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Palpation

Gentle Approach: Older patients may have fragile or sensitive skin, so it is important to approach palpation with gentle and light pressure to avoid discomfort or injury.

Skin Changes: The skin of older patients may exhibit changes such as increased dryness, thinning, or reduced elasticity. These changes can affect the quality of palpation and the perception of underlying structures. Additionally, older patients may have increased skin laxity or excess tissue, which can make it more challenging to identify specific landmarks.

Bony Structures: Age-related changes, such as osteoarthritis or osteoporosis, can affect the skeletal structures, making them more prominent or altering their position. Palpation should take into account these changes to accurately assess the location and quality of cardiac structures.

Increased Chest Wall Rigidity: The chest wall in older patients may become more rigid due to changes in the musculoskeletal system or degenerative joint diseases. This rigidity can affect the detection of cardiac movements or vibrations during palpation.

Palpation in older patients

1. **Assessing Thrills and Heaves**: Palpation is useful for detecting abnormal cardiac sensations such as thrills (vibratory sensations) or heaves (lifts or impulses). These can indicate underlying cardiac conditions, such as valvular abnormalities or ventricular hypertrophy. Careful and systematic palpation should be performed to identify any abnormal pulsations or vibrations.
2. **Peripheral Pulses**: Palpation of peripheral pulses, such as the radial, brachial, or carotid pulses, is important in assessing the quality and regularity of the arterial pulse. Changes in pulse volume or character may indicate underlying cardiovascular conditions.
3. **Assessing Oedema**: Palpation can also be used to assess for the presence of peripheral edema, which may indicate heart failure or other cardiovascular conditions. Careful examination of the ankles, lower legs, and other dependent areas can provide important diagnostic information.

Examination of the Carotid Pulse

1. **Assessment of Peripheral Circulation:** The carotid pulse provides information about the peripheral circulation and can give an indication of the overall blood flow to the brain. Changes in the character or strength of the carotid pulse may suggest alterations in systemic vascular resistance, blood volume, or cardiac output.
2. **Evaluation of Pulse Quality**: The carotid pulse can be assessed for its quality, including its amplitude, contour, and regularity. A strong and regular carotid pulse is generally indicative of normal cardiac function and adequate blood flow. Conversely, a weak or irregular carotid pulse may suggest underlying cardiovascular abnormalities or reduced cardiac output.
3. **Detection of Arrhythmias**: Look for irregularities in rhythm, such as skipped beats, extra beats, or arrhythmias. The presence of an irregular carotid pulse may prompt further investigation and evaluation for cardiac arrhythmias.
4. **Assessment of Heart Rate**: By counting the beats of the carotid pulse per minute, the heart rate can be determined. This information is valuable in assessing the patient's cardiovascular status, identifying tachycardia or bradycardia, and monitoring changes in heart rate over time.
5. **Evaluation of Carotid Artery Stenosis**: In older patients, atherosclerosis and carotid artery stenosis are common vascular conditions. Examination of the carotid pulse can help identify signs of significant narrowing or occlusion of the carotid arteries, such as diminished or absent pulse, which may be associated with an increased risk of stroke or transient ischemic attacks (TIAs).

Examination of the Praecordium

Inspection:

- Scars (previous surgery)
- Pacemakers
- Chest wall deformities
- Apex beat
- Movements

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Examination of the Praecordium

Palpation:

- Apex beat – position and character
- Movements (or heaves)
- Thrills (palpable murmurs)

Palpate all areas while the patient is lying inclined to 45°

Palpate for the apex beat and thrills in the left lateral position

Palpate the base of the heart for heaves and thrills while patient is sitting forward

Heaves and Thrills

Heaves

are abnormal pulsations or lifts felt on the chest wall during palpation. They typically indicate increased workload or hypertrophy of the heart chambers. In older individuals, common causes of heaves include left ventricular hypertrophy (LVH) due to conditions such as hypertension, aortic stenosis, or aortic regurgitation. Heaves may also be associated with right ventricular hypertrophy in cases of pulmonary hypertension or chronic lung diseases. Identifying the location, intensity, and extent of heaves can help determine the underlying cardiac condition and guide further diagnostic evaluation.

Thrills

are abnormal vibratory sensations felt on the chest wall over the major blood vessels or heart valves. They are often described as a palpable murmur. Thrills occur due to turbulent blood flow caused by valvular stenosis or regurgitation, septal defects, or abnormal blood flow patterns. In older patients, common causes of thrills include aortic stenosis, mitral regurgitation, or ventricular septal defects. Thrills are typically felt with the palm or fingertips over specific areas, such as the precordium or carotid arteries. Their presence helps identify the location and severity of the underlying cardiac abnormality.

Apex beat

- The apex beat is the point of maximum impulse and is normally in the fifth intercostal space, midclavicular line
- It may be impalpable if the chest wall is too thick, or the patient has emphysema or a pericardial effusion
- The apex beat may be displaced laterally or inferiorly with enlargement of the heart, displacement of the heart or chest wall deformity
- The character of the apex beat is altered with some abnormalities of the heart eg. forceful and/or sustained (LV hypertrophy) or dyskinetic (LV dysfunction)
- Assessing the apex beat provides valuable information about the cardiac structure, function, and overall cardiovascular health. It is an integral part of the cardiac exam and aids in the detection of abnormalities, monitoring treatment progress, and guiding further evaluation and management decisions

Abnormalities in Apex Beat

Displacement: The apex beat may be displaced laterally or inferiorly from its normal location in the fifth intercostal space, mid-clavicular line. Displacement can occur due to cardiac enlargement, such as left ventricular hypertrophy, dilated cardiomyopathy, or pericardial effusion.

Diffuse or Weak Apex Beat: A diffuse or weak apex beat may indicate impaired ventricular function or reduced cardiac contractility. This can be observed in conditions like heart failure, myocardial infarction, or cardiomyopathies.

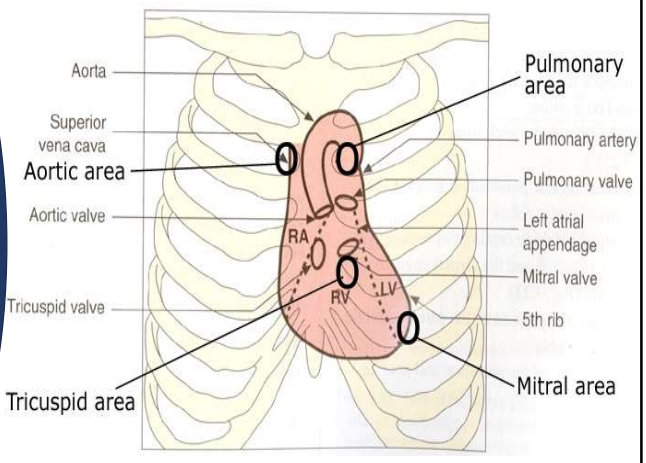
Hyperdynamic Apex Beat: An abnormally forceful and prominent apex beat, known as a hyperdynamic apex beat, can occur in conditions associated with increased cardiac output, such as hyperthyroidism, anemia, or systemic hypertension.

Parasternal Heave: A parasternal heave or lift may be palpable during the cardiac exam, indicating increased workload or hypertrophy of the ventricles. It can be associated with conditions like left ventricular hypertrophy, aortic stenosis, or pulmonary hypertension.

Sustained or Prolonged Systolic Impulse: A sustained or prolonged systolic impulse at the apex may be felt, suggesting conditions like hypertrophic cardiomyopathy or aortic stenosis.

Thrills: Abnormal vibrations or thrills may be felt over the apex beat, indicating turbulent blood flow due to valvular abnormalities or structural defects

Auscultation of the heart



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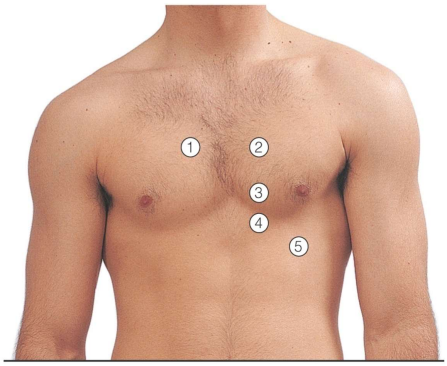
5 KEY LANDMARKS FOR AUSCULTATION



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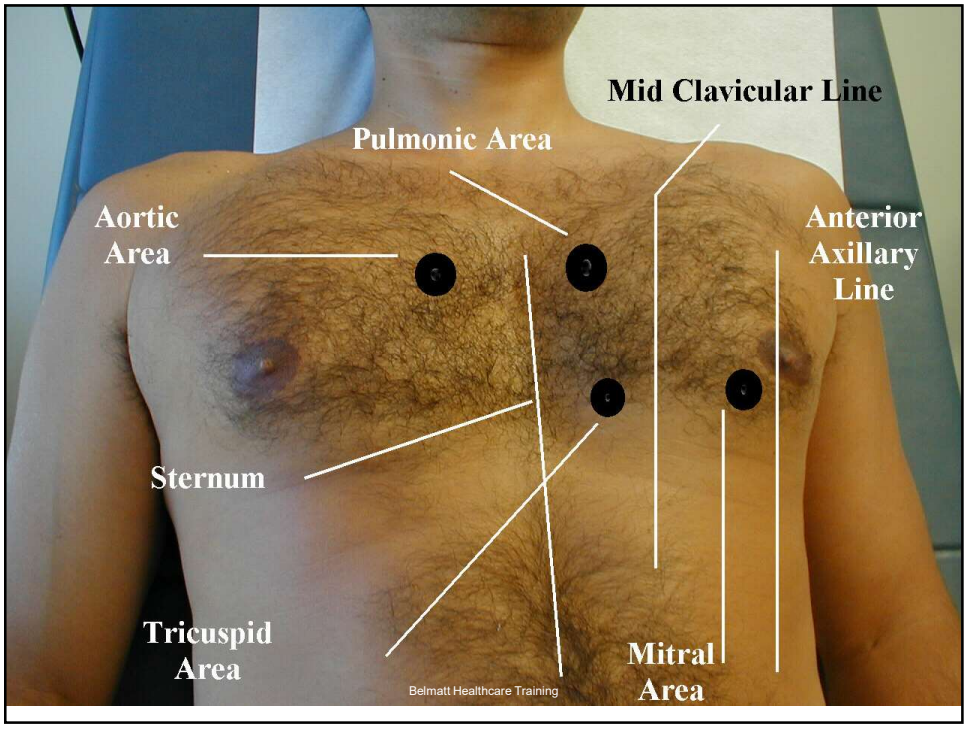

Auscultation of the Heart

- Listen to the heart sounds at the mitral area with the bell and diaphragm
- Listen to the heart sounds at the tricuspid, pulmonary and aortic areas with the diaphragm

S1 (First Heart Sound): S1 is the first sound heard during the cardiac cycle and is often described as "lub." It is produced by the closure of the mitral and tricuspid valves (the atrioventricular valves) at the beginning of systole, when the ventricles contract to pump blood out of the heart. S1 coincides with the upstroke of the carotid artery pulse and is typically heard as a single sound, although it may have components that can be appreciated separately in certain cases.

S2 (Second Heart Sound): S2 is the second sound heard during the cardiac cycle and is often described as "dub." It is produced by the closure of the aortic and pulmonic valves (the semilunar valves) at the beginning of diastole, when the ventricles relax and fill with blood. S2 is heard immediately after S1 and represents the closure of the semilunar valves. Similar to S1, S2 can also have components that can be appreciated separately in certain circumstances

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Abnormal Heart Sounds

In addition to S1 and S2, there are additional heart sounds that may be heard in certain clinical situations:

S3 (Third Heart Sound): S3 is an additional heart sound that can be heard early in diastole. It is associated with rapid ventricular filling and is often referred to as a ventricular gallop. S3 is commonly heard in conditions such as heart failure, dilated cardiomyopathy, or volume overload.

S4 (Fourth Heart Sound): S4 is another additional heart sound that can be heard late in diastole. It is associated with atrial contraction against a stiff ventricle and is often referred to as an atrial gallop. S4 is commonly heard in conditions such as hypertensive heart disease, coronary artery disease, or ventricular hypertrophy.

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Heart Murmurs

Due to turbulent blood flow, heart murmurs arise when:

- A valve is thickened and fails to open properly (stenosis)
- A valve fails to shut properly and leaks (incompetence or regurgitation)
- There is an abnormal communication between the heart chambers due to a congenital abnormality (eg atrial septal defect) or acquired abnormality (e.g. post infarct ventricular septal defect)
- An abnormally large amount of blood flowing past a normal valve such as in pregnancy.
- Some people (commonly children and young adults) have a systolic flow murmur, typically heard in the pulmonary area, but no structural abnormality. This is called an "innocent murmur" and is possibly caused by vigorous ventricular contraction. [2]

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Characteristics of murmurs

TIMING OF THE MURMUR IN THE CARDIAC CYCLE – SYSTOLIC, DIASTOLIC OR CONTINUOUS.

LOUDNESS – REFLECTS THE DEGREE OF TURBULENCE

PITCH OR FREQUENCY – LOW OR HIGH

LOCATION ON CHEST WALL – DEPENDS ON SITE OF ORIGIN OF THE MURMUR (THAT IS THE SITE OF THE ABNORMAL VALVE ETC)

RADIATION OF THE MURMUR - DEPENDS ON THE DIRECTION OF THE BLOOD FLOW THROUGH THE TURBULENT VALVE.

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Manoeuvres for detecting murmurs

- Move the patient to the left lateral position and listen at the mitral area (or apex) with the bell and diaphragm
- Sit the patient forward, ask the patient to hold their breath after expiration, and listen at the left sternal edge and aortic areas with the diaphragm
- (If the patient has a murmur, listen in other areas to find the site of maximum loudness and radiation)

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Systolic Murmurs

Aortic Stenosis: This is a common cause of systolic murmur in older patients. It occurs due to the narrowing of the aortic valve, leading to turbulent blood flow during ventricular ejection.

Mitral Regurgitation: This occurs when the mitral valve fails to close properly, allowing blood to leak back into the left atrium during ventricular contraction. Mitral regurgitation can be caused by mitral valve prolapse, age-related degeneration of the valve, or other structural abnormalities.

Tricuspid Regurgitation: Similar to mitral regurgitation, tricuspid regurgitation involves the backflow of blood from the right ventricle to the right atrium. It can occur due to valve abnormalities or right ventricular dysfunction.

Diastolic Murmurs

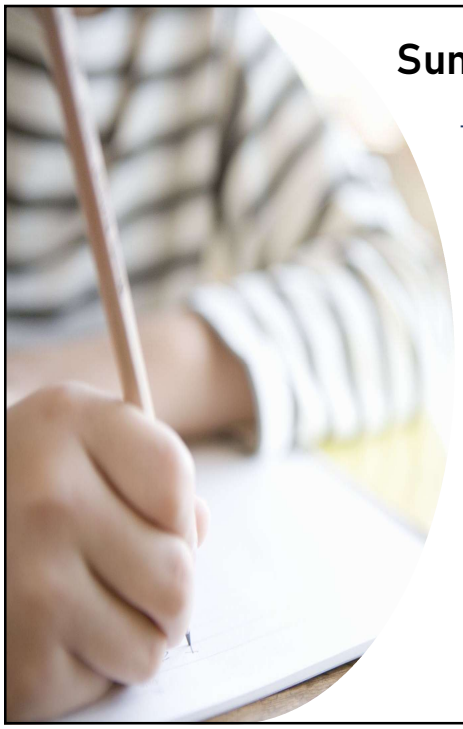
Aortic Regurgitation: This occurs when the aortic valve fails to close properly, causing blood to flow back into the left ventricle during diastole. Aortic regurgitation can result from age-related valve degeneration, infective endocarditis, or aortic root dilation.

Mitral Stenosis: Mitral stenosis involves the narrowing of the mitral valve, impeding blood flow from the left atrium to the left ventricle during diastole. It is commonly caused by rheumatic heart disease, which may have occurred earlier in life.

Other Murmurs

Innocent Murmurs: Innocent murmurs are functional or harmless murmurs that may be more prevalent in older patients due to age-related changes in the heart and blood vessels. These murmurs are typically soft and transient, without any underlying structural abnormalities.

Vascular Murmurs: Older patients may also have murmurs associated with blood vessel abnormalities, such as carotid artery bruits, indicating narrowing or stenosis of the carotid arteries.



Summary of Cardiac Exam

Additional Diagnostic Tests: Depending on the clinical presentation, further diagnostic tests such as electrocardiogram (ECG), echocardiogram, stress test, or cardiac biomarker measurements may be necessary.

Documentation: Accurately document the findings of the cardiac exam, including any abnormalities or significant findings.

- Remember, a cardiac exam should be conducted in a systematic and thorough manner, considering the patient's clinical history, symptoms, and risk factors. It is essential to integrate the findings from each component of the exam to form a comprehensive assessment of the patient's cardiovascular health and guide further management and treatment decisions.

Thank You

Any Questions

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