

A blue stethoscope is the central focus, resting on a white surface. The background is a blurred hospital hallway with white doors and walls. A blue semi-transparent banner is overlaid on the bottom right, containing the title text.

CARDIOVASCULAR 2

LUCENT NCLEX REVIEWS

HEART FAILURE



- **Heart failure** occurs when the heart can't pump enough blood to meet the body's metabolic needs
- Heart failure can occur as ***left-sided failure or right-sided failure.***
- Left-sided heart failure causes mostly pulmonary symptoms, such as shortness of breath, dyspnea on exertion, and a moist cough.
- Right-sided heart failure causes systemic symptoms, such as peripheral edema and swelling, jugular vein distention, and hepatomegaly.



CAUSES

- Cardiac conduction defects (in left-sided failure)
- Chronic obstructive pulmonary disease (in right-sided failure)
- Fluid overload
- Hypertension (in left-sided failure)
- MI
- Pulmonary hypertension (in right-sided failure)
- Valvular insufficiency
- Valvular stenosis



LEFT SIDED FAILURE

- Paroxysmal Nocturnal Dyspnea
- Elevated Pulmonary Capillary Wedge Pressure
- Pulmonary Congestion
 - Cough
 - Crackles
 - Wheezes
 - Blood-Tinged Sputum
 - Tachypnea
- Restlessness
- Confusion
- Orthopnea
- Tachycardia
- Exertional Dyspnea
- Fatigue
- Cyanosis



©2007 Nursing Education Consultants, Inc.

RIGHT SIDED FAILURE

(Cor Pulmonale)

- Fatigue
- ↑ Peripheral Venous Pressure
- Ascites
- Enlarged Liver & Spleen
- May be secondary to chronic pulmonary problems
- Distended Jugular Veins
- Anorexia & Complaints of GI Distress
- Weight Gain
- Dependent Edema



©2007 Nursing Education Consultants, Inc.

DIAGNOSTIC TEST RESULTS

Left-sided failure

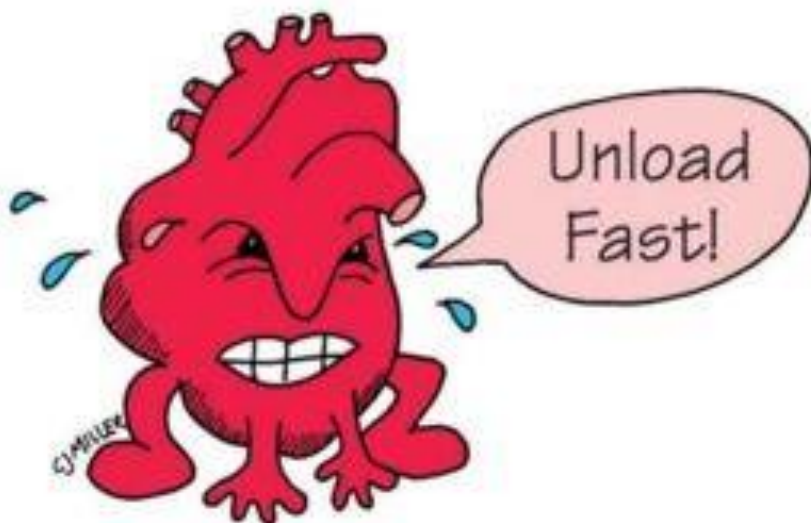
- B-type natriuretic peptide (BNP) levels are elevated.
- ABG levels indicate hypoxemia and hypercapnia.
- Blood chemistry tests reveal decreased potassium and sodium levels and increased BUN and creatinine levels.
- Chest X-ray shows increased pulmonary congestion and left ventricular hypertrophy.
- Left-sided heart failure causes pulmonary symptoms.

Right-sided failure

- BNP levels are elevated.
- Blood chemistry tests show decreased sodium and potassium levels and increased BUN and creatinine levels.
- Chest X-ray reveals pulmonary congestion, cardiomegaly, and pleural effusions.
- ABG levels indicate hypoxemia and hypercapnia.
- ECG shows left and right ventricular hypertrophy.
- Right-sided heart failure causes systemic symptoms.



TREATING CONGESTIVE HEART FAILURE



- **U**pright Position
 - **N**itrates
 - **L**asix
 - **O**xygen
 - **A**CE Inhibitors
 - **D**igoxin
-
- **F**luids (Decrease)
 - **A**fterload (Decrease)
 - **S**odium Restriction
 - **T**est (Digoxin Level, ABGs, Potassium Level)

TREATMENT

- Oxygen therapy, possibly requiring intubation and mechanical ventilation
- Establishing a low-sodium diet and limiting fluids
- IABP
- Right-sided heart failure causes systemic symptoms.
- Left ventricular assist device (for left-sided failure) Paracentesis (for right-sided failure)
- Thoracentesis (for right-sided failure)



Drug therapy

- **Human BNP: nesiritide (Natrecor)**
- **Angiotensin-converting enzyme (ACE) inhibitors** (Capoten), enalapril (Vasotec), lisinopril (Zestril), ramipril (Altace)
choice for HF. Suppresses RAA system
- **Angiotensin II Receptor Blocker** used to treat HF
angiotensin II receptor inhibitors (valsartan (Diovan), losartan (Cozaar))
furosemide (Lasix), bumetanide (Bumex)
- **Digoxin** (Lanoxin)
- **Inotropic agents:** dopamine, dobutamine, inamrinone (Amrinone), milrinone

Normal Dig levels
0.5 -2.0 ng/ml

Dig Toxicity

Early Signs: Anorexia, Nausea, Vomit

Late Signs: Vision changes, Arrhythmias

Hypokalemia + Digoxin = Toxicity

Any electrolyte imbalance can cause Dig Toxicity

INTERVENTIONS AND RATIONALES

- Assess cardiovascular status, vital signs, and hemodynamic variables to detect signs of reduced cardiac output.
- Assess respiratory status and oxygenation to detect increasing fluid in the lungs and respiratory failure.
- Keep the client in semi-Fowler's position to increase chest expansion and improve ventilation.
- Administer medications, as prescribed, to enhance cardiac performance and reduce excess fluids.
- *Administer oxygen to enhance arterial oxygenation*



INTERVENTIONS AND RATIONALES

- Measure and record intake and output. Intake greater than output may indicate fluid retention.
- Monitor laboratory studies to detect electrolyte imbalances, renal failure, and impaired cardiac circulation.
- Provide suctioning, if necessary, and assist with turning, coughing, and deep breathing to prevent pulmonary complications.
- Restrict oral fluids because excess fluids can worsen heart failure.



- Weigh the client daily and report a gain of 2-3 LBS.
- Measure and record the client's abdominal girth. An increase in abdominal girth suggests worsening fluid retention and right-sided heart failure.
- Maintain the client's prescribed diet (low sodium) to reduce fluid accumulation.
- Encourage the client to express feelings, such as a fear of dying, to reduce anxiety.
- Limiting sodium intake and supplementing diet with foods high in potassium
- Elevating legs when seated



AUDIENCE RESPONSE QUESTION

An older adult client comes to the clinic with complaints of increased weakness and fatigue. He has a history of heart failure and is currently taking furosemide and digoxin. What would be most important for the nurse to assess on this client?

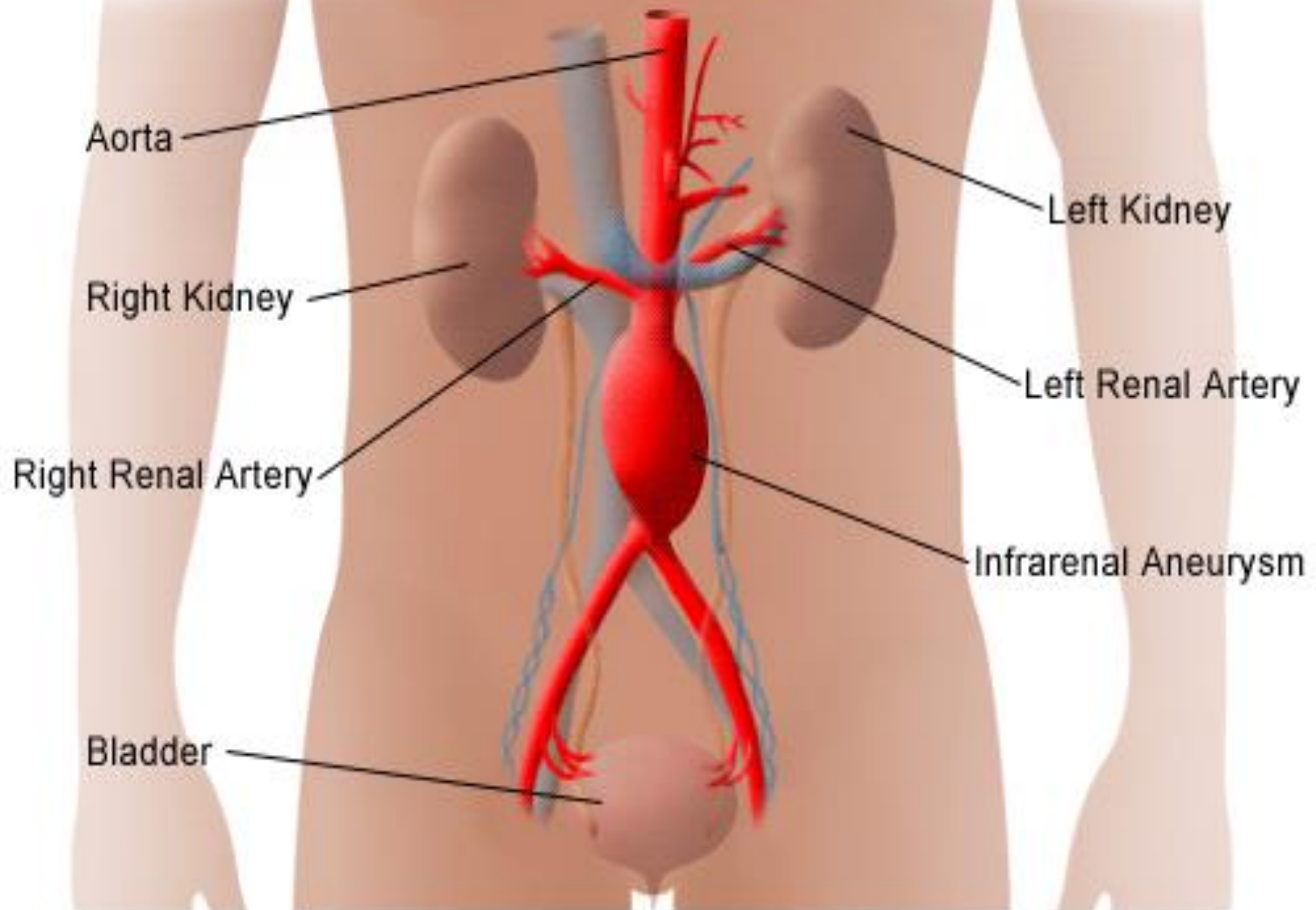
1. Increased central venous pressure and jugular vein distention
2. Any complaints of gastrointestinal problems and current level of serum potassium
3. Recent weight gain or loss and presence of peripheral edema
4. Bilateral breath sounds and recent history of dyspnea



ABDOMINAL AORTIC ANEURYSM



Infrarenal Abdominal Aortic Aneurysm



Abdominal Aortic Aneurysm

- An abdominal aortic aneurysm results from damage to the medial layer of the abdominal portion of the aorta.
- Aneurysm commonly results from atherosclerosis, which over time causes a weakening in the medial layer of the artery.
- Continued weakening from the force of blood flow results in outpouching of the artery and formation of the aneurysm.
- The aneurysm may then cause a rupture, leading to hemorrhage, hypovolemic shock, and possibly death.

CAUSES

- Atherosclerosis
- Congenital defect
- Hypertension
- Infection
- Marfans syndrome *genetic disorder that affects the connective tissues of the body (see next slide)*
- Syphilis
- Trauma



7 Major problems with MARFAN Syndrome

systemic features of Marfan syndrome

MARFANS

- **Mitral prolapse**
- **Aortic dissection**
- **Regurgitant aortic valve**
- **Fingers long (arachnodactyly)**
- **Arm span > height**
- **Nasal voice (high arched palate)**
- **Sternal excavation**



ASSESSMENT FINDINGS

- Abdominal mass to the left of the midline
- Abdominal pulsations
- Bruits over the site of the aneurysm
- Commonly asymptomatic
- Diminished femoral pulses
- Lower abdominal pain
- Lower back pain
- Systolic blood pressure in the legs that's lower than that in the arms



DIAGNOSTIC TEST RESULTS

- Abdominal computed tomography scan shows aneurysm.
- Abdominal ultrasound shows aneurysm.
- Arteriography shows aneurysm.
- Chest X-ray shows aneurysm.
- ECG differentiates aneurysm from MI.



TREATMENT

- Abdominal aortic aneurysm resection
- Bed rest
- ***Drug therapy***
 - **Analgesic:** oxycodone (OxyContin)
 - **Antihypertensives:** prazosin (Minipress), nitroprusside (Nitropress), nitroglycerin
 - **Beta-adrenergic blocker:** propranolol (Inderal), metoprolol (Lopressor)



INTERVENTIONS AND RATIONALES

- Assess cardiovascular status and monitor and record vital signs. *Tachycardia, dyspnea or hypotension may indicate fluid volume deficit caused by rupture of aneurysm.*
- Monitor intake and output and laboratory studies. *Low urine output and high specific gravity indicate hypovolemia.*
- Observe the client for signs of hypovolemic shock from aneurysm rupture, such as *anxiety, restlessness, severe back pain, decreased pulse pressure, increased thready pulse, and pale, cool, moist, clammy skin, to detect early signs of compromise.*



AUDIENCE RESPONSE QUESTION

The nurse is caring for a client immediately after repair of an abdominal aortic aneurysm. What changes in vital signs would cause the nurse the most concern?

1. Decrease in blood pressure and increased pulse
2. Decrease in blood pressure and decreased pulse
3. Increase in blood pressure and increased pulse
4. Increase in blood pressure and decreased pulse



CARDIAC TAMPONADE



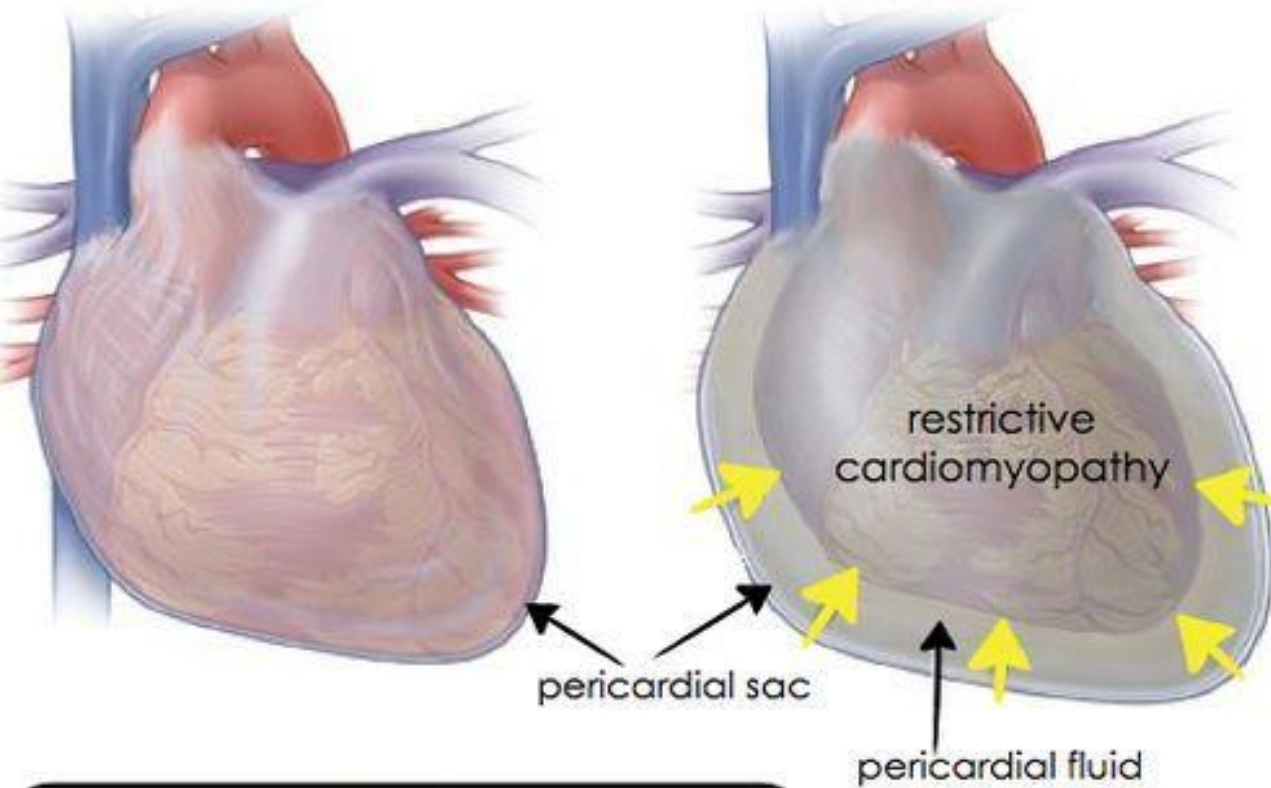
- In cardiac tamponade, a rapid rise in intrapericardial pressure impairs diastolic filling of the heart.
- The rise in pressure usually results from **blood or fluid accumulation in the pericardial sac.**
- If fluid accumulates rapidly, this condition is **commonly fatal and necessitates emergency lifesaving measures**



Pericardial Effusion with Tamponade

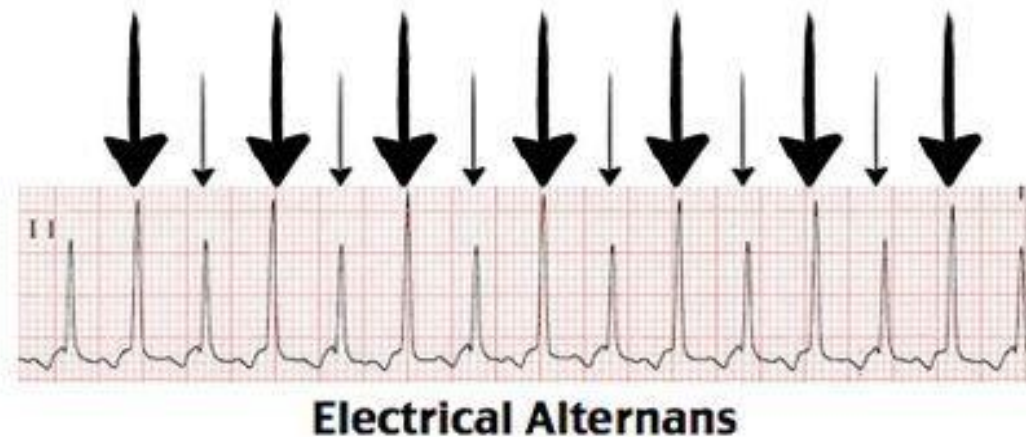
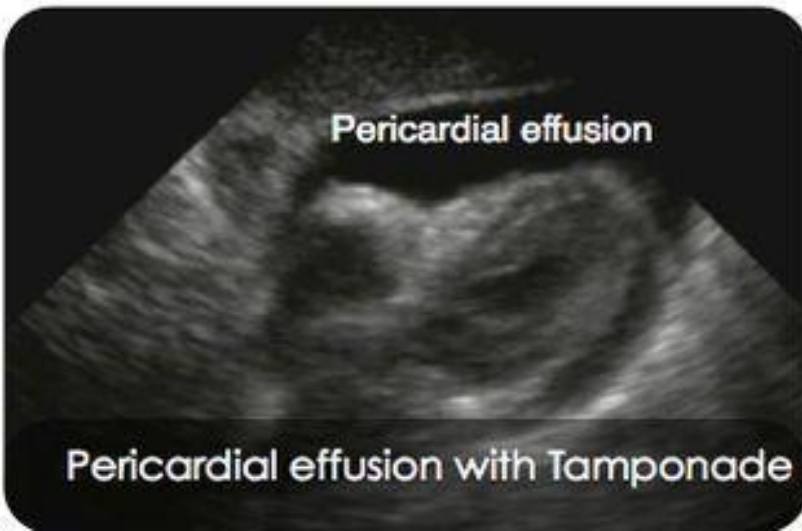
Normal Heart

Cardiac Tamponade



Beck's Triad

- Hypotension
- Jugular venous distention
- Muffled heart sounds



CAUSES

- Effusion (in cancer, bacterial infections, tuberculosis and, rarely, acute rheumatic fever)
- Hemorrhage from nontraumatic causes (such as rupture of the heart or great vessels or anticoagulant therapy in a client with peri-carditis)
- Hemorrhage from trauma (such as gunshot or stab wounds of the chest and perforation by a catheter during cardiac or central venous catheterization or after cardiac surgery)
- MI
- Uremia

ASSESSMENT FINDINGS

- Jugular vein distention ←
- Pallor or cyanosis
- **Pulsus paradoxus** (an abnormal inspiratory drop in systemic blood pressure greater than 15 mm Hg)
- Restlessness
- Tachycardia
- Upright, leaning forward posture
- Anxiety
- Diaphoresis
- Dyspnea
- Muffled Heart sounds on auscultation ←

BECKS
TRIAD



DIAGNOSTIC TEST RESULTS

- Chest X-ray shows slightly **widened mediastinum and cardiomegaly.**
- Echocardiography records pericardial effusion with signs of right ventricular and atrial compression.
- ECG may reveal changes produced by acute pericarditis. This test rarely reveals tamponade but is useful to rule out other cardiac disorders



TREATMENT

- Surgery: pericardiocentesis (needle aspiration of the pericardial cavity), surgical creation of an opening to drain fluid, or thoracotomy

Drug therapy

- **Adrenergic agent:** epinephrine
- **Heparin antagonist:** protamine sulfate in heparin-induced cardiac tamponade
- **Inotropic agent:** dopamine
- **Vitamin K** in warfarin-induced cardiac tamponade



INTERVENTIONS AND RATIONALES

If the client needs pericardiocentesis

- Explain the procedure to the client *to alleviate anxiety*.
- Keep a pericardial aspiration needle attached to a 50-ml syringe by a three- way stopcock, an ECG machine, and an emergency cart with a defibrillator at the bedside.

If the client needs a thoracotomy

- Explain the procedure to the client. Tell him what to expect postoperatively (chest tubes, chest tube drainage system, administration of oxygen)



AUDIENCE RESPONSE QUESTION

A client is being treated with dopamine and dobutamine for septic shock. What is the desired therapeutic effect of these two drugs?

1. Increased myocardial contractility and cardiac output without increased oxygen demand
2. Decreased renal perfusion and peripheral vasodilatation
3. Decreased cardiac output, vasodilatation, and increased blood pressure
4. Increased renal perfusion, increased blood pressure, and decreased myocardial contractility

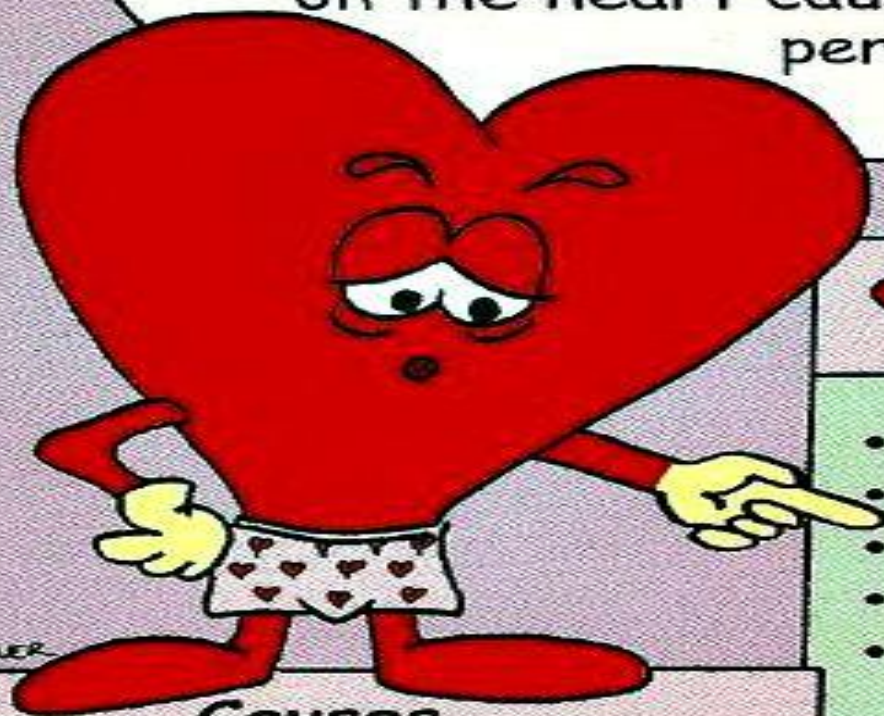
Cardiogenic shock

Cardiogenic shock occurs when the heart fails to pump adequately, thereby reducing cardiac output and compromising tissue perfusion.



CARDIOGENIC SHOCK

Cardiogenic shock is the inability of the heart to maintain cardiac output necessary to meet body needs. Extra strain on the heart causes decreased tissue perfusion.



Causes

- Systolic dysfunction
- Diastolic dysfunction
- Arrhythmias
- Structural problems

Clinical Symptoms

- Tachycardia
- Anxiety and delirium
- Increased preload
- Pulmonary congestion
- Decreased cardiac output
- Dusky skin color
- Decreased blood pressure
- Narrow pulse pressure
- Oliguria
- Dyspnea

CAUSES

- Advanced heart block
- Cardiomyopathy
- Heart failure
- MI
- Myocarditis
- Papillary muscle rupture



ASSESSMENT FINDINGS

- Anxiety, restlessness, disorientation, and confusion
- Cold, clammy skin
- Crackles in lungs
- Hypotension (systolic pressure below 90 mm Hg)
- Jugular vein distention
- Oliguria (urine output of less than 30 ml/ hour)
- Third (S3) and fourth (S4) heart sounds
- Tachycardia
- Tachypnea, hypoxia
- Weak, thready pulse

DIAGNOSTIC TEST RESULTS

- ABG levels show respiratory alkalosis initially. As shock progresses, metabolic acidosis develops.
- Blood chemistry tests show increased BUN, creatinine, and cardiac troponin levels.
- ECG shows MI (enlarged Q wave, elevated ST segment).
- Hemodynamic monitoring reveals decreased stroke volume and decreased cardiac output;



TREATMENT

- Oxygen therapy: intubation and mechanical ventilation, if necessary
- Activity changes, including maintaining bed rest and implementing passive range-of- motion and isometric exercises
- Continuous renal replacement therapy
- Dietary changes, including withholding food and oral fluids



Drug therapy

- **Adrenergic agent:** epinephrine
- **Cardiac glycoside:** digoxin (Lanoxin)
- **Cardiac inotropes:** dopamine, dobutamine, inamrinone (Amrinone), milrinone
- **Diuretics:** furosemide (Lasix), bumetanide (Bumex), metolazone (Zaroxolyn)
- **Vasodilators:** nitroglycerin
- **Vasopressor:** norepinephrine (Levophed)

INTERVENTIONS AND RATIONALES

- Assess cardiovascular status, including hemodynamic variables, vital signs, heart sounds, capillary refill, skin temperature, and peripheral pulses to monitor the effects of drug therapy and detect cardiac decompensation.
- Assess respiratory status, including breath sounds and ABGs. Tachypnea, crackles, and hypoxemia may indicate pulmonary edema



INTERVENTIONS AND RATIONALES

- Monitor level of consciousness to detect cerebral hypoxia caused by reduced cardiac output.
- Monitor fluid balance, including intake and output, to monitor kidney function and detect fluid overload leading to pulmonary edema.
- Administer I.V. fluids, oxygen, and medications, as prescribed, to maximize cardiac, pulmonary, and renal function



INTERVENTIONS AND RATIONALES

- Withhold food and fluids, as directed, to reduce risk of aspiration with a reduced level of consciousness.
- Provide suctioning to aid in the removal of secretions and reduce risk of aspiration.
- Encourage the client to express feelings such as a fear of dying to reduce his anxiety.



AUDIENCE RESPONSE QUESTION

Norepinephrine has been ordered for a client in hypovolemic shock. Before administering the drug, which condition should be verified?

1. A heart rate less than 120 beats/min
2. Urine output at least 30 mL/hr
3. Received adequate anticoagulation
4. Been receiving adequate intravenous (IV) fluid replacement



AUDIENCE RESPONSE QUESTION

Which clinical findings would the nurse expect to see in a child as hypovolemic shock progresses?

1. Tremulousness
2. Irritability
3. Increasing apprehension
4. Narrowing pulse pressure



MYOCARDITIS



Myocarditis

- Myocarditis is focal or diffuse inflammation of the cardiac muscle (myocardium).
- It may be acute or chronic and can occur at any age.
- Frequently, myocarditis fails to produce specific cardiovascular symptoms or ECG abnormalities, and recovery is usually spontaneous, without residual defects.



CAUSES

- **Bacterial infections:** diphtheria, tuberculosis, typhoid fever, tetanus, and staphylococcal, pneumococcal, and gonococcal infections
- **Chemical poisons** such as chronic alcoholism
- Helminthic infections such as trichinosis
- **Hypersensitive immune reactions**, such as acute rheumatic fever and postcardiotomy syndrome
- **Viral infections** (most common cause in the United States and western Europe)



ASSESSMENT FINDINGS

- Arrhythmias (S3 and S4 gallops, faint S1)
- Cardiomyopathy
- Chronic valvulitis (when myocarditis results from rheumatic fever)
- Dyspnea
- Fatigue
- Fever



DIAGNOSTIC TEST RESULTS

- **Blood tests show**
 - elevated cardiac enzyme levels (CK, the CK-MB isoenzyme, and AST),
 - increased WBC count and ESR,
 - and elevated antibody titers (such as antistreptolysin-O titer in rheumatic fever).
- ECG typically shows diffuse ST-segment and T-wave abnormalities



Treatment

- Endomyocardial biopsy confirms the diagnosis, but a negative biopsy doesn't exclude the diagnosis.
 - A repeat biopsy may be needed.
- Stool and throat cultures may identify the causative bacteria.



TREATMENT

- Bed rest
- Diet: sodium restriction

Drug therapy

- **Antiarrhythmics:** amiodarone (Cordarone), procainamide
- **Antibiotics:** according to sensitivity of infecting organism
- **Anticoagulants:** warfarin (Coumadin), heparin, dalteparin (Fragmin), enoxaparin (Lovenox)
- **Cardiac glycoside:** digoxin (Lanoxin) to increase myocardial contractility
- **Diuretic:** furosemide (Lasix)

INTERVENTIONS AND RATIONALES

- Assess cardiovascular status frequently to monitor for signs of heart failure, such as dyspnea, hypotension, and tachycardia.
- Observe for signs of **digoxin toxicity (anorexia, nausea, vomiting, blurred vision, cardiac arrhythmias)**
- and for complicating factors that may potentiate toxicity, such as **electrolyte imbalances** or hypoxia, to prevent further complications.



INTERVENTIONS AND RATIONALES

- Stress the importance of bed rest to decrease oxygen demands on the heart.
- Assist with bathing as necessary; provide a bedside commode, which puts less stress on the heart than using a bedpan.
- Reassure the client that activity limitations are temporary.
- Offer diversional activities that are physically undemanding to decrease anxiety.



PERICARDITIS



- Pericarditis is an inflammation of the pericardium, the fibroserous sac that envelops, supports, and protects the heart.
- It occurs in both acute and chronic forms.
- Acute pericarditis can be fibrinous or effusive, with purulent, serous, or hemorrhagic exudate;
- chronic constrictive pericarditis is characterized by dense fibrous pericardial thickening.



CAUSES

- Bacterial, fungal, or viral infection (infectious pericarditis)
- High-dose radiation to the chest
- Hypersensitivity or autoimmune disease, such as acute rheumatic fever (most common cause of pericarditis in children), systemic lupus erythematosus, and rheumatoid arthritis
- Idiopathic factors (most common in acute pericarditis)



ASSESSMENT FINDINGS

Acute pericarditis

- Pericardial friction rub (grating sound heard as the heart moves)
- Sharp and usually sudden pain that usually starts over the sternum and radiates to the neck, shoulders, back, and arms (Unlike the pain of MI, pericardial pain is commonly pleuritic, increasing with deep inspiration and decreasing when the client sits up and leans forward, pulling the heart away from the diaphragmatic pleurae of the lungs.)



- Symptoms of cardiac tamponade (pallor, clammy skin, hypotension, pulsus paradoxus, neck vein distention)
- Symptoms of heart failure (dyspnea, orthopnea, tachycardia, ill-defined substernal chest pain, feeling of fullness in the chest)

Chronic pericarditis

- Gradual increase in systemic venous pressure
- Pericardial friction rub
- Symptoms similar to those of chronic right-sided heart failure (fluid retention, ascites, hepatomegaly)



DIAGNOSTIC TEST RESULTS

- **Blood tests reflect inflammation**
 - normal or elevated WBC count, especially in infectious pericarditis;
 - elevated ESR; and
 - slightly elevated cardiac enzyme levels with associated myocarditis.
- **Echocardiography** confirms the diagnosis when it shows an echo-free space between the ventricular wall and the pericardium (in cases of pleural effusion).
- **ECG** shows the following changes in acute pericarditis: **elevation of ST segments.**

TREATMENT

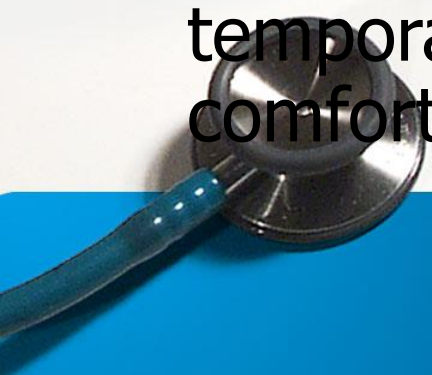
- **Bed rest**
- **Surgery:** **pericardiocentesis** (in cases of cardiac tamponade), partial pericardectomy (for recurrent pericarditis), total pericardectomy (for constrictive pericarditis)

Drug therapy

- **Antibiotics:** according to sensitivity of infecting organism
- **Corticosteroid:** methylprednisolone (Solu-Medrol)
- **Nonsteroidal anti-inflammatory drugs (NSAIDs):** aspirin, indomethacin (Indocin)

INTERVENTIONS AND RATIONALES

- Provide **complete bed rest** to decrease oxygen demands on the heart.
- **Assess pain in relation to respiration and body position to distinguish pericardial pain from myocardial ischemic pain.**
- **Place the client in an upright position to relieve dyspnea and chest pain.**
- Provide analgesics and oxygen, and reassure the client with acute pericarditis that his condition is temporary and treatable to promote client comfort and allay anxiety.



ENDOCARDITIS



- Endocarditis is an infection of the endocardium, heart valves, or a cardiac prosthesis resulting from bacterial or fungal invasion.
- This invasion produces vegetative growths on the heart valves, the endocardial lining of a heart chamber, or the endothelium of a blood vessel that may embolize to the spleen, kidneys, central nervous system, and lungs.
- This disorder may also be called infective endocarditis and bacterial endocarditis.



CAUSES

- Enterococci
- **I.V. drug abuse**
- Mitral valve prolapse
- **Prosthetic heart valve**
- **Rheumatic heart disease**
- Streptococci (especially *Streptococcus viridans*)
- Staphylococci (especially *Staphylococcus aureus*)



CONTRIBUTING FACTORS

- Coarctation of the aorta
- Degenerative heart disease
- Marfan syndrome
- Pulmonary stenosis
- Subaortic and valvular aortic stenosis
- Tetralogy of Fallot
- Ventricular septal defects



Tetralogy of Fallot (4 heart defects)

- A hole in the wall between your heart's main pumping chambers (**ventricular septal defect or VSD**)
- A valve between your heart and lungs that is too narrow (**pulmonary stenosis or PS**)
- A right heart chamber with walls that are too thick (**right ventricular hypertrophy**)
- A major blood vessel (aorta) that is misplaced or moved (**overriding aorta**)



Assessment Findings

- Anorexia
- Arthralgia
- Chills
- Fatigue
- intermittent, recurring fever
- Loud, regurgitant murmur
- Malaise
- Night sweats
- Signs of cerebral, pulmonary, renal, or splenic infarction
- Valvular insufficiency
- Weakness
- Weight loss



DIAGNOSTIC TEST RESULTS

- Blood test results may include normal or elevated WBC count.
- Echocardiography may identify valvular damage.
- ECG may show AF and other arrhythmias that accompany valvular disease.
- Three or more blood cultures in a 24- to 48-hour period identify the causative organism in up to 90% of clients



TREATMENT

- Bed rest
- Maintaining sufficient fluid intake
- Surgery (in cases of severe valvular damage) to replace defective valve

Drug therapy

- Antibiotics: based on infective organism
- Aspirin



INTERVENTIONS AND RATIONALES

- Monitor the client's renal status (BUN levels, serum creatinine, creatinine clearance, and urine output) to check for signs of renal emboli or evidence of drug toxicity.
- Observe for signs of heart failure, such as dyspnea, tachypnea, tachycardia, crackles, jugular vein distention, edema, and weight gain.
- Need for prophylactic antibiotics before, during, and after dental work, childbirth, and genitourinary, GI, or gynecologic procedures



AUDIENCE RESPONSE QUESTION

What would be an important home care goal for a client who has infective endocarditis?

1. To begin an exercise regimen as soon as possible
2. To monitor urinary output
3. To continue antibiotic therapy
4. To decrease activity until pulse stabilizes



LUCENT NCLEX REVIEW

