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FACULTY OF NURSING SCIENCES

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CARDIOMYOPATHY

Objectives

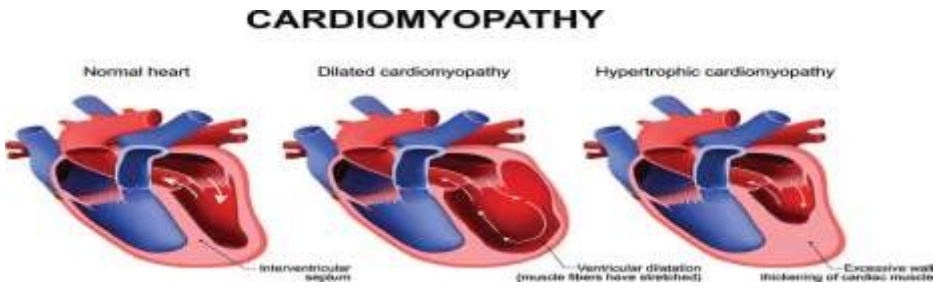
At the end of the class, the student will,

- Define epidemiology of cardiomyopathy
- Classify Cardiomyoapthy
- Identify the risk factors and etiologies of cardiomyopathy
- Recognize the signs and symptoms and methods of diagnosing cardiomyopathy
- Understand the treatment options
- Discuss the nursing interventions

Introduction

- An acquired or hereditary disease of heart muscle, this condition makes it hard for the heart to deliver blood to the body, and can lead to heart failure.

- In the United States, at least 0.7% of cardiac deaths are attributable to cardiomyopathy. ... The mortality rate for cardiomyopathy in males is twice that of females, and for blacks it is 2.4 times that of whites.



Cardiomyopathy

- Disease of the heart muscle in which the heart is unable to pump the blood effectively through the aorta, which makes the heart muscle to become enlarged, thick or rigid.

- In rare cases, the muscle tissue in the heart is replaced with scar tissue.

- As cardiomyopathy progressess the heart becomes weaker and leads to heart failure, arrhythmias, systemic and pulmonary edema and, more rarely, endocarditis

Types of cardiomyopathy

The 5 main types of cardiomyopathy are:

- Dilated cardiomyopathy
- Hypertrophic cardiomyopathy
- Restrictive cardiomyopathy
- Arrhythmogenic Right Ventricular Cardiomyopathy
- Unclassified cardiomyopathy

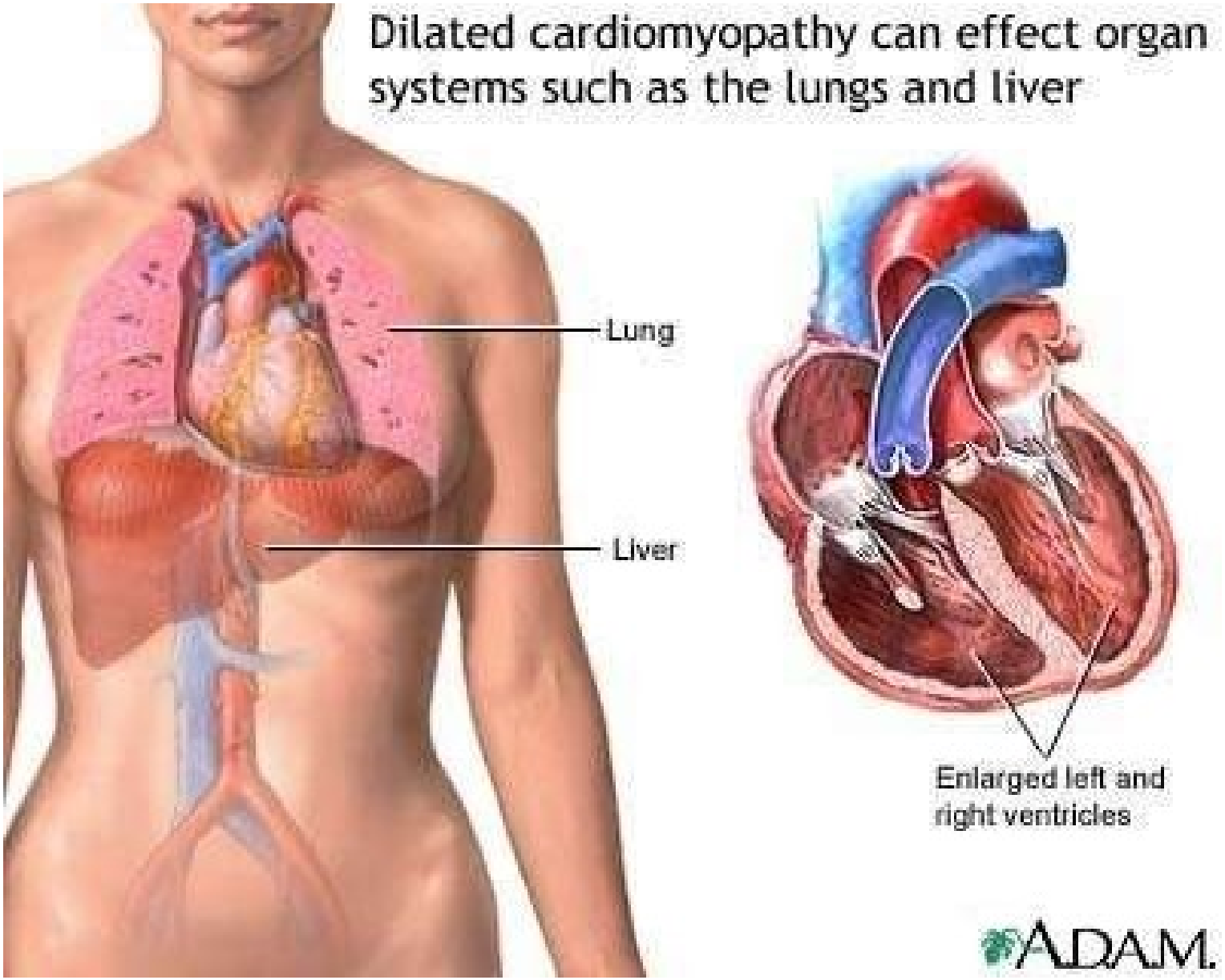
Dilated cardiomyopathy

- Most common form of cardiomyopathy (5 to 8/lakh/year)
- Occurs in adults aged 20 to 60 years
- More common in men

Dilated cardiomyopathy

- The heart muscle begins to dilate or stretch and become thinner with out hypertrophy
- Ventricular chamber size gets increased
- Over time, the heart becomes weaker, leads to heart failure
- Symptoms of heart failure: fatigue, edema, and SOB
- Can also lead to valve problems (regurgitation),
- arrhythmias, and blood clots in the heart (poor blood flow), emboli formation

Dilated cardiomyopathy can effect organ systems such as the lungs and liver



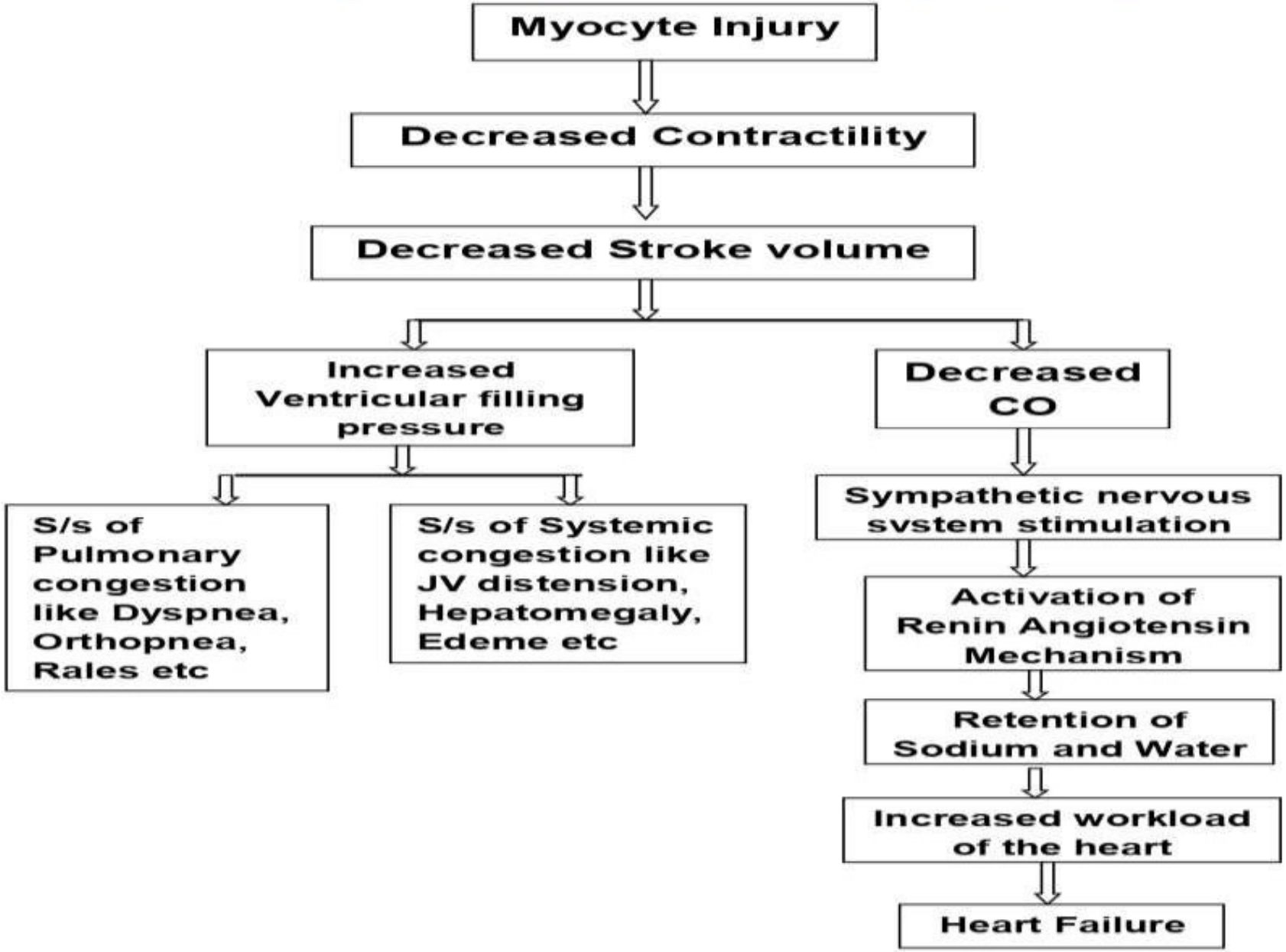
Types and Causes

- **Ischemic** cardiomyopathy - caused by CAD & MI , w/c leave scars in the heart muscle
- **Idiopathic** cardiomyopathy - the cause is unknown.
- **Hypertensive** cardiomyopathy - seen in people who have high BP for a long time, particularly when it has gone untreated for years.
- **Infectious** cardiomyopathy - HIV, viral

Types and Causes (contd)

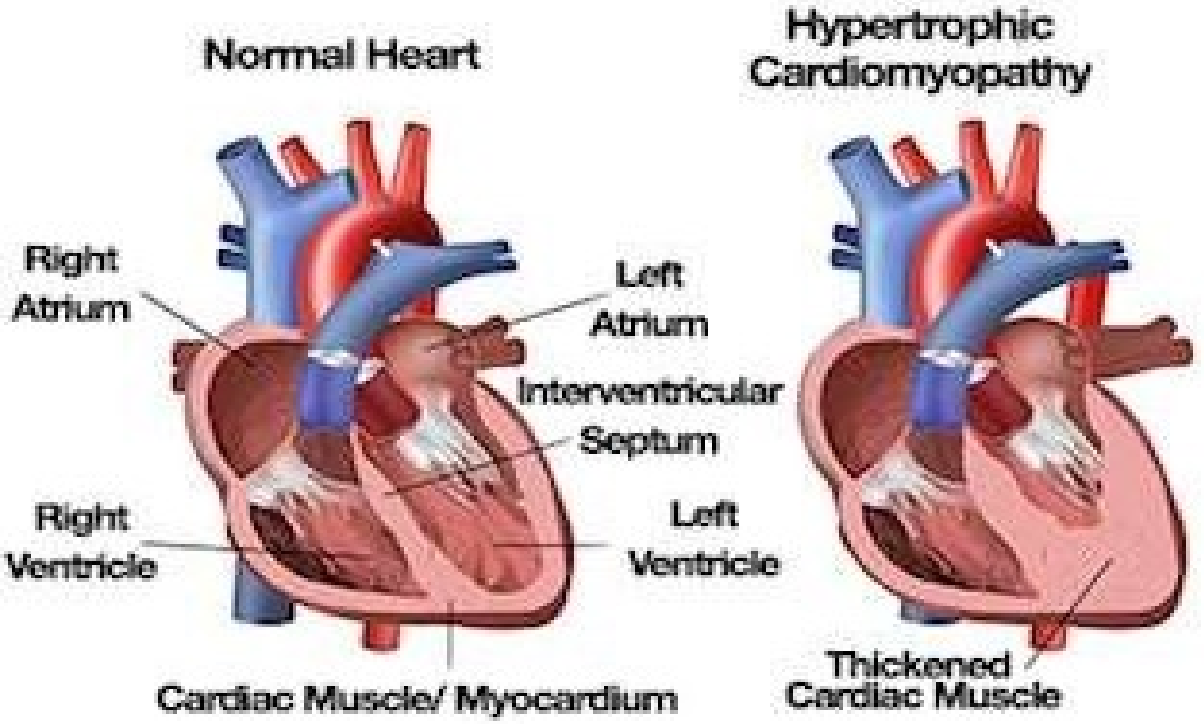
- **Alcoholic** cardiomyopathy - usually begins about 10 years after sustained, heavy alcohol consumption.
- **Toxic** cardiomyopathy – due to cocaine, amphetamines, and some chemotherapy drugs (doxorubicin, daunorubicin)
- **Peripartum** cardiomyopathy- This type appears in women during the last trimester of pregnancy or after childbirth.
- **Iatrogenic** cardiomyopathy- Radiotherapy (cobalt) diabetes and thyroid disease

Pathophysiology of Cardiomyopathy



Hypertrophic Cardiomyopathy (HCM)

- HCM is a rare autosomal dominant condition
- occurring in men, women, and children (often detected after puberty)



Hypertrophic Cardiomyopathy

occurs when the heart muscle thickens abnormally (left ventricle)

1.) **Obstructive type** -the septum thickens and bulges into the left ventricle

-blocks the flow of blood into the aorta

- T he ventricle must work much harder to pump blood past the blockage

-symptoms can include chest pain, dizziness, shortness of breath, or fainting.

-can also affect the mitral valve,

Hypertrophic cardiomyopathy

2.) **Non-obstructive Type**

–the entire ventricle may become thicker (symmetric ventricular hypertrophy) or

–it may happen only at the bottom of the heart (apical hypertrophy).

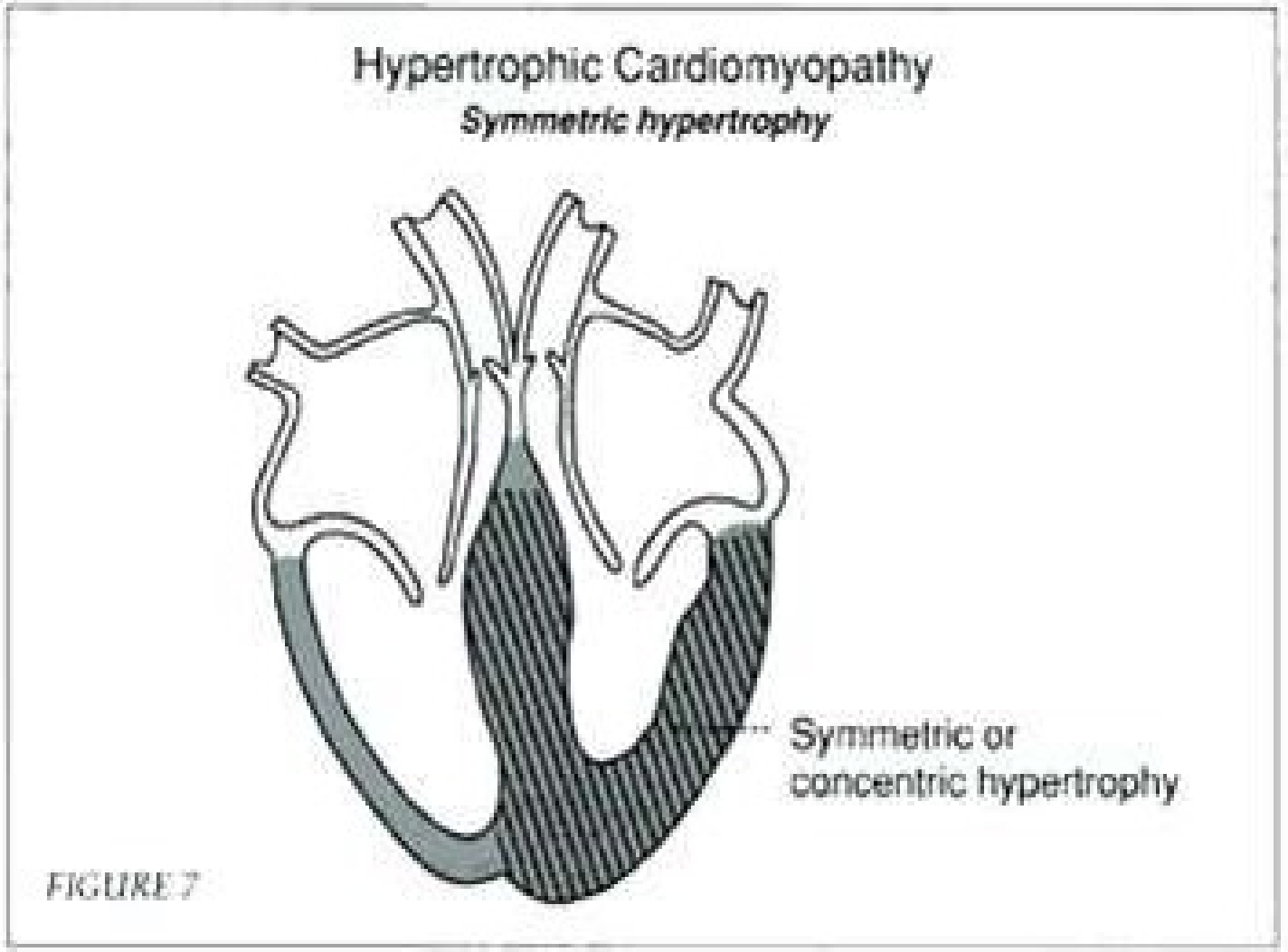

Hypertrophic Cardiomyopathy
Symmetric hypertrophy
Symmetric or
concentric hypertrophy

FIGURE 7

Hypertrophic cardiomyopathy

Causes:

- Unknown.
- Inherited because of a gene mutation
- Hypertension
- Aging

Hypertrophic Cardiomyopathy

- **Pathophysiology:**

➢ Left ventricular hypertrophy (thick ventricular wall)

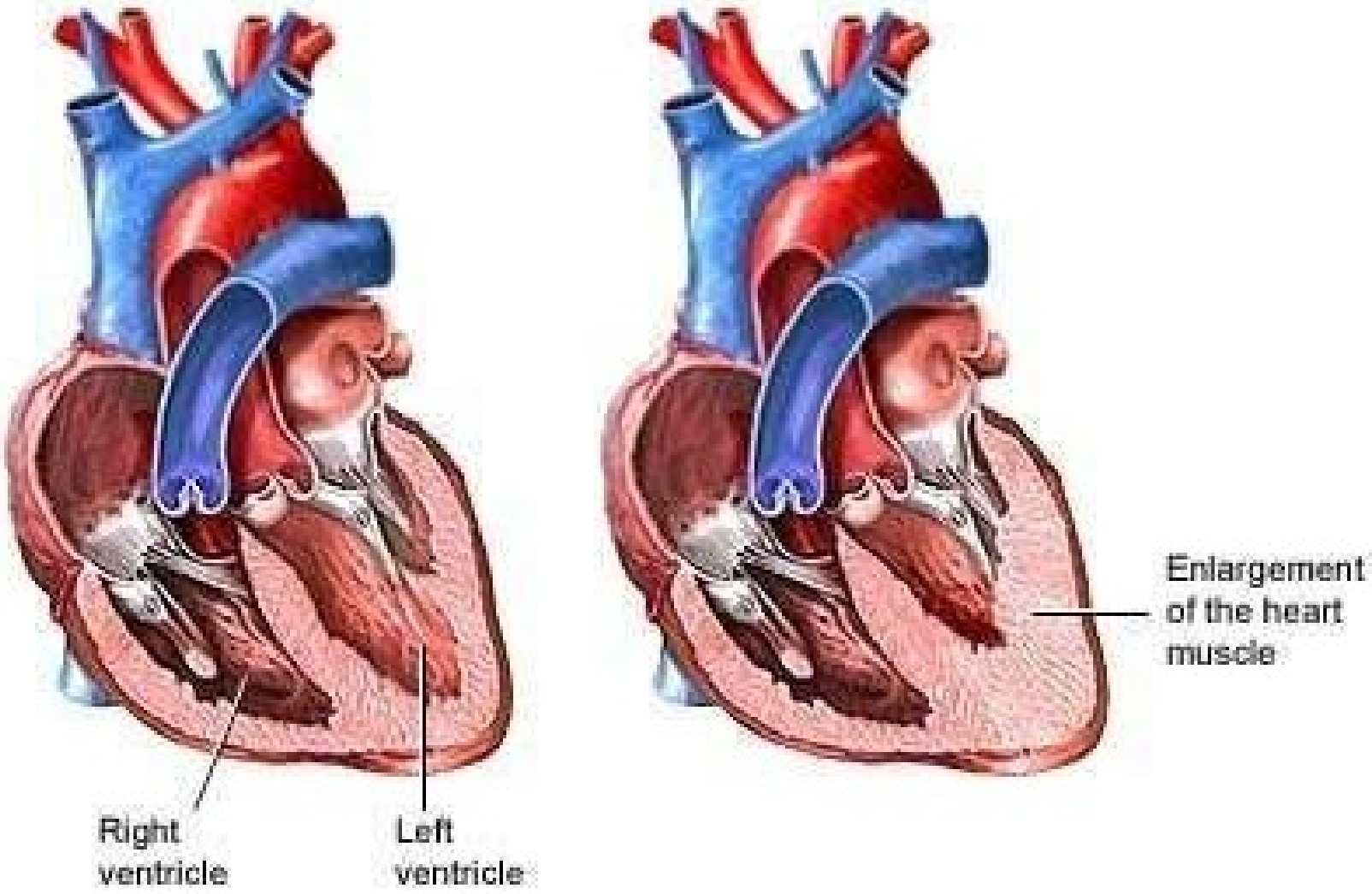
➢ Increase in ventricular chamber size hold less blood decrease in CO

➢ Pressure increases in the ventricles and lungs

➢ changes in the cardiac muscles and interfere with the heart's electrical signals, leading to arrhythmias and sudden cardiac arrest

Normal heart

Hypertrophic cardiomyopathy

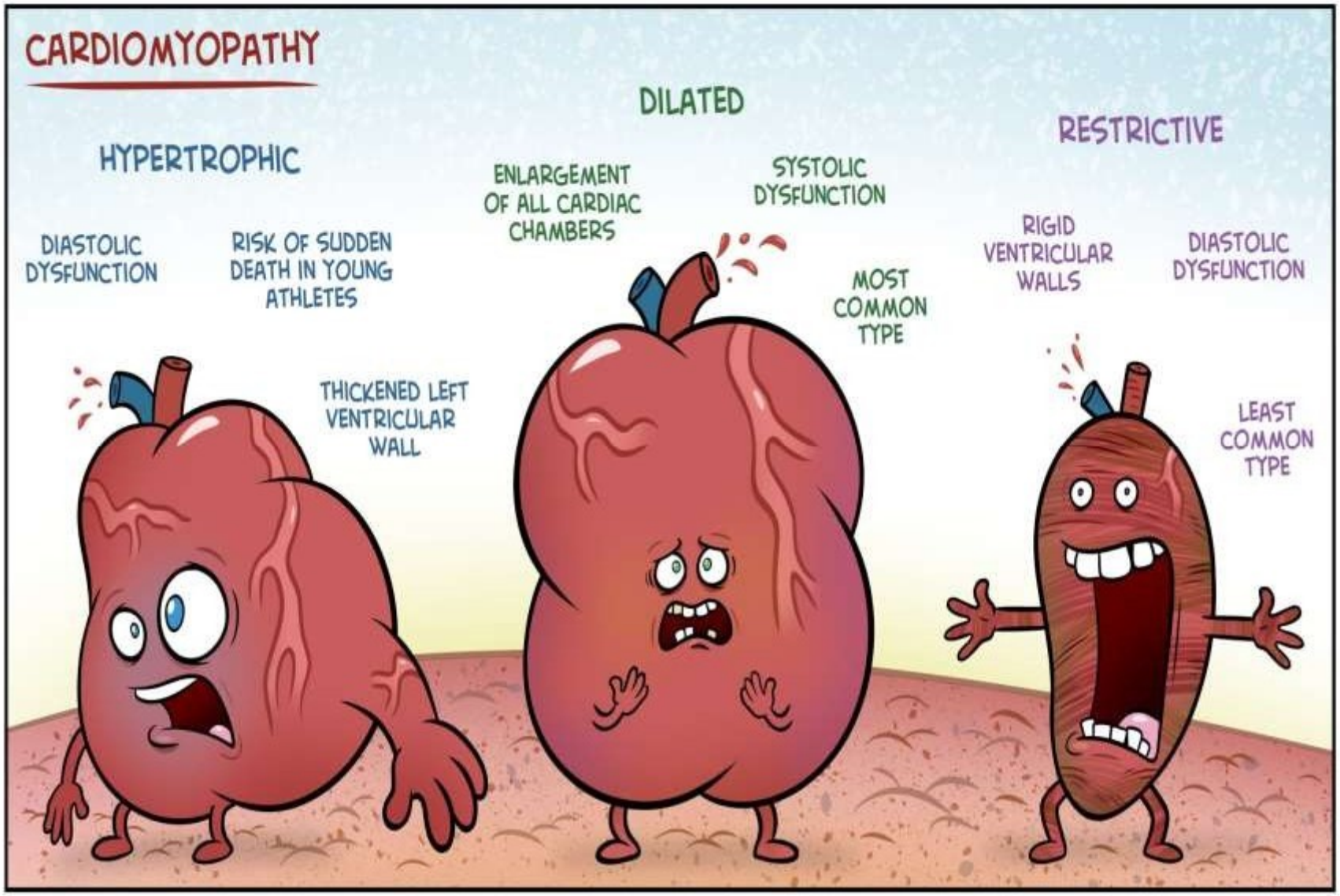


Restrictive Cardiomyopathy

- Tends to mostly affect older adults
- the ventricles become stiff and rigid due to replacement of the normal heart muscle with abnormal tissue, such as scar tissue.
- As a result, the ventricles cannot relax normally and expand to fill with blood, which causes the atria to become enlarged.
- Eventually, blood flow in the heart is reduced, and complications such as heart failure or arrhythmias occur.

Causes

- Radiation treatments, infections, or scarring after surgery
- Hemochromatosis - a condition in which too much iron is deposited into tissues, including heart tissue
- Amyloidosis, a disease in which abnormal proteins are deposited into heart tissue


CARDIOMYOPATHY
HYPERTROPHIC
DIASTOLIC DYSFUNCTION
RISK OF SUDDEN DEATH IN YOUNG ATHLETES
THICKENED LEFT VENTRICULAR WALL
DILATED
ENLARGEMENT OF ALL CARDIAC CHAMBERS
SYSTOLIC DYSFUNCTION
MOST COMMON TYPE
RESTRICTIVE
RIGID VENTRICULAR WALLS
DIASTOLIC DYSFUNCTION
LEAST COMMON TYPE
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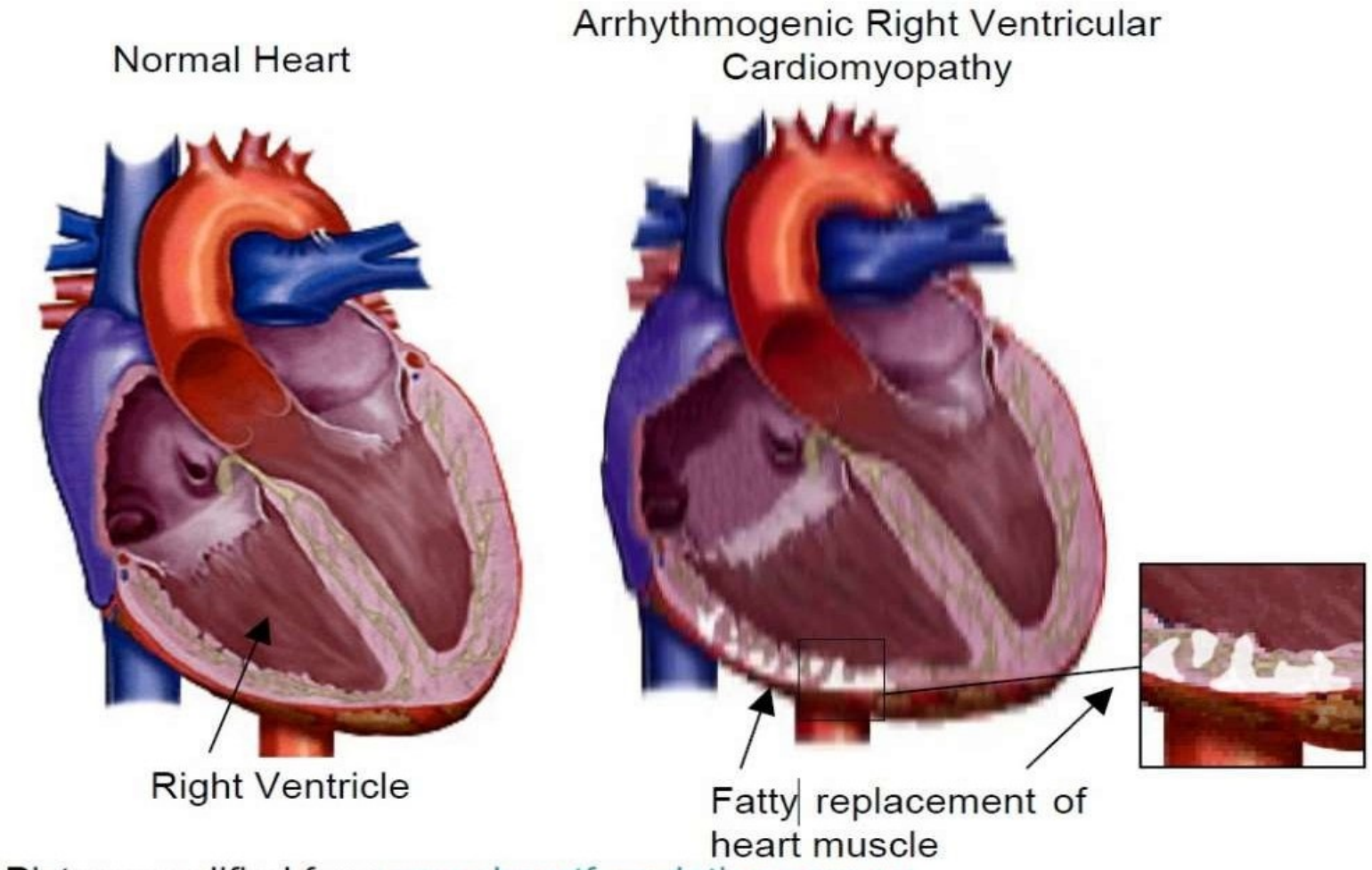
Arrhythmogenic Right Ventricular Cardiomyopathy

- ARVC occurs when the myocardium of the right ventricle is progressively infiltrated and replaced by fibrous scar and adipose tissue.
- Initially, only localized areas of the right ventricle are affected, but as the disease progresses, the entire heart is affected.
- Eventually, the right ventricle dilates and develops poor contractility, right ventricular wall abnormalities, and dysrhythmias.



Picture modified from www.heartfoundation.com.au

Unclassified cardiomyopathies

Unclassified cardiomyopathies are different from or have characteristics of more than one of the previously described types.

Major Risk Factors

❖Having a family history of cardiomyopathy, heart failure, or sudden cardiac death

❖Having a disease or condition that can lead to cardiomyopathy, such as:

- Coronary artery disease
- A previous heart attack
- Myocarditis

Major Risk Factors

- Diseases that can damage the heart (for example, hemochromatosis, sarcoidosis, or amyloidosis)
- Chronic alcoholism
- Uncontrolled hypertension
- Diabetes and other metabolic diseases

Signs and Symptoms

- Some have no symptoms in the early stages of the disease.
- As cardiomyopathy progresses and the heart weakens, signs and symptoms of heart failure usually appear.

Signs and Symptoms

These signs and symptoms include:

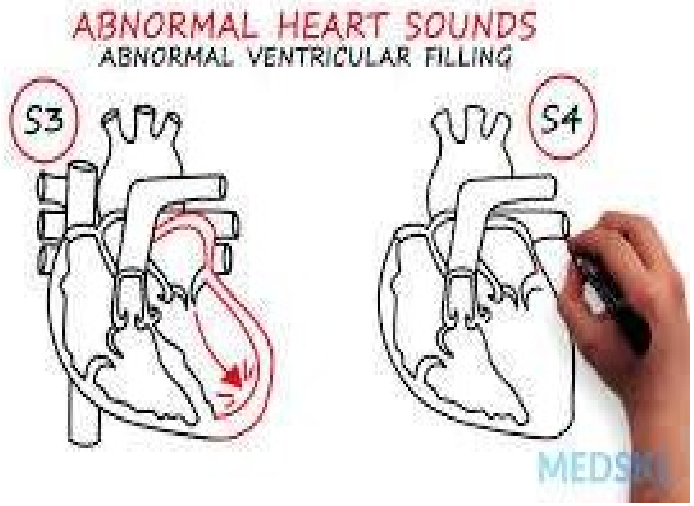
- Tiredness, Weakness
- Shortness of breath after exercise or even at rest
- PND, Orthopnea
- Nausea
- Swelling of the abdomen, legs, ankles, and feet
- dizziness, lightheadedness, fainting during exercise, abnormal heart rhythms, murmurs

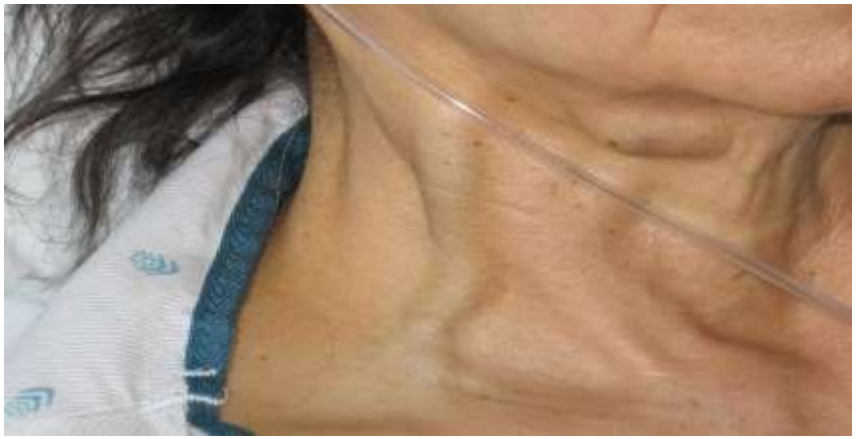
Assessment of CMP

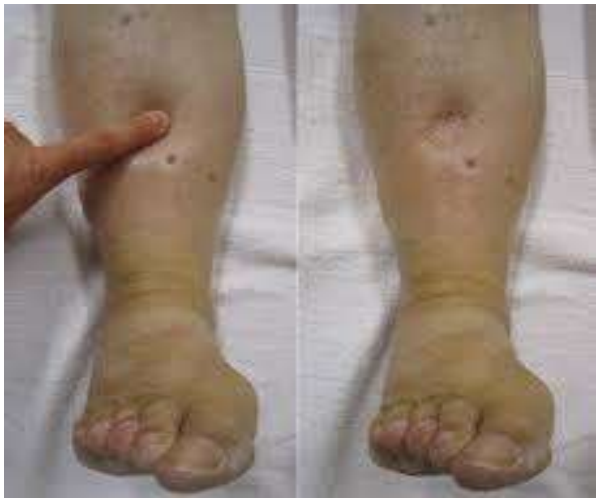
Physical examination may reveal

- Tachycardia
- Extra heart sounds (eg, S3, S4).
- Diastolic murmurs, and systolic murmurs.
- Signs and symptoms of heart failure

  (Crackles on pulmonary auscultation, jugular vein distention, pitting edema of dependent body parts, hepatomegaly).

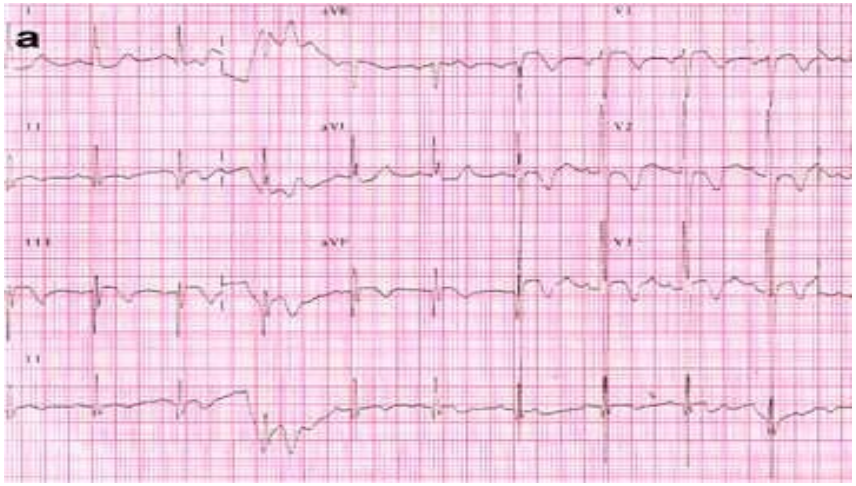

ABNORMAL HEART SOUNDS
ABNORMAL VENTRICULAR FILLING
S3
S4





Assessment contd….

- The echocardiogram
- Cardiac MRI (HCM)
- ECG demonstrates dysrhythmias
- Chest x-ray reveals heart enlargement and possibly pulmonary congestion.
- Cardiac catheterization
- Endomyocardial biopsy may be performed to analyze myocardial cells.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Interventions

Goals of treating cardiomyopathies are

- Manage any conditions that cause or contribute to cardiomyopathy
- Control symptoms so that the person can live as normally as possible
- Stop the disease from getting worse
- Reduce complications and the chance of sudden cardiac death

Lifestyle changes

Lifestyle changes may include:

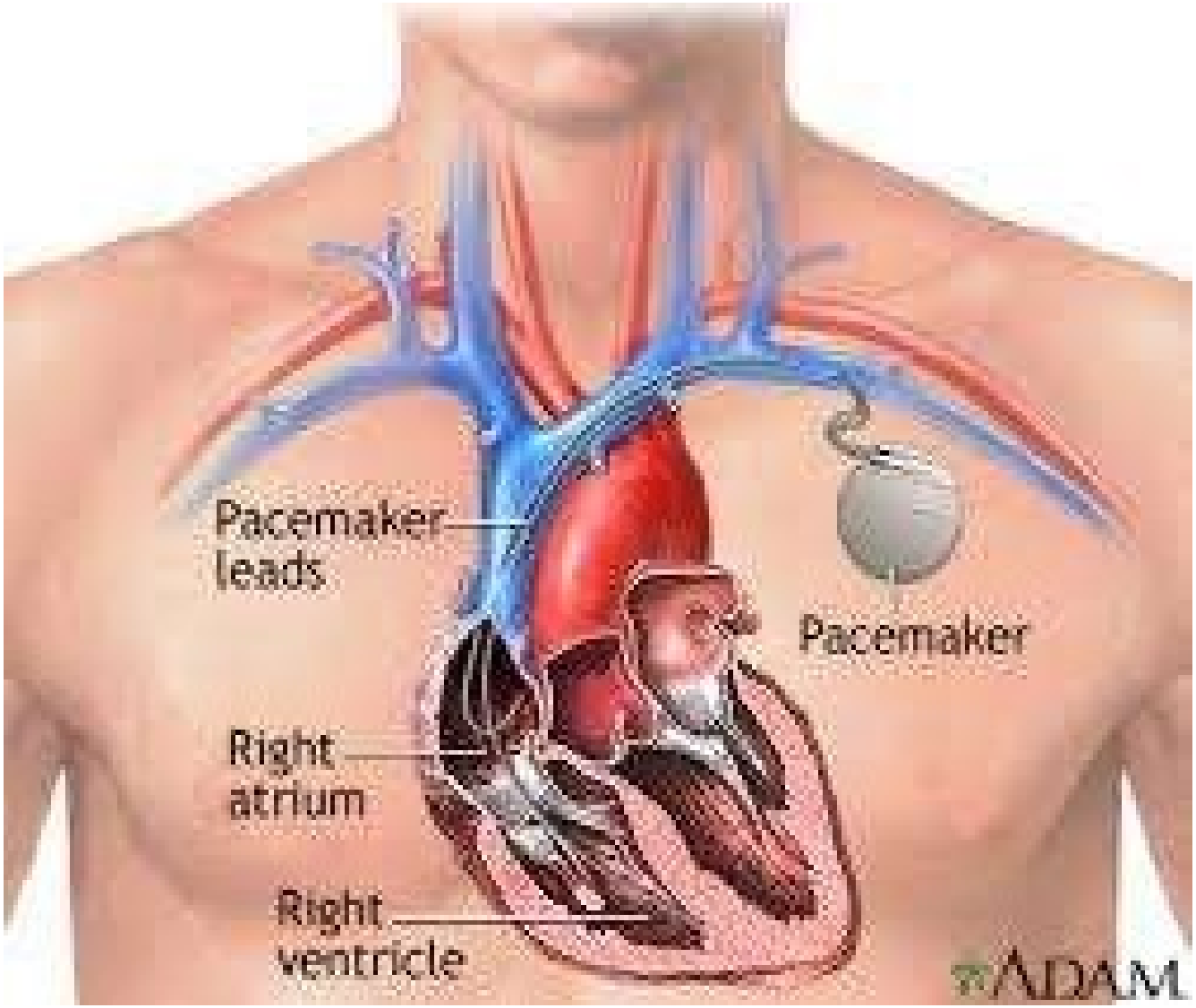
- ✓Quit smoking
- ✓Losing excess weight
- ✓Eating a low-salt diet
- ✓Getting moderate exercise, such as walking, and avoiding strenuous exercise
- ✓Avoiding the use of alcohol and illegal drugs
- ✓Getting enough sleep and rest
- ✓Reducing stress
- ✓Treating underlying conditions, such as diabetes and high blood pressure

Medications

1. Diuretics
2. ACE inhibitors,
3. Calcium channel blockers
4. Digoxin
5. Anticoagulants
6. Antiarrhythmia
7. Antibiotics,
8. Corticosteroids,

Pacemaker Implantation

- Done to alter the electrical stimulation of the muscle and prevent the forceful hyper dynamic contractions that occur with HCM.
- For some patients with DCM and HCM, biventricular pacing increases the ejection fraction and reverses some of the structural changes in the myocardium


Pacemaker leads
Pacemaker
Right atrium
Right ventricle
A.D.A.M.

Nonsurgical Septal Reduction Therapy

- Also called as alcohol septal ablation, has been used to treat obstructive HCM.
- A percutaneous catheter is positioned in one or more of the septal coronary arteries. Once the position is verified, 1 to 5 mL of 96% to 98% ethanol (ethyl alcohol) is injected at a rate of about 1 mL/min to destroy the myocardial cells.
- **Action:** dehydration of the cardiac cells and minimizes the risk of heart block and premature ventricular contractions.

Surgery

- **Septal Myomectomy -** (removal of part of the thickened septum that is bulging into the left ventricle)
  - Indicated for hypertrophic obstructive cardiomyopathy generally used in younger patients and when medicines aren't working well.
  - Repair and replacement of cardiac valves

A Left Ventricular Assist Device (LVAD)

-helps the heart pump blood to the body

- LVAD can be used as a long-term therapy or as a short-term treatment for people who are waiting for a heart transplant.

FIGURE 29-10. Left ventricular assist device.

An Implantable Cardioverter Defibrillator (ICD)

Used in people who are at risk of life-threatening arrhythmia or sudden cardiac death.

- This small device is implanted in the chest and connected to the heart with wires.
- If the ICD senses a dangerous change in heart rhythm, it will send an electric shock to the heart to restore a normal heartbeat

Heart Transplant

- Diseased heart in a person is replaced with a healthy heart from a deceased donor
- 90% of heart transplants are performed on patients with end-stage heart failure ---condition has become so severe that all treatments, other than heart transplant, have failed.

Common Indications for Transplantation

Candidates who have severe symptoms uncontrolled by medical therapy, no other surgical options, and a prognosis of less than 2 years to live will the candidates for heart transplantation.

- Cardiomyopathy
- Ischemic heart disease
- Valvular disease
- Rejection of previously transplanted hearts
- Congenital heart disease

Contraindications for Heart Transplant

- ✓Advanced age - most transplant surgery isn't performed on patients older than 70 years.
- ✓Poor blood circulation throughout the body, including the brain.
- ✓Diseases of the kidney, lungs, or liver that can't be reversed.

Contraindications for Heart Transplant

- ✓History of cancer or malignant tumors.
- ✓Inability or unwillingness to follow lifelong medical instructions after a transplant.
- ✓Pulmonary arterial hypertension (high blood pressure in the lungs) that can't be reversed.
- ✓Active infection throughout the body.

Guidelines to select the donor heart

- **Do not meet the legal requirement for brain death**
- **Consent forms are signed**
- **Younger than 65 years of age**
- **Have little or no history of heart disease or trauma to the chest**

Guidelines to select the donor heart

- Not exposed to hepatitis or HIV and other infections
- Donor heart must be transplanted w/in 4 hrs. After removal from the donor
- Pulmonary status, psychosocial status, family support, history of other transplantations, compliance, and current health status also to be reviewed.

Procedure

- Orthotopic transplantation is the most common surgical procedure for cardiac transplantation.
- The recipient's heart is removed, and the donor heart is implanted at the vena cava and pulmonary veins.
- a portion of the recipient's atria (with the vena cava and pulmonary veins) in place is left behind.

Procedure

- The donor heart, which usually has been preserved in ice, is prepared for implant by cutting away a small section of the atria that corresponds with the sections of the recipient's heart that were left in place.
- The donor heart is implanted by suturing the donor atria to the residual atrial tissue of the recipient's heart.
- After the venous or atrial anastomoses are complete, the recipient's pulmonary artery and aorta are sutured to those of the donor heart

Heart Transplant (cont.)

Complications

•Patients who have had heart transplants are constantly balancing the risk of rejection with the risk of infection.

•They must adhere to a complex regimen of diet, medications, activity, follow-up laboratory studies, biopsies of the transplanted heart (to diagnose rejection), and clinic visits.

Complications

- Most commonly, patients receive tacrolimus (Prograf) or cyclosporine, mycophenolate mofetil (CellCept) or azathioprine (Imuran), and corticosteroids (eg, prednisone) to minimize rejection
- In addition to rejection and infection, complications may include accelerated atherosclerosis of the coronary arteries
- Hypertension may occur in patients taking cyclosporine or tacrolimus

Complications -contd.....

•Osteoporosis is a frequent side effect of the anti rejection medications as well as pre transplantation dietary insufficiency and medications

•Post transplantation lymphoproliferative disease and cancer of the skin and lips are the most common malignancies after transplantation, possibly caused by immuno suppression.

Complications -contd.....

- Weight gain,Obesity
- Diabetes
- Dyslipidemias (eg, hypercholesterolemia)
- Hypotension
- Renal failure
- Central nervous system, respiratory, and gastrointestinal disturbances may be adverse effects of the corticosteroids or other immuno suppressants

Nursing Management

Assessment

- Detailed history of the presenting signs and symptoms.
- Identifies possible etiologic factors, such as heavy alcohol intake, recent illness or pregnancy, or history of the disease in immediate family members.
- A thorough review of the pain, including its precipitating factors and relieving factors

Nursing Management

- The review of systems includes the presence of orthopnea, PND, and syncope or dyspnea with exertion.
- The patient's usual diet is evaluated to determine the need to reduce sodium intake, optimize nutrition, or supplement with vitamins.
- Psychosocial history

Physical Assessment

The baseline assessment includes

- Vital signs
- Calculation of pulse pressure and identification of pulsus paradoxus
- Current weight and any weight gain or loss
- Detection by palpation of the point of maximal impulse, often shifted to the left

Physical Assessment

- Cardiac auscultation for a systolic murmur and S3 and S4 heart sounds
- Pulmonary auscultation for crackles
- Measurement of jugular vein distention
- Assessment of edema and its severity

Nursing Diagnoses

Based on the assessment data, major nursing diagnoses may include:

- Decreased cardiac output related to structural disorders caused by cardiomyopathy or to dysrhythmia from the disease process and medical treatments
- Ineffective cardiopulmonary, cerebral, peripheral, and renal tissue perfusion related to decreased peripheral blood flow
- Impaired gas exchange related to pulmonary congestion caused by myocardial failure

Nursing Diagnoses

- Activity intolerance related to decreased cardiac output or excessive fluid volume or both
- Anxiety related to the change in health status and in role functioning
- Powerlessness related to disease process
- Noncompliance with medication and diet therapies

Nursing Interventions

Improving Cardiac Output

✓Positioning the patient in sitting up with their legs down will be helpful in pooling venous blood in the periphery and reducing preload.

✓Assess the patient's oxygen saturation at rest and during activity to determine the need for supplemental oxygen.

Nursing Interventions

- ✓ Ensure that medications are taken as prescribed
- ✓ Offer a low sodium diet
- ✓ Check the patient's weight every day and identify any significant change.
- ✓ Educate the patients to avoid dehydration.

Nursing Interventions- contd…

Increasing Activity Tolerance:

✓Alternate the periods of rest with activity.

✓make sure that the patient recognizes the symptoms indicating the need for rest and actions to take when the symptoms occur.

✓Patients with HCM or RCM must avoid strenuous activity, isometric exercises, and competitive sports

Conclusion

Cardiomyopathy is a disease of the heart muscle leading to abnormal structure or function in the absence of coronary artery disease, hypertension, or valvular or congenital heart disease. Every year the number patients with cardiomyopathy is increasing globally. Early recognition of signs and symptoms, prompt diagnosis and early interventions may avoid or delay the heart transplantation.

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