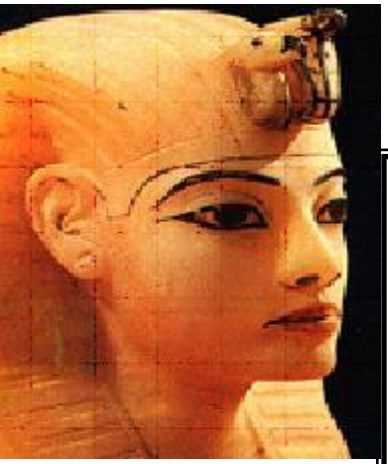
Heart Disease In Pregnancy



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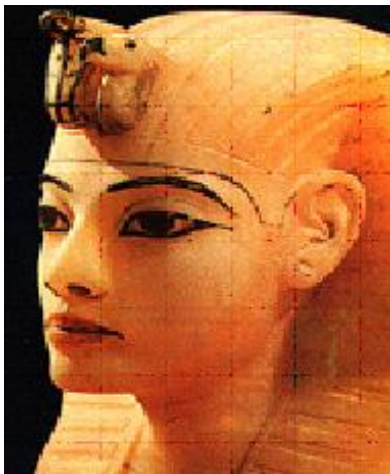


Classification Of Heart Diseases In Pregnancy:

Incidence : 1% of all pregnancies.

1-Rheumatic valve diseases

(still the commonest in the developing countries).

MS,MR,DM,AS,AR.

2-Congenital disorders

(The commonest in developed countries)

ASD,VSD,PDA, coarcitation of the aorta, Fallot's tetralogy , Eisenminger syndrome and Marfan syndrome.

3-Others :Arrhythmias,ischemic heart disease and cardiomyopathy.

Physiological Changes During Pregnancy

Parameter	Change
Heart rate	+ 15 %
stroke volume	+ 10%
Cardiac output=(HR X stroke volume↑ 28-32 w)	+ 40%
Systemic Vascular resistance	- 20%
Pulmonary Vascular resistance	- 35%
Colloid osmotic pressure	- 15
Plasma volume	+ 50%
Red cell mass	+ 20%
HB or Haematocrit	- 20%

Blood volume:↑ 50% starts at 8 weeks &reaches maximum at 32 to 36 weeks

Effect Of Pregnancy On Heart Disease

1.Decompensation (heart failure):

- **<u>During pregnancy</u>: Precipitated by increased cardiac output especially with anemia (at 28-32 weeks).**
- **<u>During labor</u>: Due to bearing down and the effort and stress of labor &↑ venous return.**
- **<u>After delivery</u>: Due to sudden ↑ in venous return (10-20%) with exhausted cardiac reserve or massive emoblization.**

Effect Of Pregnancy On Heart Disease

2-Rheumatic activity which may cause further damage to the valves.

3-Bacterial endocarditis due to infection by streptococcus viridans in the valves and myocardium.

4-Pregnancy induced low vascular resistance may improve the symptoms of MR,AR& MV prolapse.

So *a small family, while young, with 2-3 years spacing is advised before* progression of the lesions.

Effect Of Heart Disease On Pregnancy

- Intrauterine growth restriction.
- Pre-term labor.
- Intrauterine fetal death.
- Abortion.
- Fetal polycythemia.
- Perinatal mortality up to 20%.
- Increase fetal congenital HD (from 0.6% to 4.5%) if the mother has CHD.

Prognosis

It depends on:

- **The functional capacity of the heart**
- **Existing complications that increase the cardiac load as stress, infection and high effort**
- **Anemia**
- **Quality of medical care**

Diagnosis

Diagnostic Definition of Heart Disease

- 1-Etioloical Diagnosis
- 2-Anatomical Diagnosis
- 3-Functional Classification
- 4-Therapuetic Status

(e g. patient under digitalis has less prognosis than those of the same functional class without treatment)

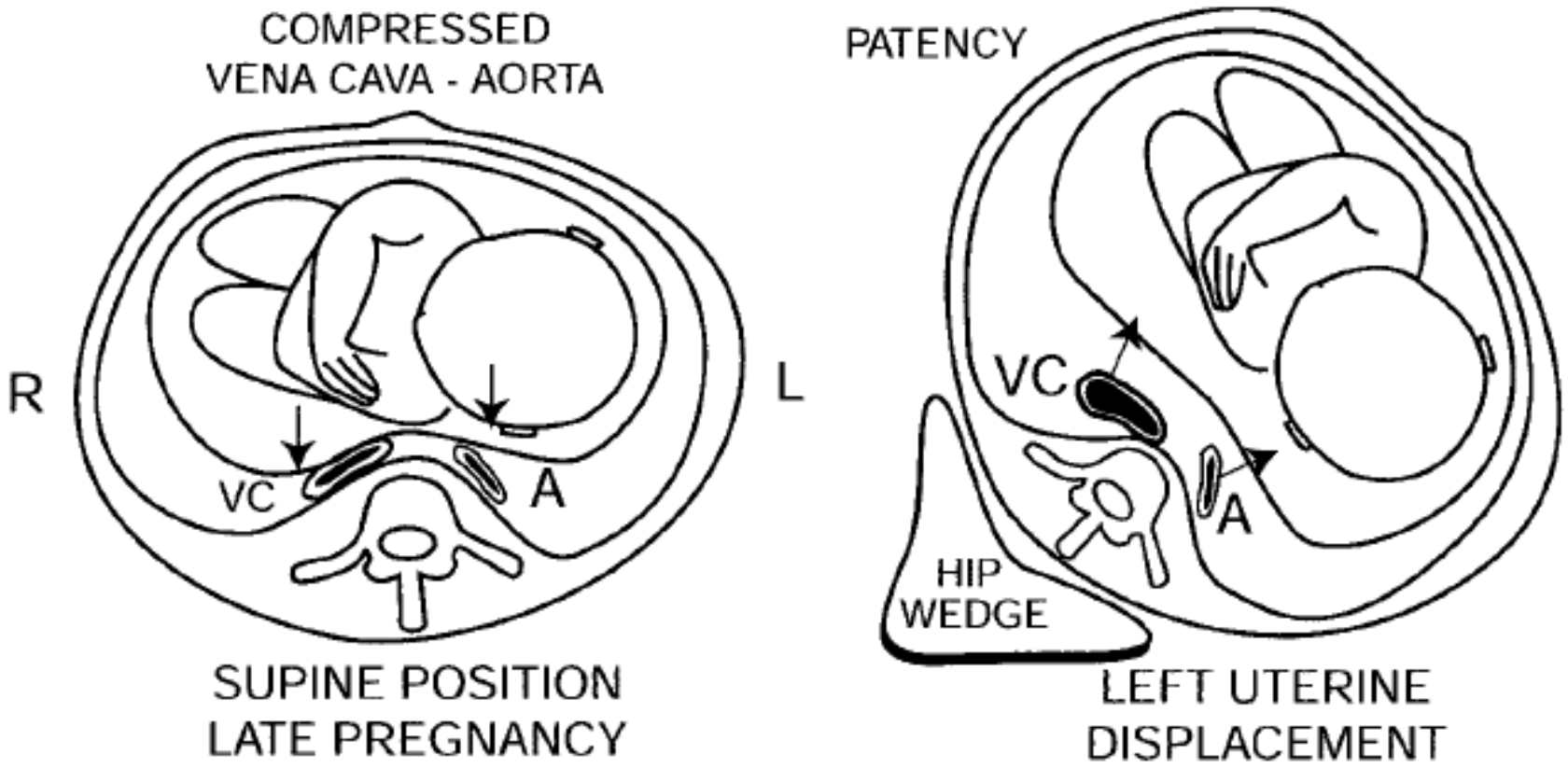
Diagnosis Of Heart Disease

The physiological adaptations of normal pregnancy can induce symptoms and signs that may be confused with that of the heart disease.

Symptoms:

- **Dyspnea : ↑HR, consciousness of breathing (progesterone)**
- **Orthopnea: Supine Hypocaval S.**
- **Palpitation**
- **Easily fatigability: Hormonal E&P**

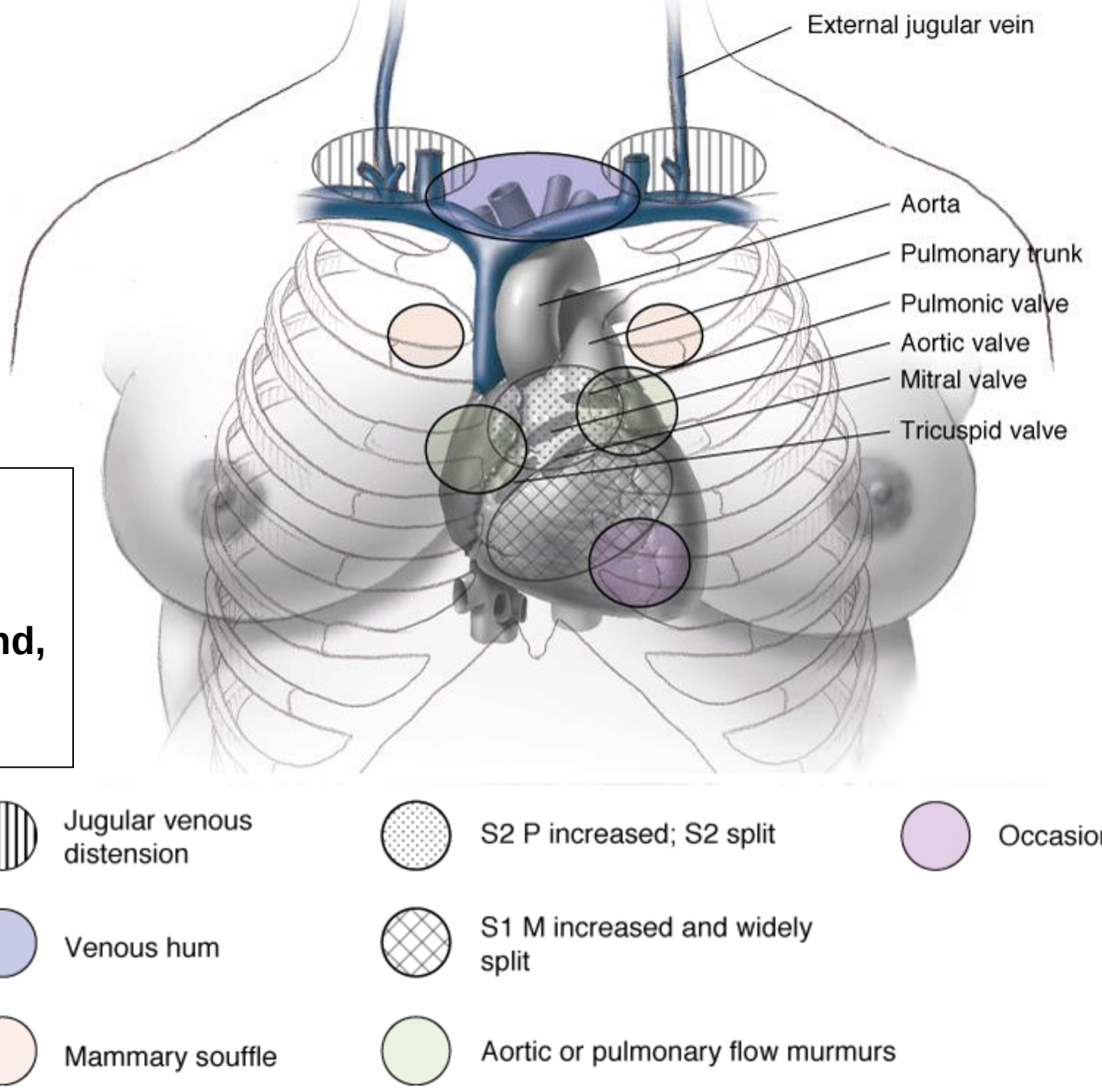
Supine Hypotensive Syndrome



Compression of the aorta (*A)* and vena cava (*VC) when the mother is* supine (*drawing on left). When she is in the* left lateral recumbent position (*wedge under* her right *hip), both vessels are patent (drawing on right).*

Signs:

- Peripheral edema
- Extrasystole
- SVT
- Prominent pulsation of the neck veins.
- Accentuated 1st H. sound : DD MS
- Systolic murmur :DD Aortic or P. stenosis
- Mammary Souffle :DD P. ductus arteriosis



S_1 = first sound
M_1 = mitral first sound
S_2 = second sound,
P_2 = pulmonary second sound.

Normal cardiac examination findings in the pregnant woman

Clinical Indicators of Heart Disease during Pregnancy

Symptoms:

- Progressive dyspnea or orthopnea
- Nocturnal cough
- Hemoptysis
- Syncope
- Chest pain

Clinical Indicators of Heart Disease during Pregnancy

Signs

- Cyanosis
- Clubbing of fingers
- Persistent neck vein distension
- Systolic murmur grade≥ 3/6
- Diastolic murmur
- Cardiomegaly
- Persistent arrhythmia

Pregnant women who have none of these findings rarely have serious heart disease.

Diagnostic Study &Normal Pregnancy Findings

ECG: 15º left-axis deviation

Echocardiography: Tircuspid regurgitation and significantly increased left-atria size and left-ventricular outflow crosssectional area

Chest Xray.: heart silhouette is larger in pregnancy; however, gross cardiomegaly can be excluded.

If indicated, heart **catheterization**.

Classification Of Heart Diseases In Pregnancy:

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3-Others:Arrhythmias,ischemic heart disease and cardiomyopathy.

Functional Classification :

Grade	Symptoms	Degree of compromise
I	No limitation of physical activity	Uncompromised
II	Mild discomfort as dyspnea, excess fatigue, angina or palpitations on ordinary activity	Slightly compromised
III	Marked discomfort on less than ordinary activity	Markedly compromised
IV	Unable to perform any activity without discomfort. Dyspnea at rest	Severely compromised

New York Heart Association 1928, 8th revised time in 1979.

Preconceptional Counseling

Preconception Care

1-Prenatal folic acid 400-500ug/d

2-Rubella immune status; immunize if not immune.

3-Medications contraindicated in pregnancy should be stopped:

- **Warfarin**: (Except with mechanical valves) Embryopathy (abnormal cartilage and bone formation)
- **ACE Inhibitors** (at all trimesters: Fetal renal dysgenesis)

Preconception Care

4-Manging or correction before pregnancy:

- **Associated Medical disorders :Anemia, control of diabetes or thydroid disorder.**
- **Surgical correction when indicated:**

  Commissurotomy or M vulve replacment for MS , coronary bypass for ischemic heart or correction of cyanotic heart diseases.

Preconception Care

5-Prevention/ postponing of pregnancy according to:

- The functional cardiac(Class III&IV NYHA)
- Risk of Maternal Mortality: moderate and severe (NYHA&ACOG)
- Congenital heart disease risks in the fetus with affected family members

Risk of Maternal Mortality

Heart Diseases

Contraindications To Pregnancy

Major Risk : Mortality 25-50%

- **Pulmonary hypertension**
- **Aortic coarctation with valvular involvement**
- **Marfan syndrome with aortic involvement**

Moderate Risk: Mortality 15-25%

Mitral stenosis, NYHA class III and IV

Aortic stenosis

Aortic coarctation without valvular involvement

Fallot tetralogy, uncorrected

Previous myocardial infarction

Marfan syndrome, normal aorta

Potential Contraindications To Pregnancy

NYHA = New York Heart Association&ACOG 1996

Risk of Maternal Mortality

Heart Diseases

Minimal Risk : Mortality 0-1%

- **Atrial septal defect**
- **Ventricular septal defect**
- **Patent ductus arteriosus**
- **Pulmonary or tricuspid disease**
- **Fallot tetralogy, corrected**
- **Bioprosthetic valve**
- **Mitral stenosis, NYHA class I and II**

NYHA = New York Heart Association&ACOG 1996

Congenital Heart Disease Risks in the Fetus with Affected Family Members

Maternal Heart Disease	Congenital Heart Disease in Fetus (Percent)		
Cardiac Lesion	Previous Sibling Affected	Father Affected	Mother Affected
Marfan syndrome	NS	50	50
Aortic stenosis	2	3	15–18
Pulmonary stenosis	2	2	6–7
Ventricular septal defect	3	2	10–16

Congenital Heart Disease Risks in the Fetus with Affected Family Members

Maternal Heart Disease	Congenital Heart Disease in Fetus (Percent)		
Cardiac Lesion	**Previous Sibling Affected**	**Father Affected**	**Mother Affected**
Atrial septal defect	2.5	1.5	5-11
Patent ductus arteriosus	3	2.5	4
Coarctation of the aorta	NS	NS	15
Fallot tetralogy	2.5	1.5	2-3

Management

Management According To The Functional Grade

Class I And II During Pregnancy

- **Bed rest: At least 10 hours each night and half an hour after each meal.**
- **Light house work and walking is permitted but no heavy work.**
- **Avoid salt rich foods.**
- **Weight gain should not exceed 12 kg during pregnancy.**
- **Avoid contact with persons who have respiratory infections including common colds and flu condition.**

Class I And II During Pregnancy

- Pneumococcal &influenza vaccines are recommended.
- Cigarette smoking is prohibited.
- Observe for signs and symptoms of deteriorating heart condition,if deterioration: Induce abortion< 13 weeks.
- Active treatment of anemia . Hemoglobin should be kept at or above 12 g/dl throughout pregnancy.
- Tachycardia with MS can be treated with beta-blocker drug as propranolol (inderal)

  to have HR ± 80/m.
- Treatment of Paroxysmal Supra Ventricular (PSVT) &Atrial Fibrillation(AF).

Paroxysmal Supra Ventricular Tachycardia (PSVT)

- **Symptoms include dizziness, syncope, chest discomfort, dyspnea and palpitations**
- **Unilateral *carotid sinus massage for* 10 seconds The patient should lie supine with IV fluids running and by ECG, if there is no response, try massaging the opposite side (not simultaneously).**
- **The patient may attempt a valsalva's maneuver during the carotid sinus massage . If this fails, the case is managed as with atrial fibrillation.**

Atrial Fibrillation(AF)

Investigation for the precipitating causes

- Myocardial ischemia
- congestive heart failure
- pulmonary embolism
- fever
- Hypovolemia

Atrial Fibrillation(AF)

- Anxiety
- Hyper-thyroidism
- Symphathomimetic
- Aminophylline.

- **Any underlying causes or a medical disorder mandates treatment. Consultation with a cardiologist is of great value.**

Atrial Fibrillation: Treatment

- **If the patient of AF is hemodynamically stable cardiac conversion is usually achieved by verapamil (e.g. Isopten) administered intravenously.**
- **If hemodynamically compromised or pharmacological conversion is not achieved direct current (DC) cardioconversion can be resorted to.**
- **Beta-blockers can be of help when the above measures are ineffective.**
- **Anticoagulation is necessary if history of TED.**

Class I And II During Labor

- Semi-recumbent position with lateral tilt.
- Vital signs every 15 minutes and every 10 minutes in the second stage.
- Pulse rates > 100 and respiratory rates >24 indicate impending heart failure.
- Oxygen by face mask. + Pulseoximetry.
- Restriction of IV fluid to 75 ml per hour.
- Straining during the second stage of labor is avoided as far as possible.
- Outlet forceps or ventous delivery can be used to shorten the second stage.

Class I And II During Labor

- No bolus oxytocin : sudden hypotension &no ergot (Methergin): sudden hypertension.
- Prophylaxis for the bacterial endocarditis -mainly streptococcus viridans - in parturient with RHD, vulvar prosthesis, previous endocarditis , cardiac surgery and cyanotic heart D.
- Thromboprophylaxis: MS,HF, vulvar prosthesis and other general risk factors
- Treatment of pulmonary edema (which is most likely developed immediately postpartum)

Antimicrobial Prophylaxis

- **Either ampicillin, 2 g, or cefazolin or ceftriaxone, 1 g, is given intravenously. For penicillin-sensitive patients, one of the latter regimens is given, or if there is a history of anaphylaxis, then clindamycin, 600 mg is given intravenously.**
- **The recommended oral regimen is 2 g of amoxicillin. If enterococcus infection is of concern, vancomycin is also given.**

American College of Obstetricians and Gynecologists (2008)

Treatment Of Pulmonary Edema

Pulmonary edema is common with MS and most likely to develop immediately postpartum

- Probing up the patient to semisitting position
- Oxygen by a face mask or nasal prong
- Furosemide (Lasix) IV 10 to 40 mg
- Morphine 5 mg IV slowly .If hypotension does not occur, 10 mg can be given 15 minutes later.

Class 1 And II During Labor

- Spontaneous vaginal delivery is associated with less morbidity in spite of the increased effort.
- Pain relief : Pethidine and gas &O2.

Epidural anesthesia (Fentanyl) is advised especially in primigravidas

Class I And II During Labor

Regional (spinal &Epidural)Vs General Anesth.

- **Regional anesthesia is preferred to general anesthesia for CS.**

If hypotension occurs, IV infusion of 10 mg of metaraminol (Aramine) in 250 ml of saline is the vasopressor of choice. It has a central inotropic action and is preferred to ephedrine as it does not cause tachycardia.

- **Regional anesthesia is not recommended in :**

❖ **A.stenosis : low or fixed cardiac output**

❖ ***Tetralogy of Fallot***

❖ **Severe mitral stenosis: Pulmonary edema, as the resolution of the sympathectomy may coincide with the postpartum increase of venous return.**

Class I & II During Puerperium

- Continue close monitoring in the puerperium to avoid or to detect early the complications mainly:
  - Infection
  - Hemorrhage
  - Thromboembolism
- Breast feeding is allowed in the absence of heart failure.
- Sterilization or other contraceptive options should be discussed.

Management Of Class III& IV _(Heart Failure)

- If seen early enough : termination is considered.s
- If the woman chooses to continue pregnancy, prolonged hospitalization or bed rest will often be necessary.
- Strict adherence to advice and treatment.
- Caesarean section is poorly tolerated.
- Treatment of heart failure.

Heart Failure

Heart failure is divided into 2 types:

- **Left-sided heart failure** is failure of the left ventricle). This may result in pulmonary edema It manfists by dyspnea,orthopnea &paroxysmal nocturnal dyspnea
- **Right-sided heart failure** is failure of the right ventricle and may result in hepatomegaly, ankle edema, ascites and pleural effusion.

Treatment Of Congestive Heart Failure (CHF)

Consultation with internist is usually necessary.

- **1.Recognition of the *underlying cardiac disease.***
- ***2.*** **Rapid correction of a *precipitating cause* like anemia, respiratory tract infection, administration of beta sympathomimetic drugs or tachyarrthmia.**
- ***3.Bed rest***
- **4.Guard against thromboembolic complication. Exercises in bed and wearing compression stockings are of help, and heparin anticoagulation may be required..**

Treatment Of Congestive Heart Failure (CHF)

- **5.Diuretics:** IV furosemide &Chlorothiazide (25 to 50 mg daily) The changes in the hematocrit and electrolytes should be monitored if use of diuretics is prolonged.
- **6.Digoxin** is usually orally with a loading dose of 1.0 - 1.5 mg over 24 hours.

  A maintenance dose of 0.125 to 0.375 mg daily
- **5.Vasodilators** (↓ peripheral vascular resistance):sublingual nitroglycerine is the vasodilator of choice.

Surgical Management of RHD

. This is better done before pregnancy.

The main indications in pregnancy are:

1) Pulmonary edema not responsive to medical management

2) A reliable history of previous pulmonary edema while under good medical management

3) profuse and uncontrollable hemoptysis

or

4) progressive pulmonary hypertension.

Surgical Management of RHD

When *commissurotomy* is the procedure of choice ?

- **Mitral valve is not calcified &no incompetence**
- **Symptomatic young women who are considering pregnancy.**

Patients usually benefit for 5 to 20 years after commissurotomy.

If the symptoms recur later mitral valve replacement will be needed

Surgical Management of RHD

Mitral valve replacement

Operative mortality of 6%.

A porcine or human allograft (7-10 y duration) does not require chronic anticoagulant therapy and is recommended for women who desire to have other pregnancies.

. A mechanical valve (life) is recommended for those not desiring children as it requires continuous anticoagulant therapy.

Rheumatic Heart Disease In Pregnancy

Rheumatic Fever

- **The high prevalence rheumatic fever and RHDs in developing countries is due to the prevalence of streptococcal throat infection in children and crowdedness of the population.**
- **Rheumatic fever is an inflammatory - autoimmune - disease as a delayed sequela of throat infection with *group-A. β hemolytic streptococci.***

Rheumatic Fever

- Rheumatic fever is manifested by damage to the collagen fibrils and the ground substance of connective tissue.
- The disease process is widespread and affects primarily the joints, the heart, CNS, skin, subcutaneous tissue and renal glomeruli.
- Active antibiotic treatment of throat infections, & tonsillitis will diminish the incidence of acute rheumatic fever .

Diagnosis Of Acute Rheumatic Fever

The Major Criteria:

- Migratory polyartheritis
- Carditis (with mitral or aortic valve dysfunction)
- Chorea (restlessness, anxiety, and involuntary choreiform movements)
- Subcutaneous nodules
- Erythema marginatum.

The Minor Criteria :

- Fever
- Arthralgias
- Heart block
- Preexisting rheumatic fever or rheumatic heart disease
- Presence of acute phase reactants in the serum (elevated ASO).

The diagnosis :2 major criteria or
one major and 2 minor criteria

Chorea

Subcutaneous nodule.

Erythema marginatum.

Typically slightly raised annular lesions, pale pink in color, appear to wax and wane in their intensity, being more obvious in late afternoon.

Acute Rheumatic Fever (ARF)

- **ARF may be especially severe during pregnancy.**
- **Pregnancy tends to reactivate chorea (*chorea gravidarum)* and predisposes to its recurrence in subsequent pregnancy which can be fatal**
- **The long-term prognosis is excellent if there is no acute carditis.**
- **Acute carditis: The sequela is Valvular infiltrations that is progressively replaced by fibrosis mainly MS&AR with liability of recurrences of ARF and additional cardiac damage.**

Acute Rheumatic Fever (ARF)

Treatment

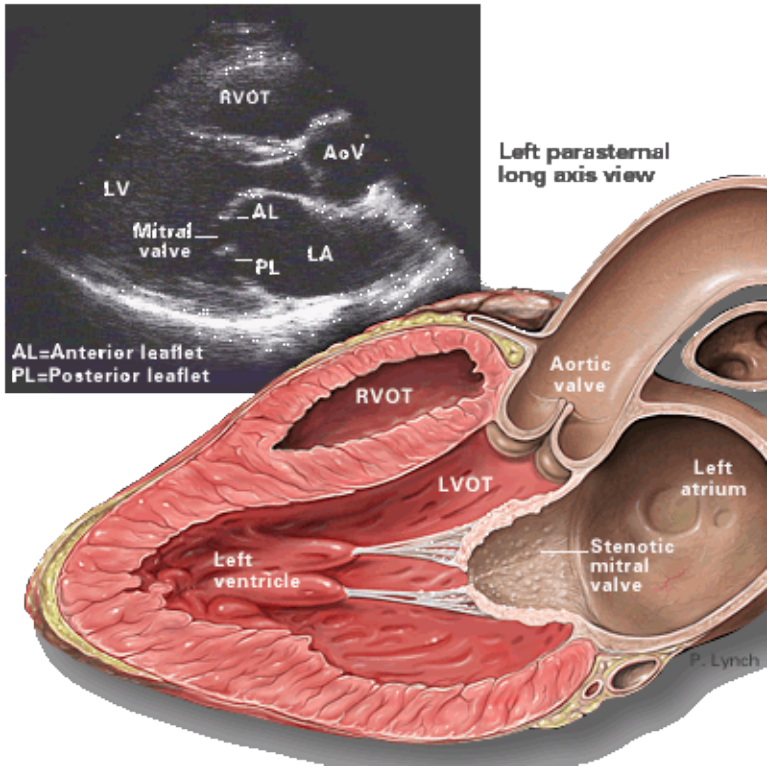
- Bed rest
- Salicylates,
- Glucocorticoids
- Penicillin therapy for any residual streptococcal infection.
- Prophlaxis :Deep IM injection of 1.2 million units of long acting (benzathine) penicillin / 4 weeks or erythromycin 250 mg orally twice daily.

Rheumatic Heart Disease In Pregnancy

- **Mitral stenosis** **90%**
- **Mitral regurgitation** **6.6%**

  (Most often in conjunction with MS).
- **Aortic regurgitation** **2.5%**
- **Aortic stenosis** **1%**

Mitral Stenosis



Pathophysiology of Mitral Stenosis

- Rheumatic carditis cause progressive thickening, scarring, and calcification of the mitral leaflets and chordae.
- Fusion of the commissures and chordae decreases the size of the mitral opening.
- This obstruction results in the development of a pressure gradient across the valve in diastole and causes an elevation in left atrial and pulmonary venous pressures.

Pathophysiology of Mitral Stenosis

- **Elevated left atrial pressures lead to left atrial enlargement, predisposing to AF &and arterial thromboembolism.**
- **Elevated pulmonary venous pressure results in pulmonary congestion and pulmonary edema.**
- **In advanced MS, patients develop pulmonary hypertension (due to P arteriolar vasoconstriction) and right-sided heart failure.**

Symptoms & Signs of MS

- **Dyspnea: Dyspnea is due to pulmonary congesion and reduced pulmonary compliance (capacity).**
- **Orthopnea &paroxysmal nocturnal dyspnea**

They occur as the disease progresses that result from augmentation of venous return from the dependent portions of the body upon recumbency.

- **Coughing, Hemoptysis *(particularly at night)* as a result of pulmonary congesion or pulmonary edema .**

Symptoms & Signs of MS

- **Sequelae of left atrial enlargement** :
  - **Premature atrial contractions**
  - **Paroxysmal atrial tachycardia**
  - **Atrial flutter, and attrial fibrillation (AF).**
- **Sequelae of AF :**
  - **Precipitate acute pulmonary edema or**
  - **Predispose to intra-atrial thrombosis which can embolize to cerebral arteries**
- **The jugular venous pressure ↑ when pulmonary hypertension develops**
- **The radial pulse is typically ↓ in volume.**

Symptoms & Signs of MS

Right ventricular hypertrophy

Shifting of the heart apex to *the left in the 5 IS.*

A diastolic thrill is usually felt over the apex.

Right ventricular failure (Late) :

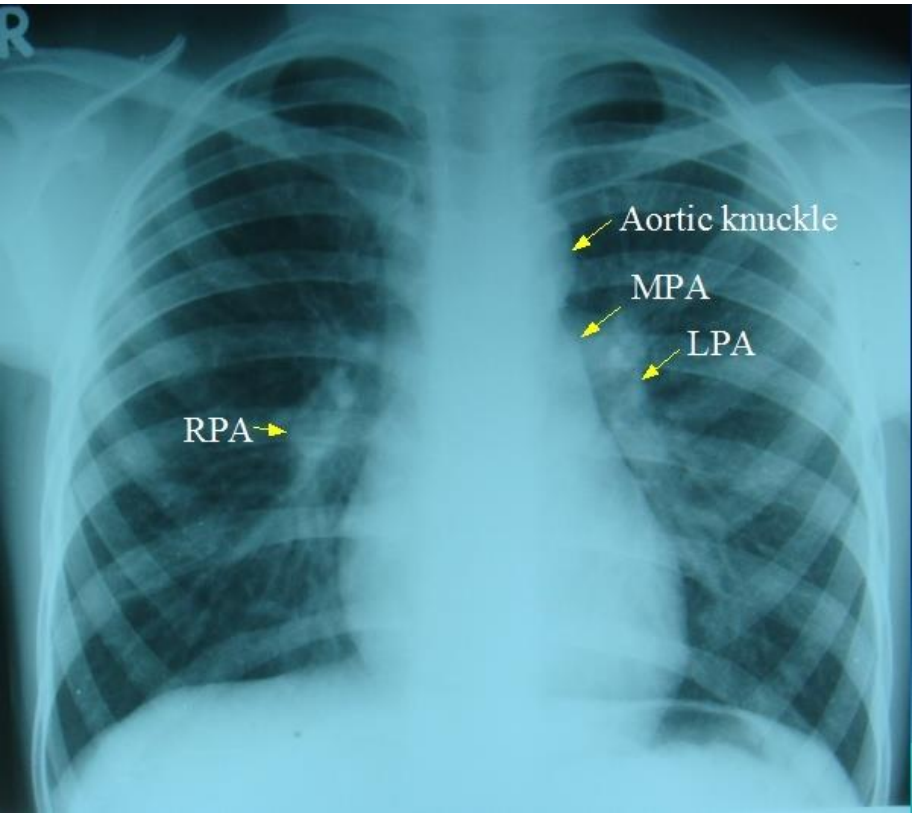
Hepatomegaly, ankle edema, ascites and pleural effusion, particularly on the right side

Auscultatation:

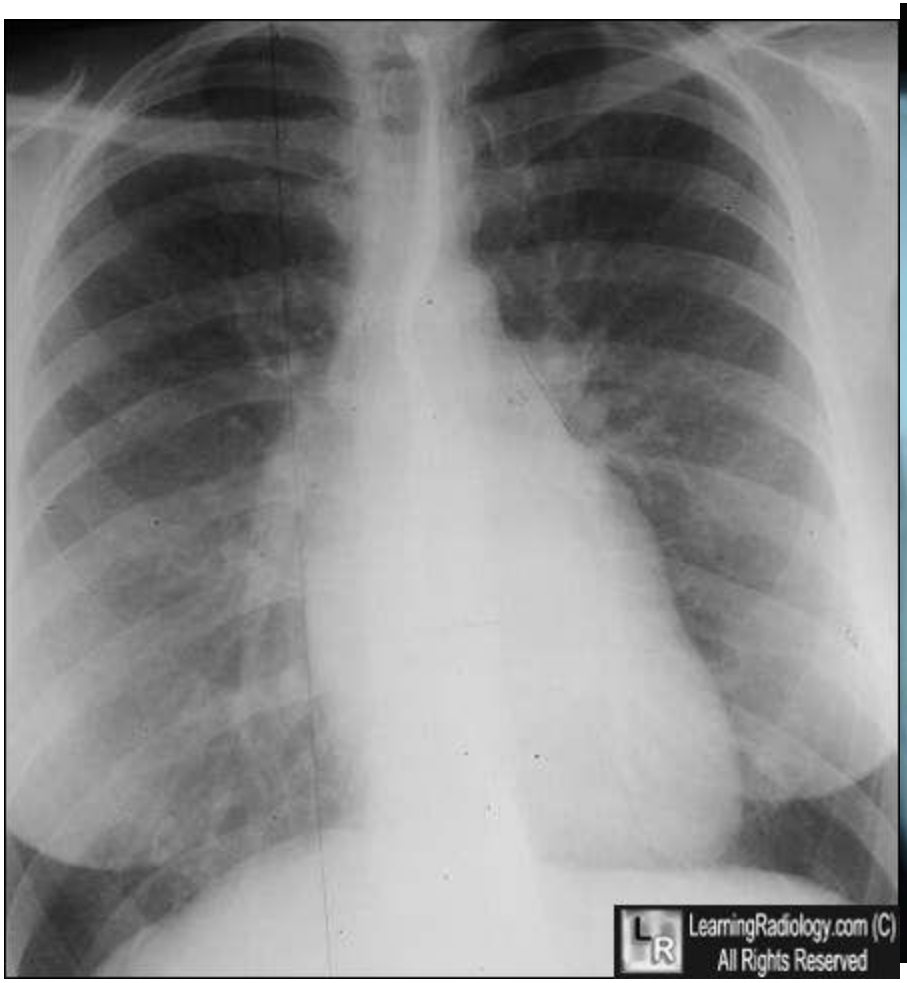
- **Accentuated first heart sound**
- **An opening snap (OS) follows the 2nd**
- **Low pitched mid-diastolic murmur (D. Rumble), as a result of turbulent flow across the stenotic M valve**

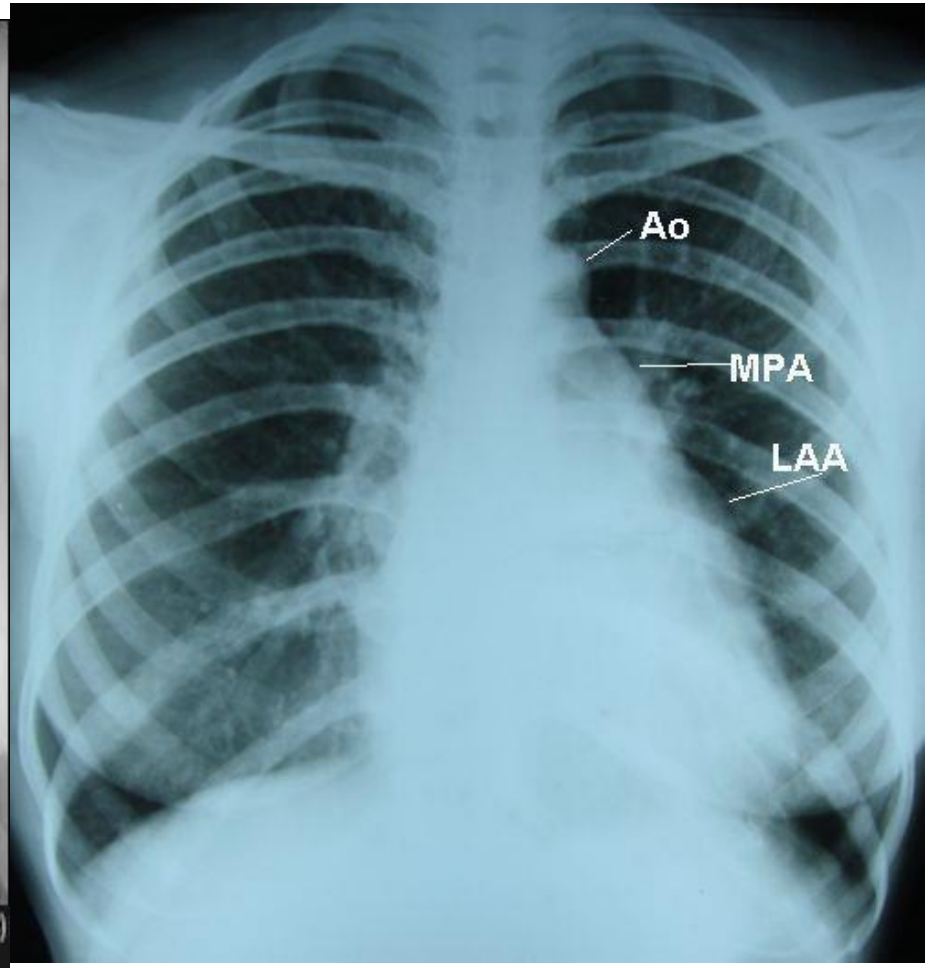
Chest X-ray : MS

- Enlargement of the left atrium
- Straightening of the left heart border.
- Prominent pulmonary trunk.
- Lung congestion or acute pulmonary edema (butterfly densities in the hilar region)
- In later stages right ventricular enlargement



Normal X-ray chest PA. RPA: right pulmonary artery; LPA: left pulmonary artery; MPA: main pulmonary artery. Right heart border is formed by the right atrium. Linear shadow above the right atrial contour is the superior vena cava along the right para spinal region. Left heart border is formed by the main pulmonary artery segment above and the left ventricle below. The mild depression in between is the region of the left atrial appendage. Apex is formed by the left ventricle in the normal chest X-ray. The left heart border is seen extending below diaphragm and is seen through the fundal gas bubble. Right ventricle is not a border forming strucutre in PA view.

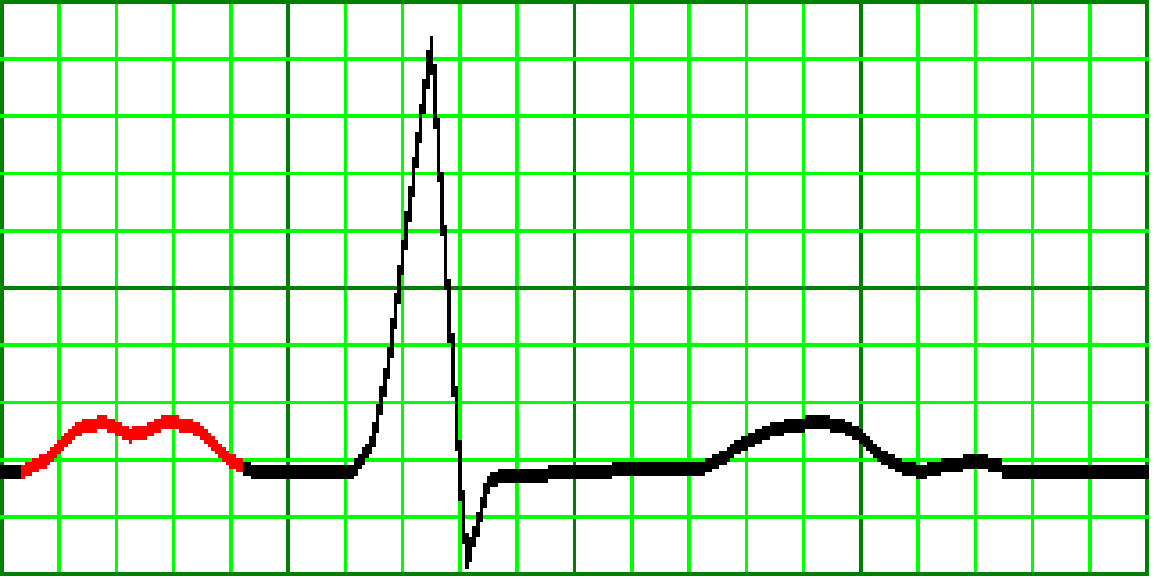




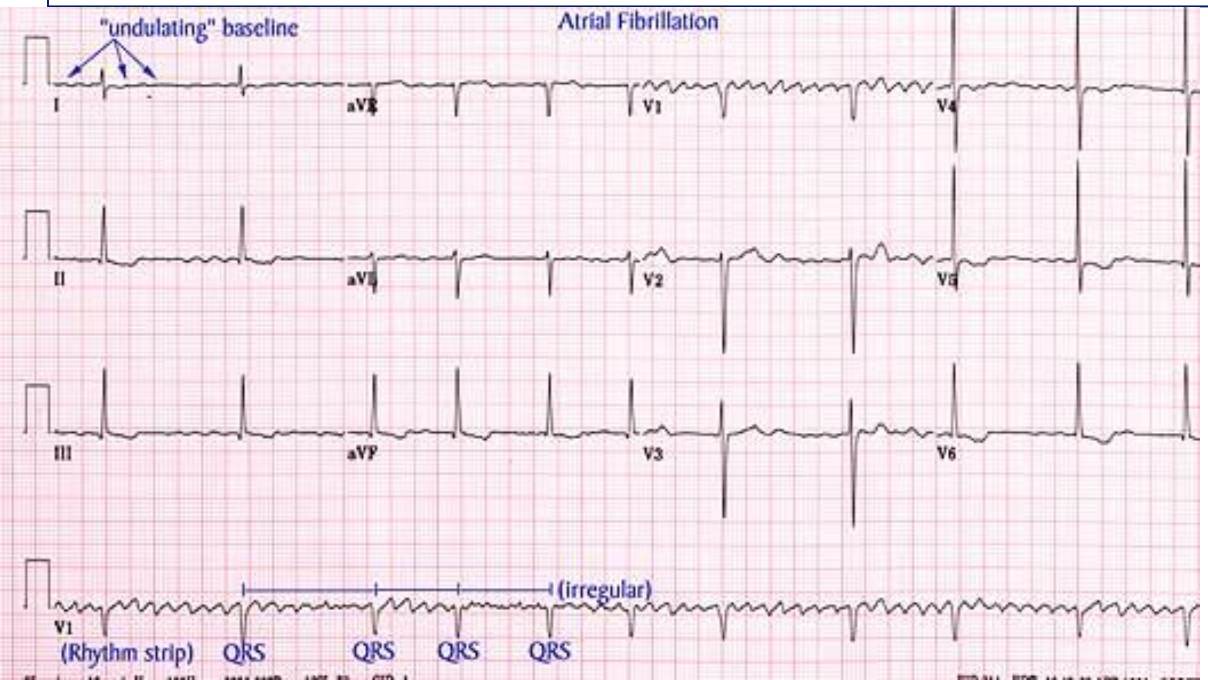
mitral stenosis

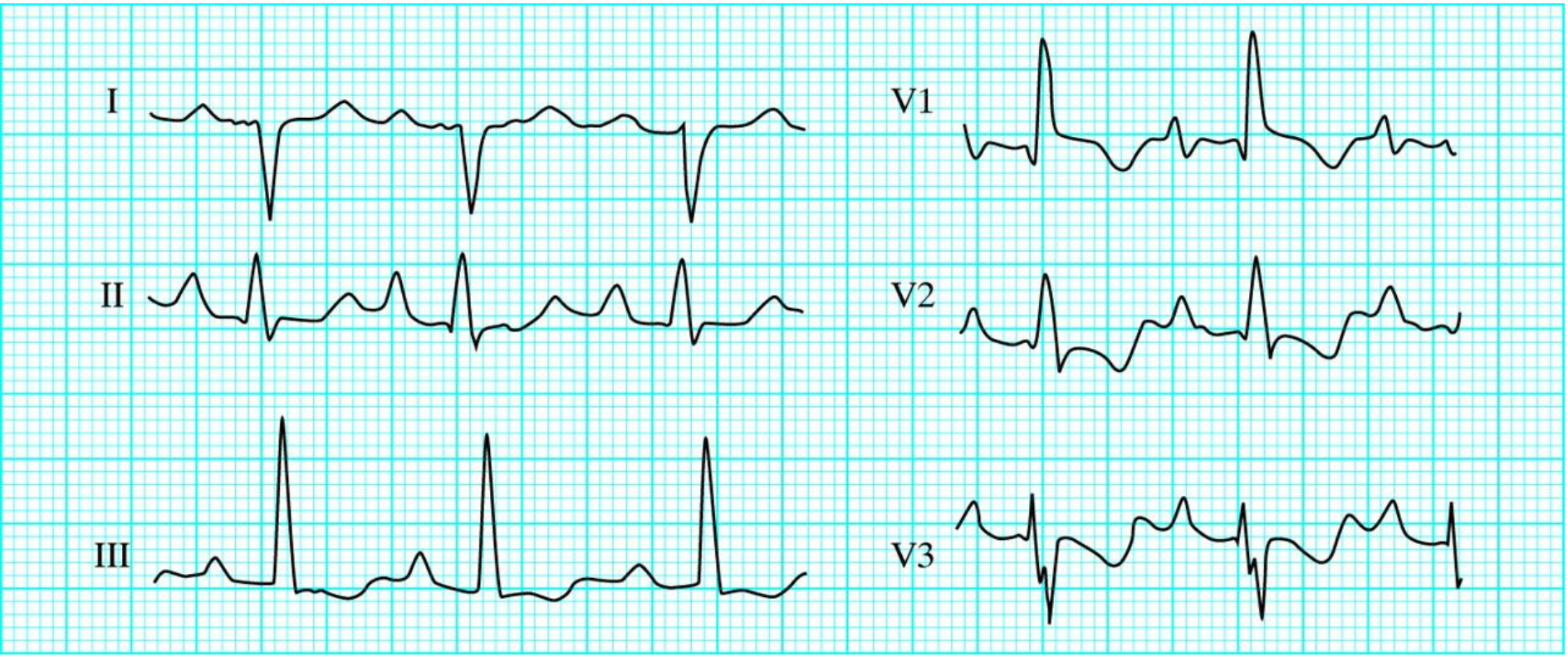
Mitral stenosis – straightening of left border on X-ray chest PA view

Severe mitral stenosis showing pulmonary congestion and left atrial enlargement, with a normal left ventricular silhouette



Notched P wave is often called “P mitrale with Lift Atrial enlargmen t(mainly due to MS)





Right ventricular hypertrophy
Prominent S waves in lead I) and tall R waves in lead V1 P waves in lead II (P mitrale).

Echocardiography of MS

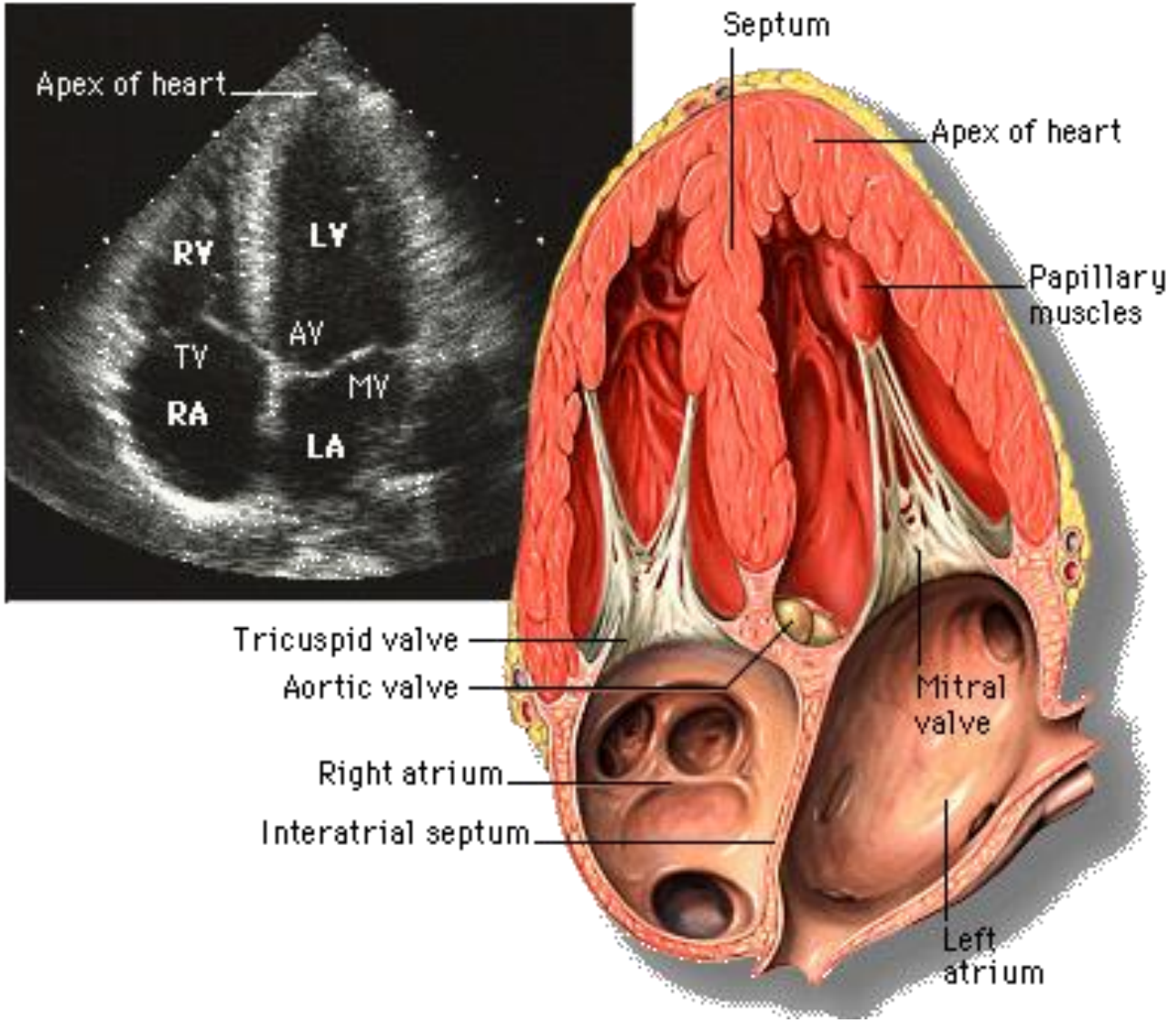
The accurate diagnosis of stenosis:

Mild MS< 2.5 cm^2 Severe MS < 1cm^2

(Normal: 4.0 cm^2)

It allows also assessment of

- **Pulmonary artery pressures**
- **Detection of other valve disease**
- **Visualization of left atrial thrombus**



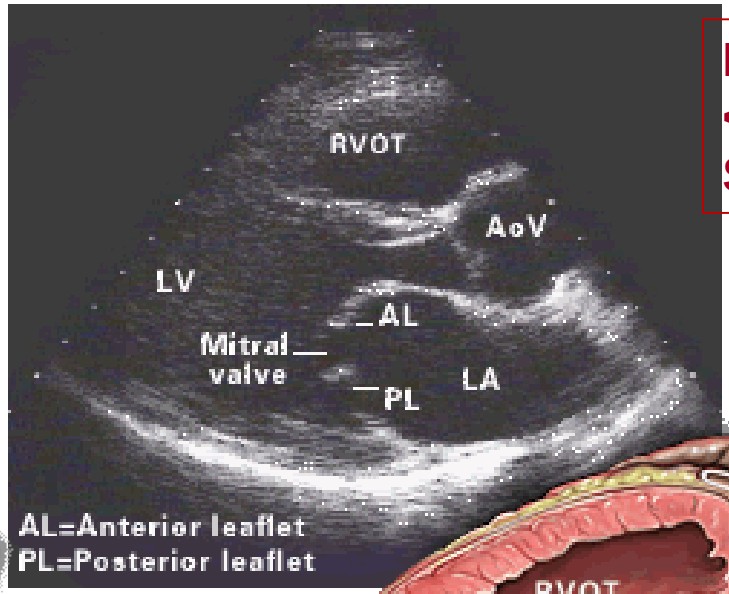
Normal Heart Apical 4 Chamber view

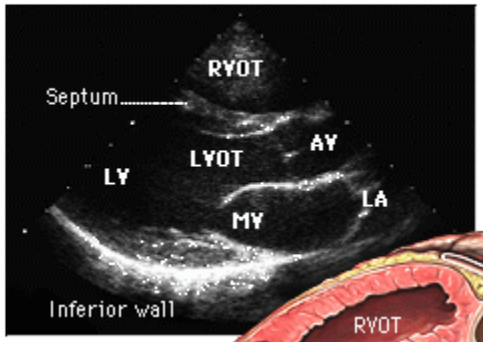
Pathophysiology
LA dilation
Pulmonary congesion
Passive pulmonary hypertension
Atrial fibrillation

Left para-sternal view

M valve stenosis
< 2.5 cm^2
Severe MS < 1cm^2

M valve is 4.0 cm^2.



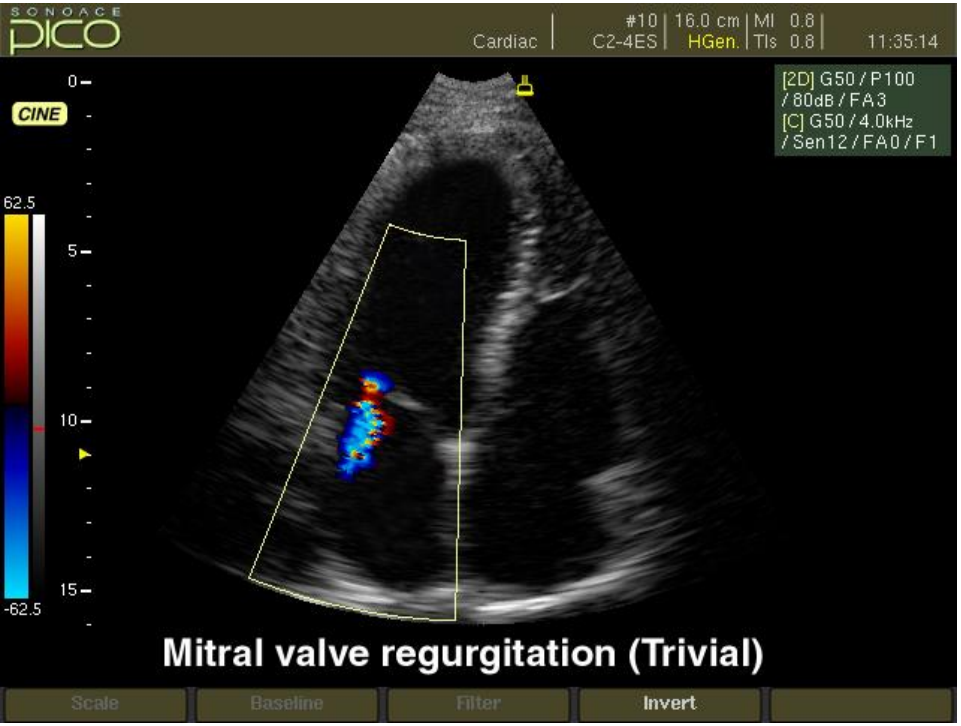


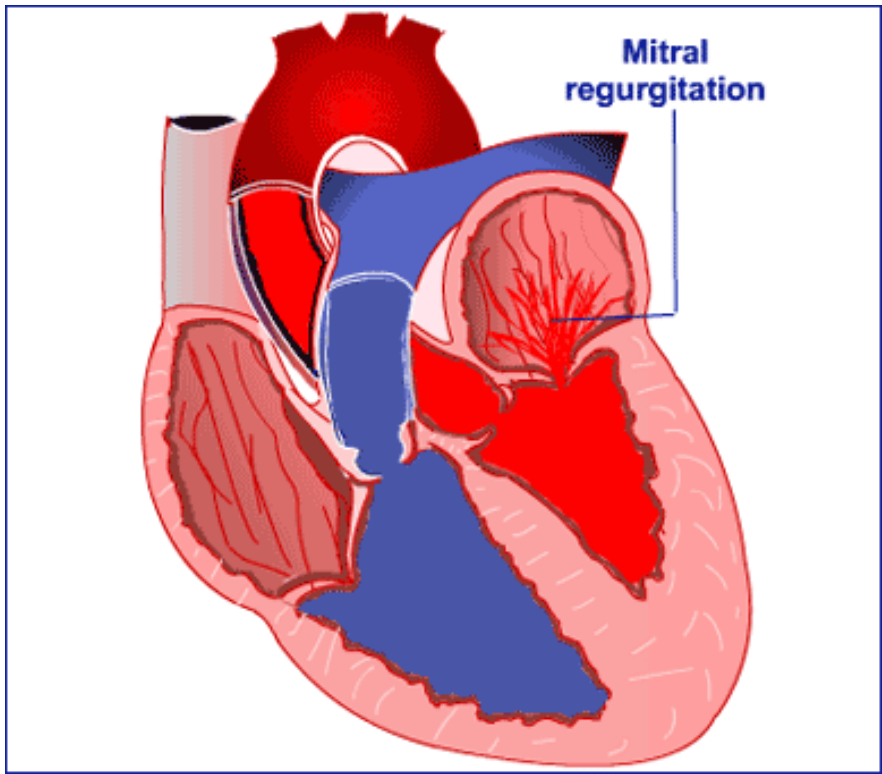
Normal Heart

Mitral stenosis

Mitral Regurgitation (MR)

- MR is leakage of blood from the left ventricle into the left atrium during systole
- It is frequently rheumatic and usually combined with MS (DM)
- May remain asymptomatic for years because the regurgitant load is well tolerated due to ventricular & atrial dilation.





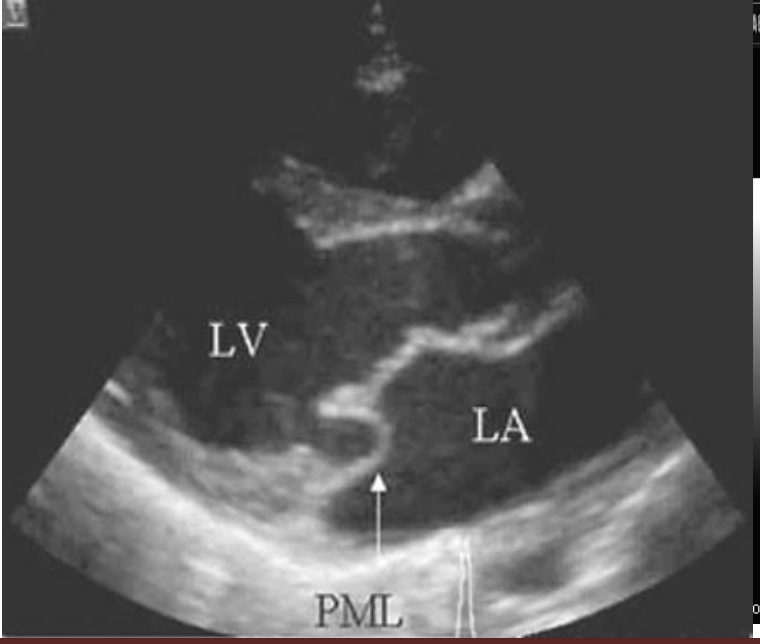
Mitral regurgitation

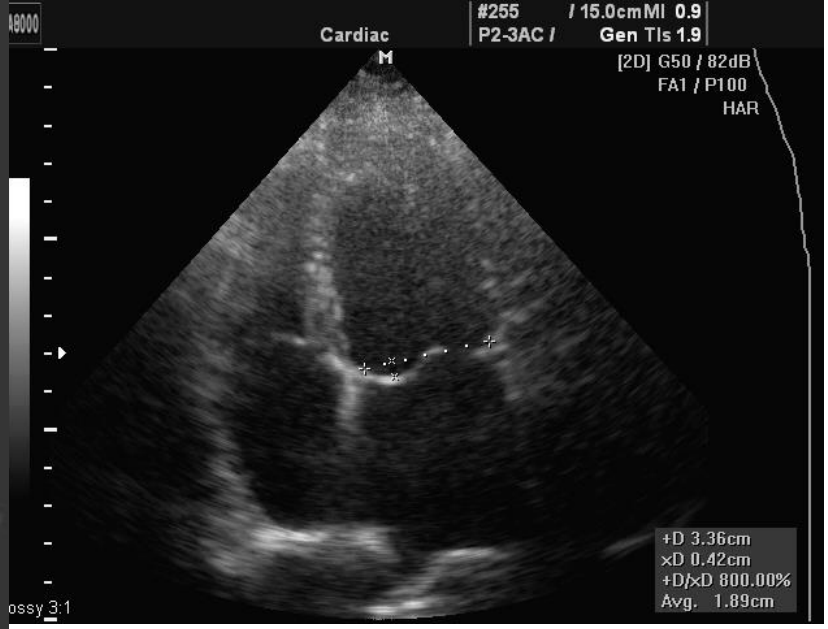
Mitral Regurgitation In Pregnancy

- **Mitral regurgitation is well tolerated during pregnancy, probably due to decreased systemic vascular resistance**
- **Heart failure rarely occurs.**

Mitral Valve Prolapse

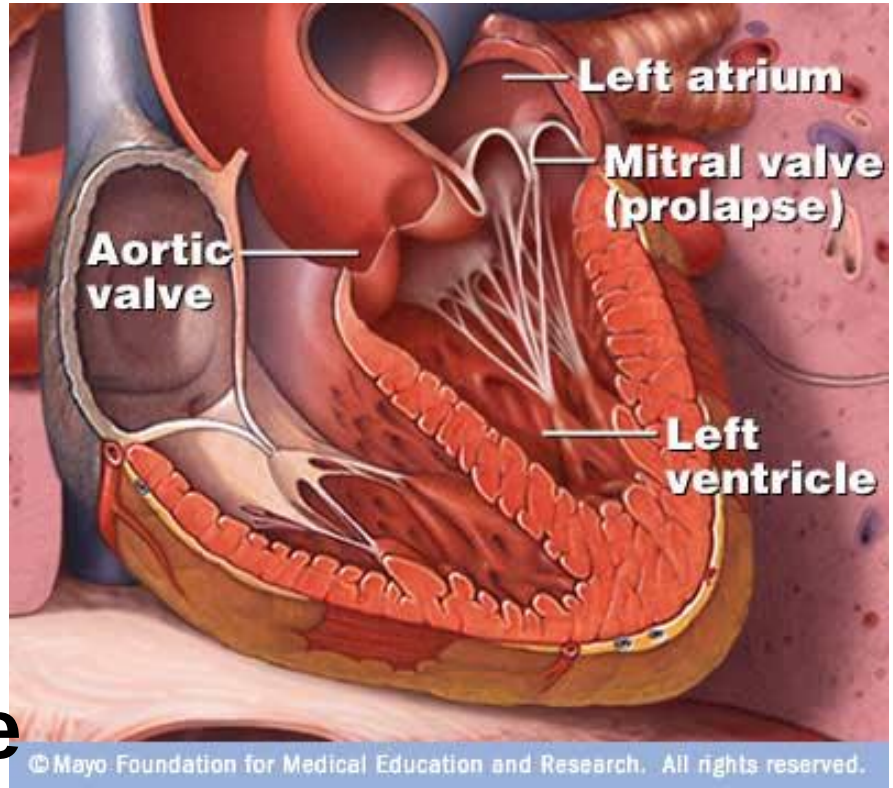
- Occurring in 2.4%of the general population due to defect of collagen synthesis (?genetic)
- Systolic bulging of one or both mitral leaflets into the left atrium during systole caused by a defect in collagen synthesis
- Most patients with MVP are asymptomatic.
- Symptoms (rare): Atypical chest pain, dyspnea, palpitations and syncope
- A midsystolic click, with a late soft systolic murmur





parasternal long-axis view) severe prolapse of the posterior mitral leaflet (PML

Diagnosis: Prolapse of >2 mm into the LA during systole in a parasternal long-axis or apical 3 chamber view



Mitral Valve Prolapse

Mitral Valve Prolapse In Pregnancy

- Rarely have complications.
- On the contrary, the pregnancy induced hypervolemia may improve the symptoms.
- Beta blockers may be given for palpitation.
- Mitral valve prolapse with significant mitral regurgitation: ↑ risk peripartum subacute bacterial endocarditis and should begiven the prophylactic antibiotic regimen

Aortic Regurgitation (AR)

- **It is the backward (diastolic) flow of blood from the aorta into the left ventricle.**
- **Causes : Rheumatic fever, connective tissue abnormalities, and congenital.**
- **Hemodynamic: Volume overload of the left ventricle and reduced diastolic perfusion of the coronary arteries.**
- **Symptoms: Mild cases of AR are *asymptomatic***

Late or severe :sensation of carotid pulsation.

If left ventricular failure develops: dyspnea, orthopnea and nocturnal dyspnea.

Exertional chest pain (angina pectoris)

Aortic Regurgitation (AR)

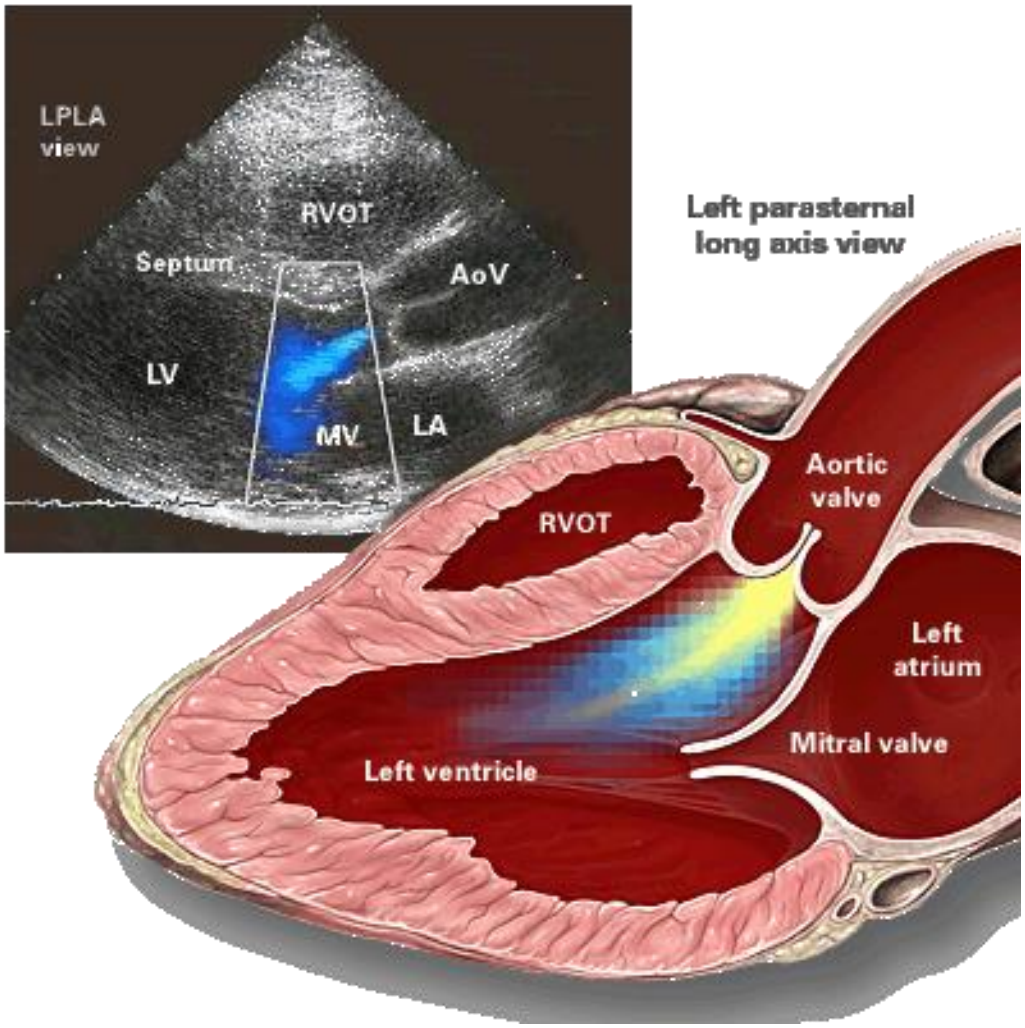
❖ ***Physical signs***

Water hammer" pulse (Corrigan pulse head bobbing, bounding carotid pulses, prominent capillary pulsation in the nail bed and pulsation of retinal arterioles. ↑ arterial pulse pressure . A diastolic thrill palpable along the left sternal border.

High-pitched diastolic murmur (left sternal)

❖ **ECG : Tall R (L ventricular hypertrophy) and deep S waves over the right precordial leads.**

❖ **Echocardiograpby (± Transesophageal) Evidence of Left ventricular hypertrophy and dilation**



Aortic Regurgitation

AR In Pregnancy

Aortic regurgitation usually is tolerated quite well during pregnancy, and patients who are asymptomatic do not require any medical treatment.

If pulmonary congestion develops, restriction of activity is essential, and treatment with digoxin, diuretics, and vasodilators is indicated.

Aortic Stenosis (AS)

- Stenosis reduces the normal 2 to 3 cm' aortic orifice and creates resistance to ejection**.**
- **Causes : Rheumatic, Aging & congenital.**
- **Hemodynamic:. Fixed low cardiac output in severe stenosis.**
- Concentric left-ventricular hypertrophy.
- **Symptoms: (Late) chest pain, syncope, heart failure, and sudden death from arrhythmias.**
- **Concentric left-ventricular hypertrophy**

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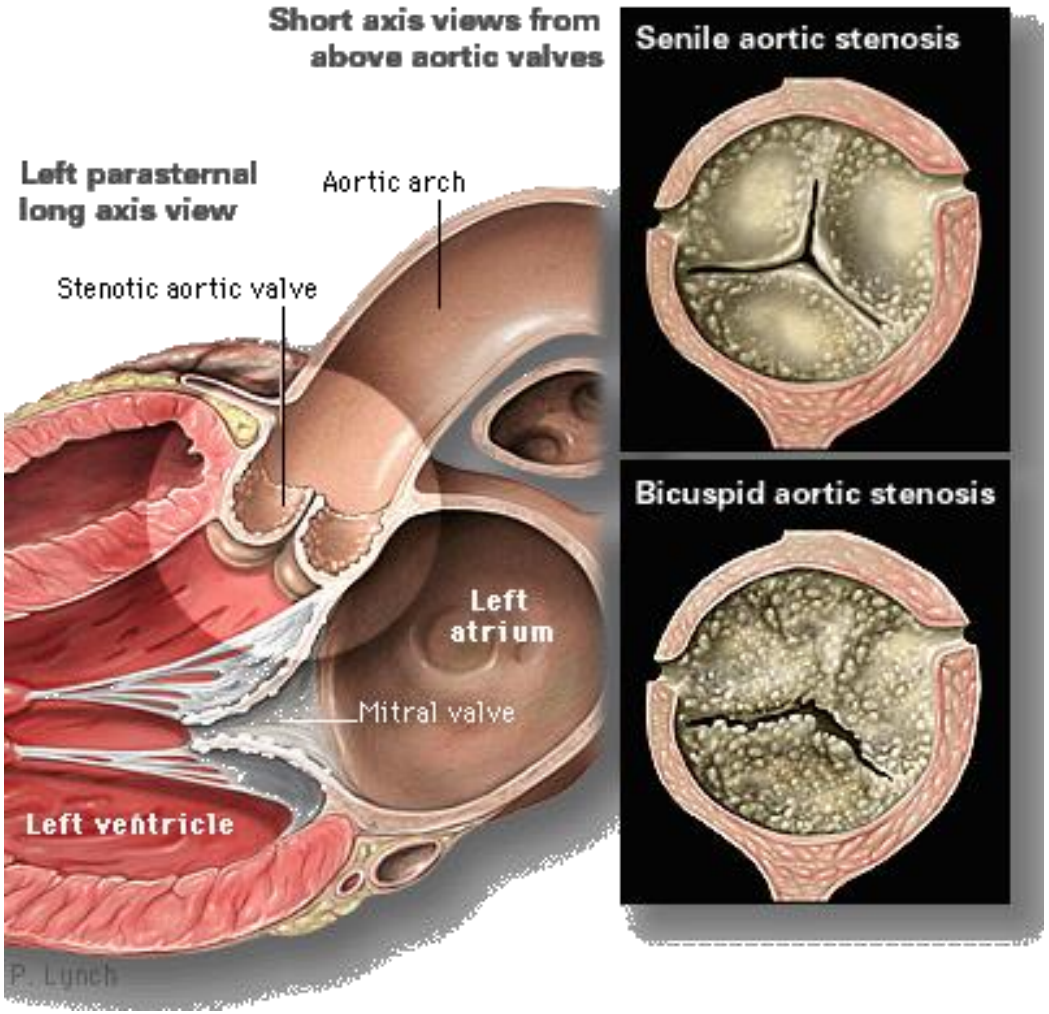


Aortic stenosis (senile)

Aortic Stenosis In Pregnancy

- Clinically significant aortic stenosis is uncommonly encountered during pregnancy.
- Mild to moderate degrees of stenosis are well tolerated, but severe disease is life-threatening.
- Factors that aggravate the fixed cardiac output:
  - Blood loss
  - Regional analgesia
  - Vena caval occlusion.

All of these aggravating factors decrease cardiac, cerebral, and uterine perfusion.

Major Cardiac Valve Disorders

Type	Cause	Pathophysiology	Pregnancy
Mitral stenosis	Rheumatic valvulitis	LA dilation and P. congestion Passive pulmon. hypertension Atrial fibrillation	Heart failure from fluid overload, tachycardia
Mitral insufficiency	Rheumatic valvulitis Mitral-valve prolapse LV dilatation	LV dilatation and eccentric hypertrophy	Ventricular function improves with afterload decrease
Aortic stenosis	Congenital Bicuspid valve	LV concentric hypertrophy, decreased cardiac output	Moderate stenosis tolerated; severe is life-threatening with decreased preload, e.g., obstetrical hemorrhage or regional analgesia

Major Cardiac Valve Disorders

Type	Cause	Pathophysiology	Pregnancy
Aortic insufficiency	Rheumatic valvulitis Connective-tissue disease Congenital	LV hypertrophy and dilatation	Ventricular function improves with afterload decrease
Pulmonary stenosis	Congenital Rheumatic valvulitis	Severe stenosis associated with RA and RV enlargement	Mild stenosis usually well tolerated; severe stenosis associated with right heart failure and atrial arrhythmias

Valvular Heart Diseases

- **Mitral Stenosis :Presystolic murmur & opening snap.**
- **Mitral Regurgitation : Pansystolic murmur.**
- **Aortic Stenosis: Systolic ejection murmur)**
- **Aortic Regurgitation: Diastolic murmur with wide pulse pressure**
- **Mitral Valve Prolapse : Systolic murmur with midsystolic click)**

Congenital Heart Diseases

The most common lesions seen in pregnancy are

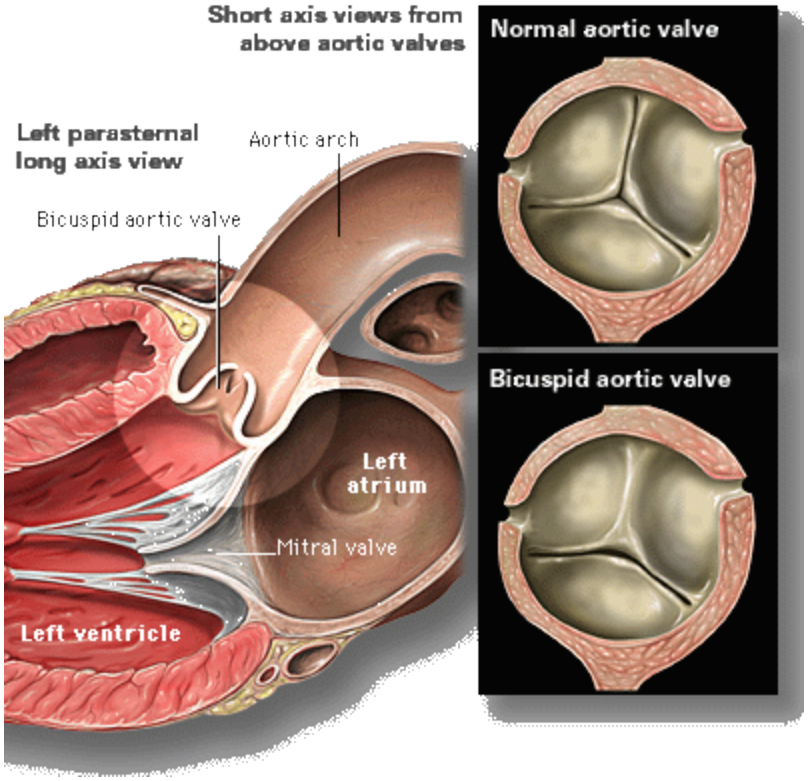
- **Aortic Stenosis**
- **Atrial Septal Defect**
- **Ventricular Septal Defect**

Congenital Aortic Stenosis

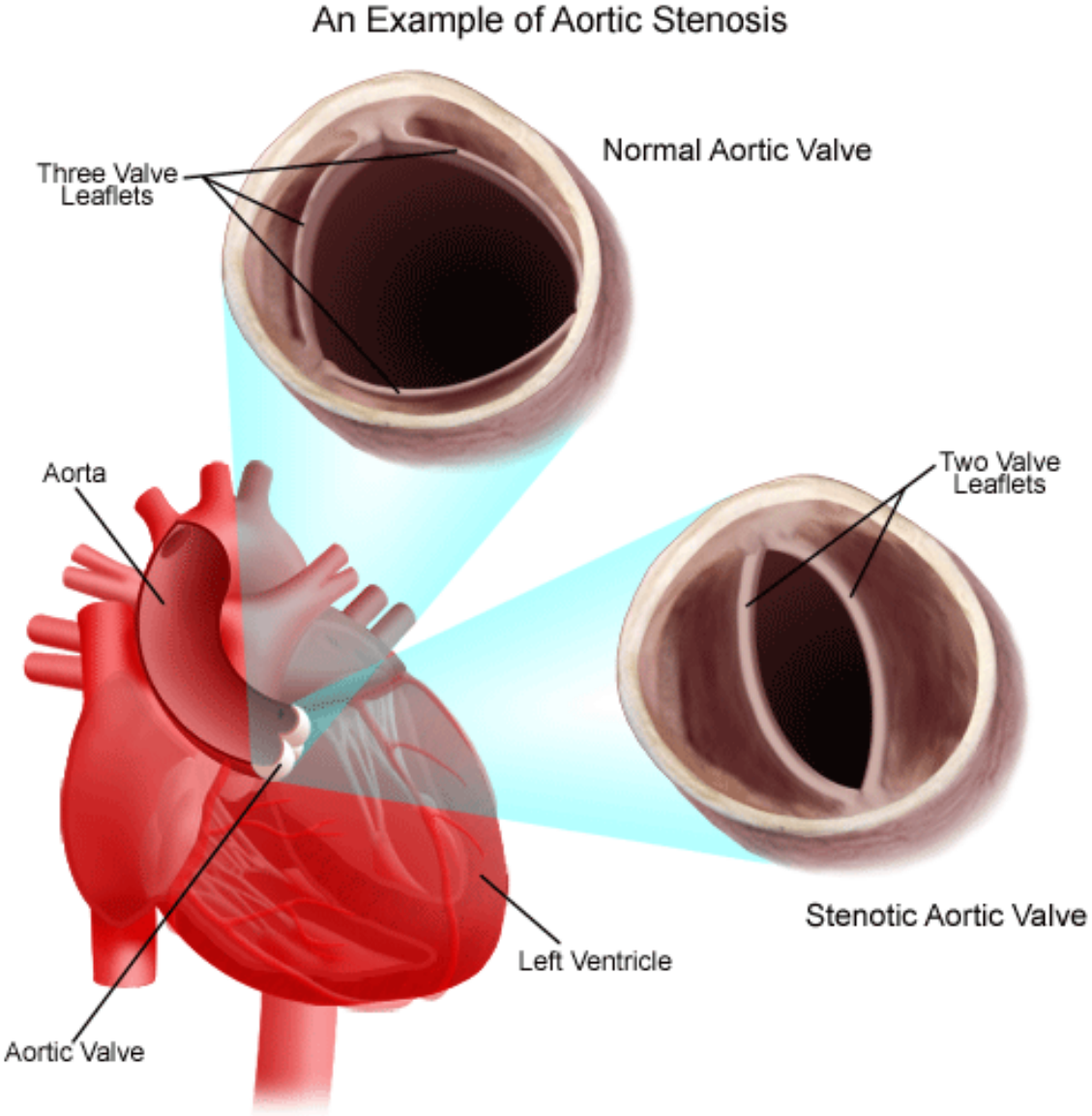
It is the most common congenital heart defect.

The manifestations of aortic stenosis due to bicuspid valve do not appear until relatively late in adult life

So, the condition is rare in reproductive age. The basic defect in aortic stenosis involves noncompliant valvular leaflets which place an increased blood volume load on the left ventricle during systole. The end result is ventricular hypertrophy and, later on failure.

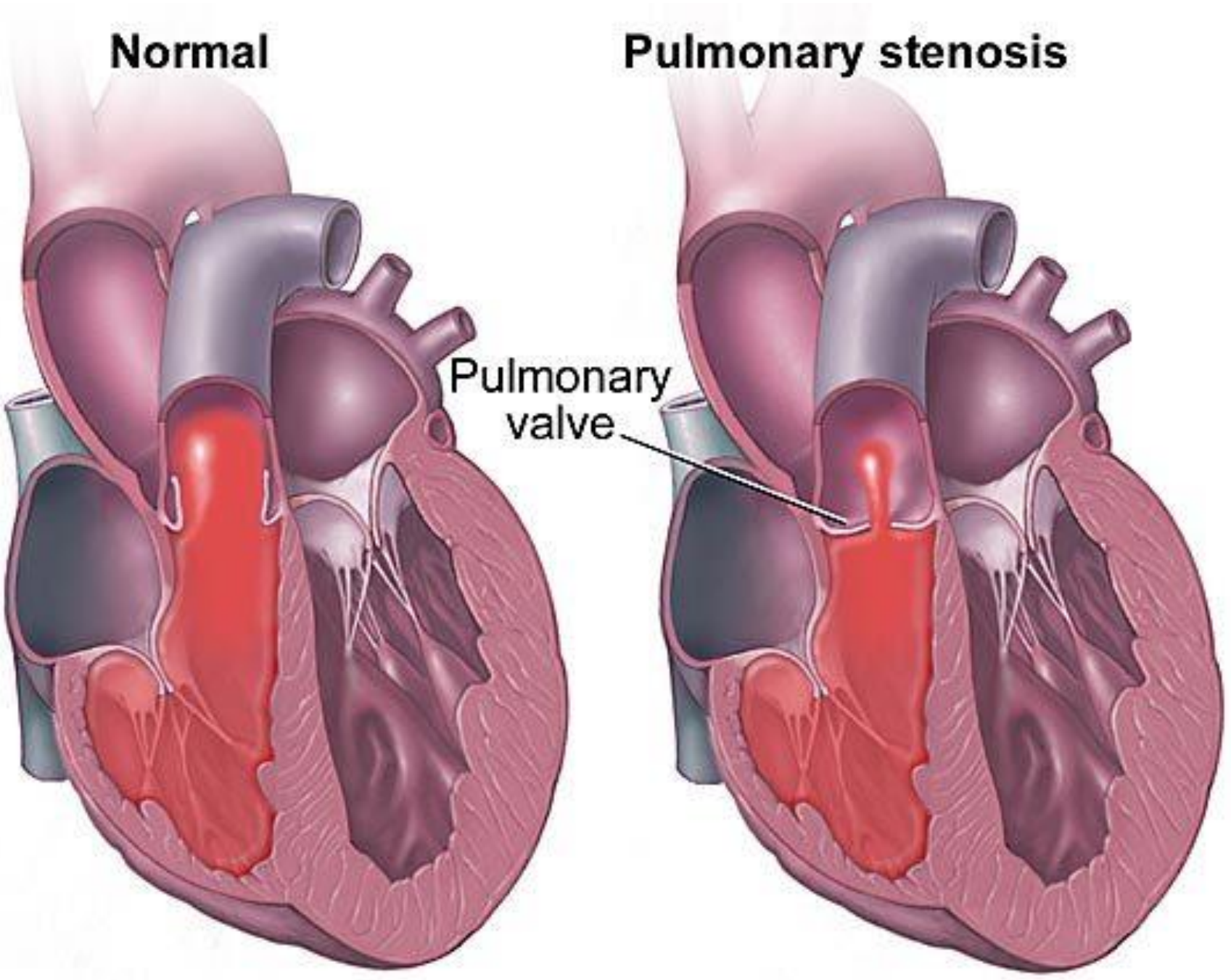


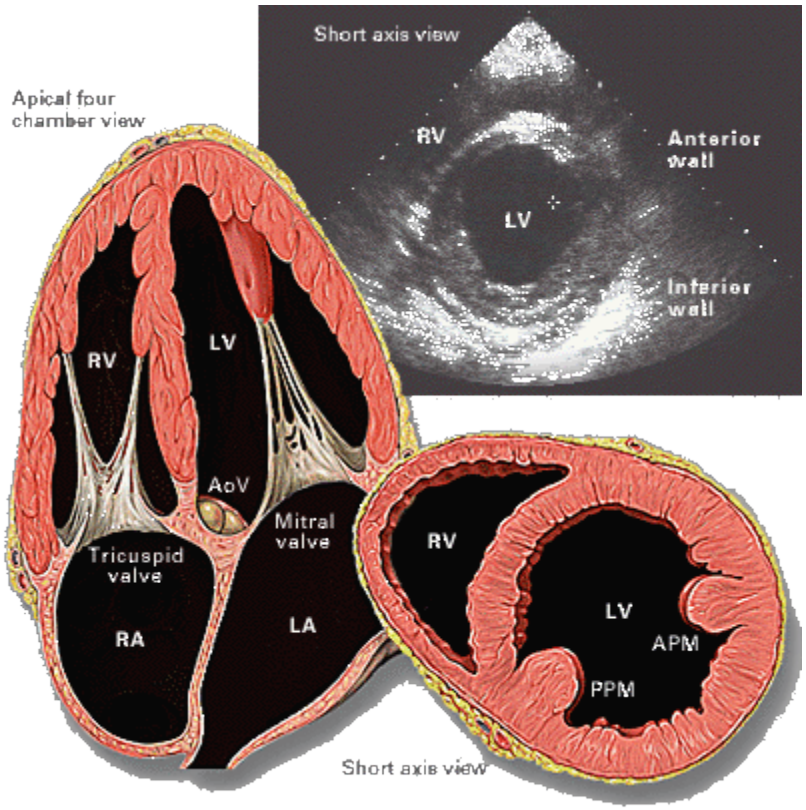
Bicuspid aortic valve(Congenital AS)


An Example of Aortic Stenosis
Three Valve Leaflets
Normal Aortic Valve
Aorta
Two Valve Leaflets
Stenotic Aortic Valve
Left Ventricle
Aortic Valve

Congenital Aortic Stenosis

- **The syncope, angina pectoris. and congestive heart failure**
- **A risk for sudden death that may be due to arrhythmias or sudden decrease in cardiac output due to the stenosis.**
- **Management includes bedrest, digitalis, diuretics and prophylactic heparinization for the duration of pregnancy**
- **Labor and delivery management : Hypotension and blood loss should be kept to the minimum. No conduction anasthesia**

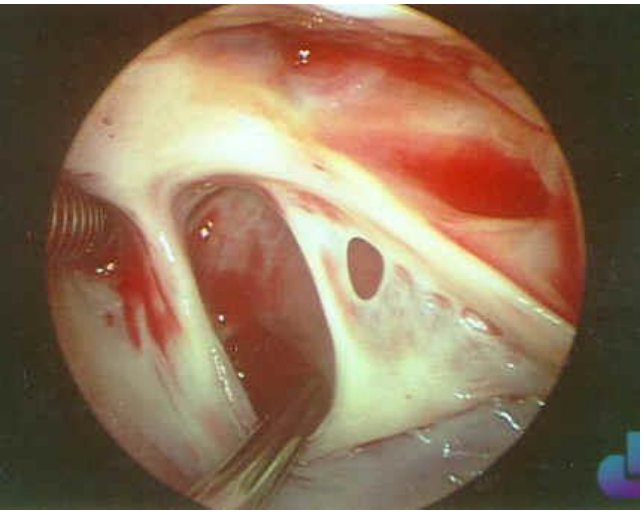

Normal
Pulmonary stenosis
Pulmonary valve

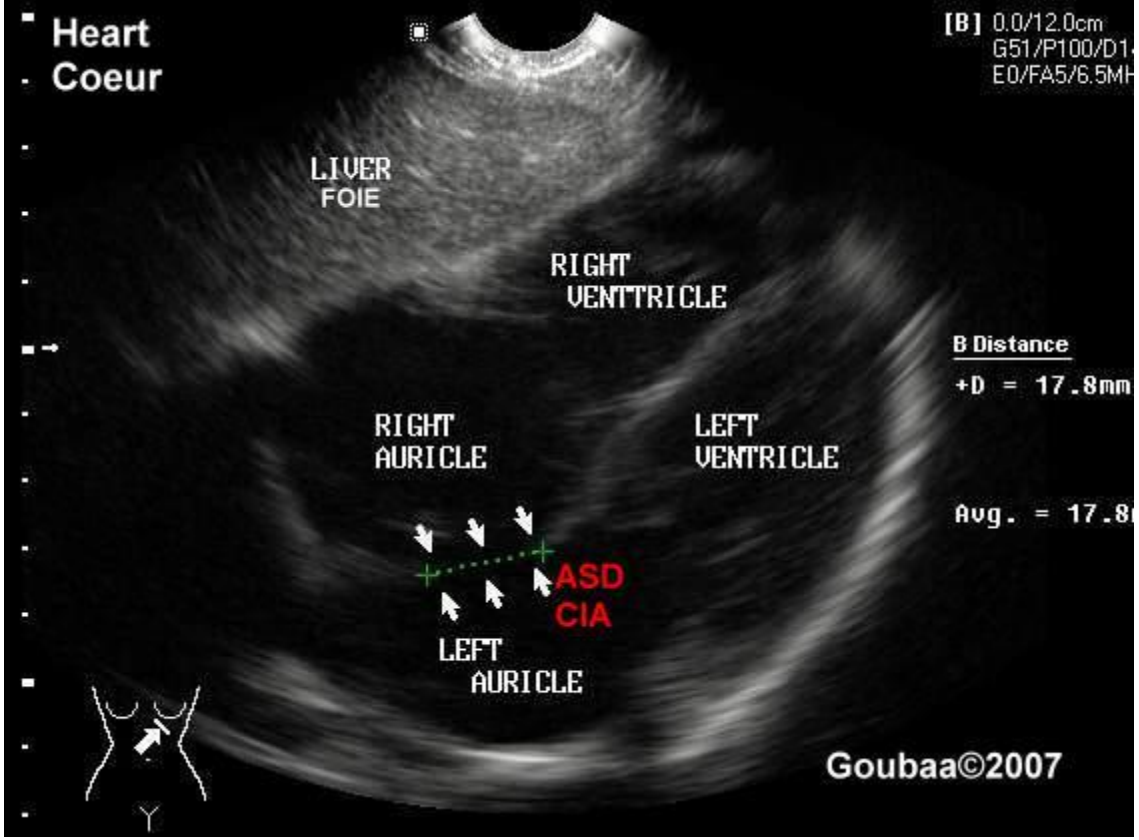


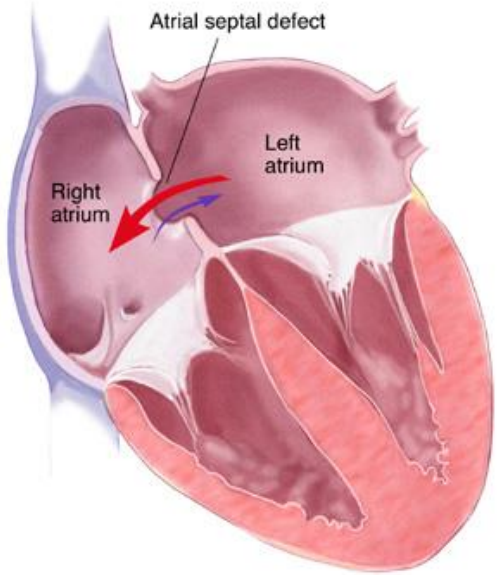
Cardiomyopathy

Atrial Septal Defect

- **It is the second common congenital heart disease after congenital aortic valve stenosis. Many are asymptomatic until adult age.**
- **The defect results in slight to moderate left to right shunting of blood. The shunt is more marked if the septal defect is associated with mitral valve prolapse. Pulmonary hypertension is a rare sequela. A systolic murmur is heard on the left side of the sternum. It is tolerated during pregnancy. However, the defect is better being surgically corrected before pregnancy.. Peripartum prophylaxis against SBE is required for all cases with atrial septal defect.**







Atrial septal defect

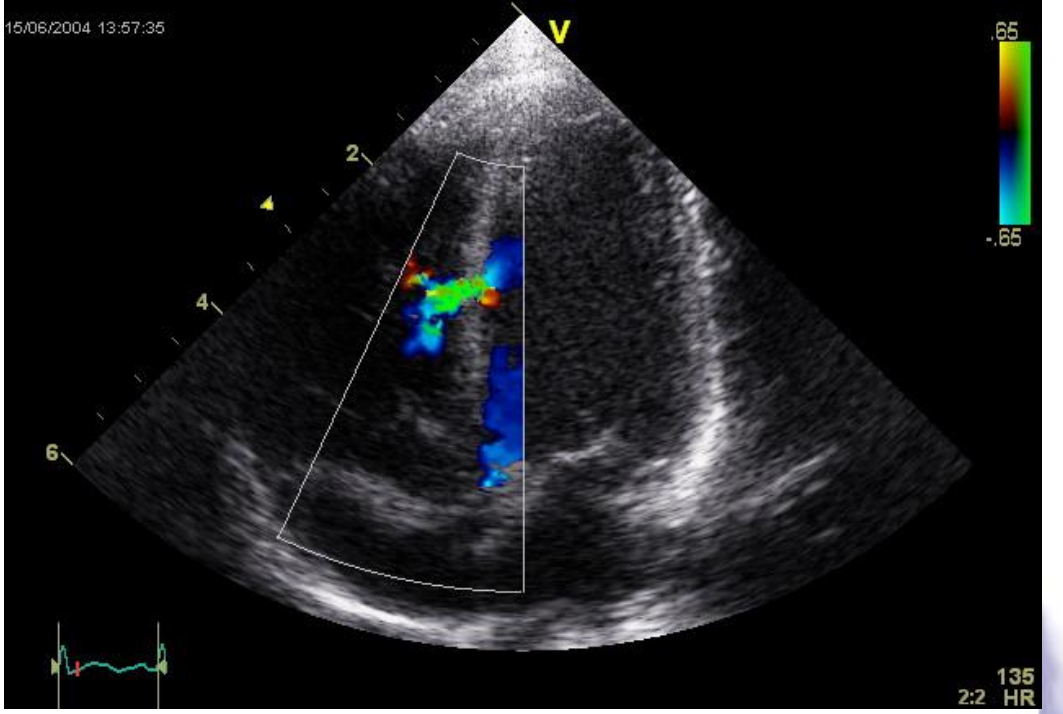
Ventricular septal defect

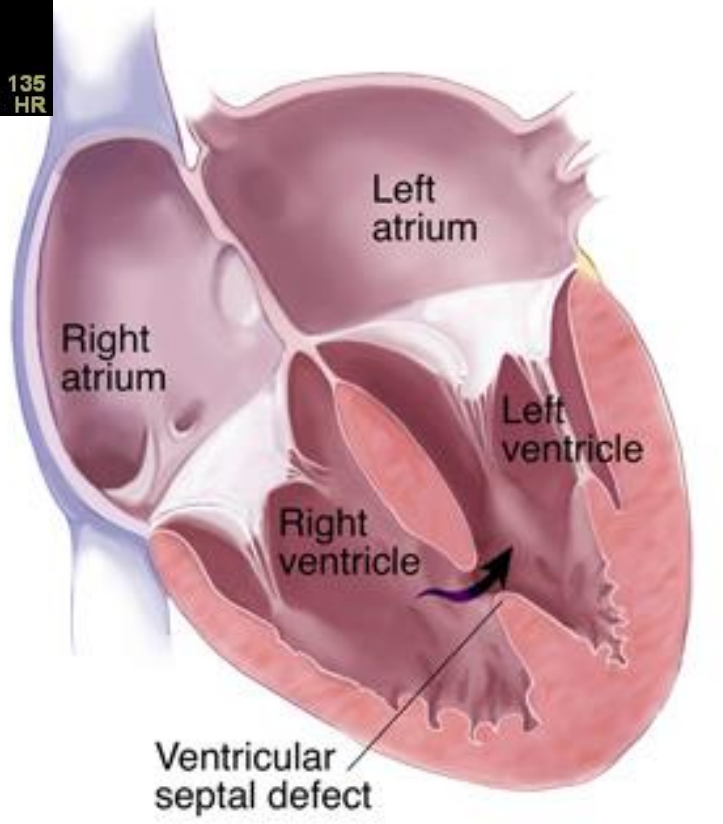
It results in left-to-right shunt. This can be significant if the defect is wider than the aortic orifice.

Arrhythmias are commonly associated.

A to-and-fro murmur is usually heard to the left of the sternum.

A marked shunt can result in pulmonary hypertension and reversal of the shunt, cyanosis or Eisenmenger syndrome.





Ventricular septal defect

VSD In Pregnancy

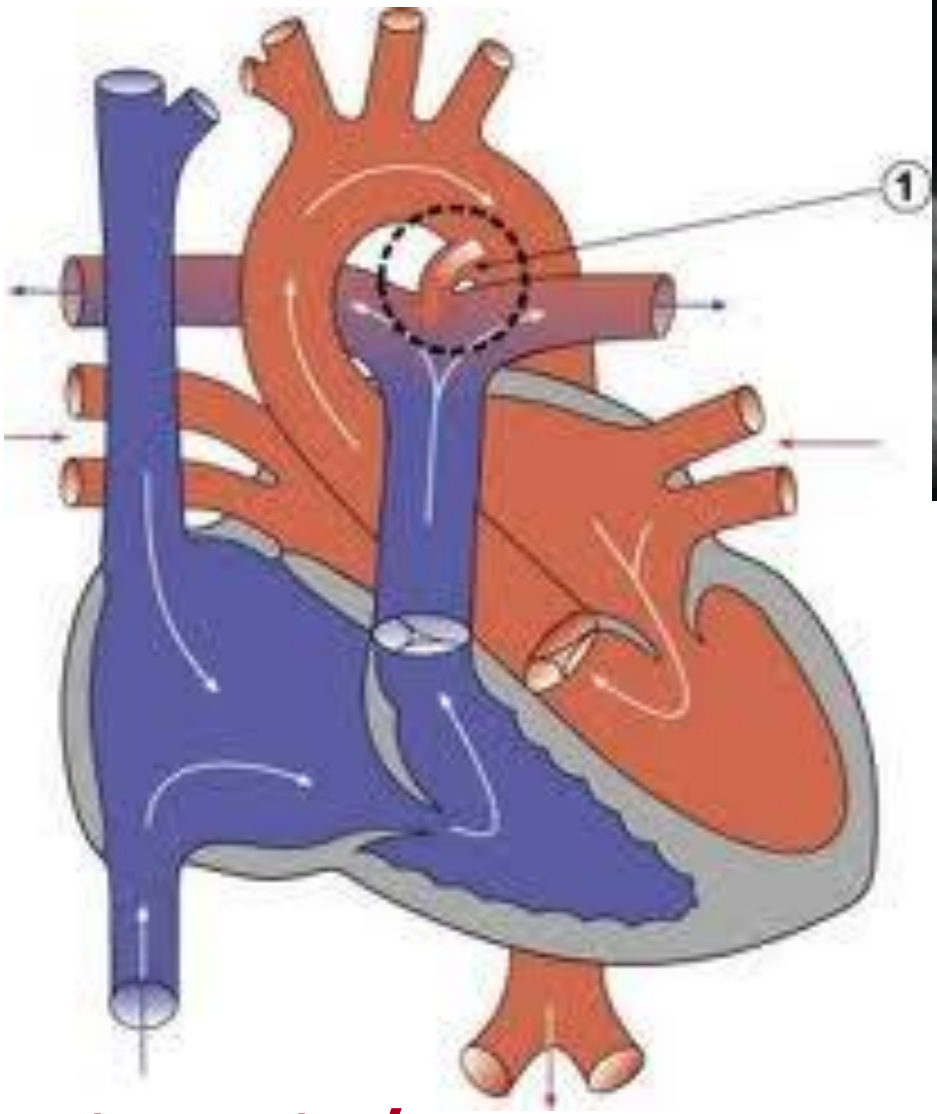
pregnancy is well tolerated in uncomplicated cases

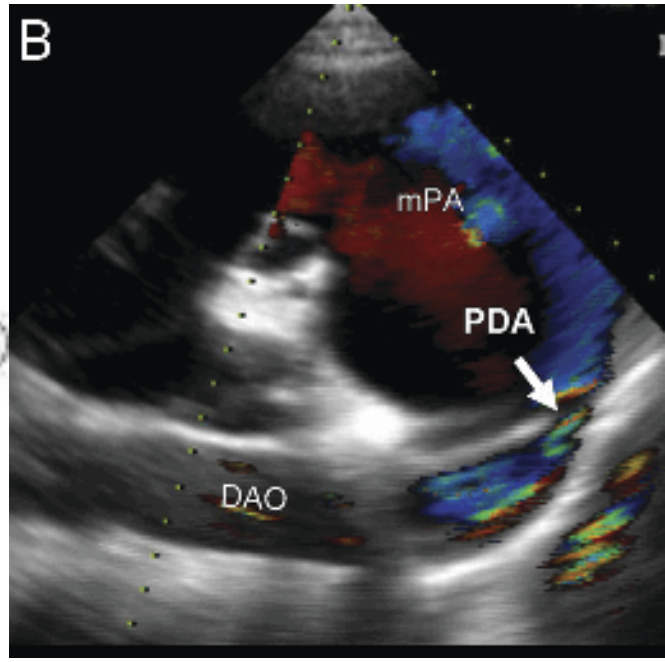
Advanced cases should be strongly advised against pregnancy, and induction of abortion should be advised if recognized .

- The defect should be surgically corrected in children and if recognized before pregnancy. However,
- Antibiotic prophylaxis is recommended in the peripartum.

Patent ductus arteriosus

- **This is a common defect in adults, and the main effect is a left-to-right shunt. In the patient with an uncorrected patent ductus, pregnancy is usually well tolerated.**
- **However, with large shunt, pulmonary hypertension and reversal of the shunt occurs, which will markedly worsen the prognosis.**





Patent ductus arteriosus

Tetralogy of Fallot

It is one of the most common forms of cyanotic heart disease in adults.

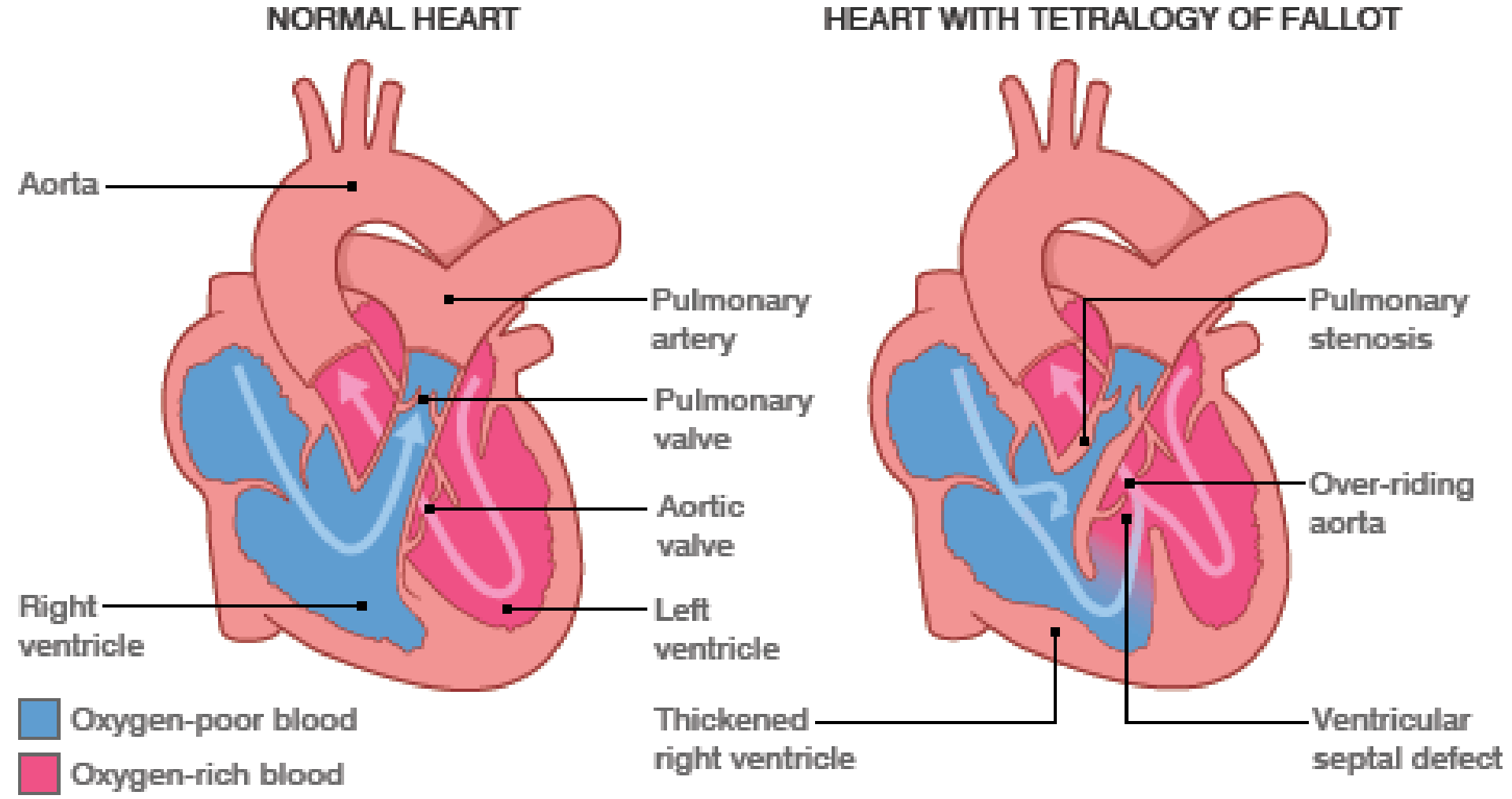
The primary cardiac defects are:

1- Intraventricular septal defect

2-Pulmonary valve or artery stenosis

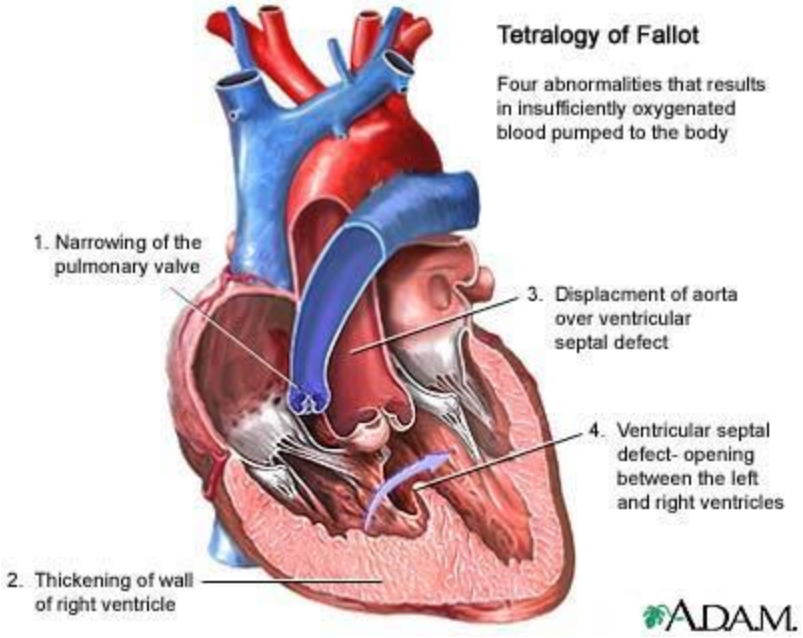
3-Displaced aorta which overrides the ventricular defect

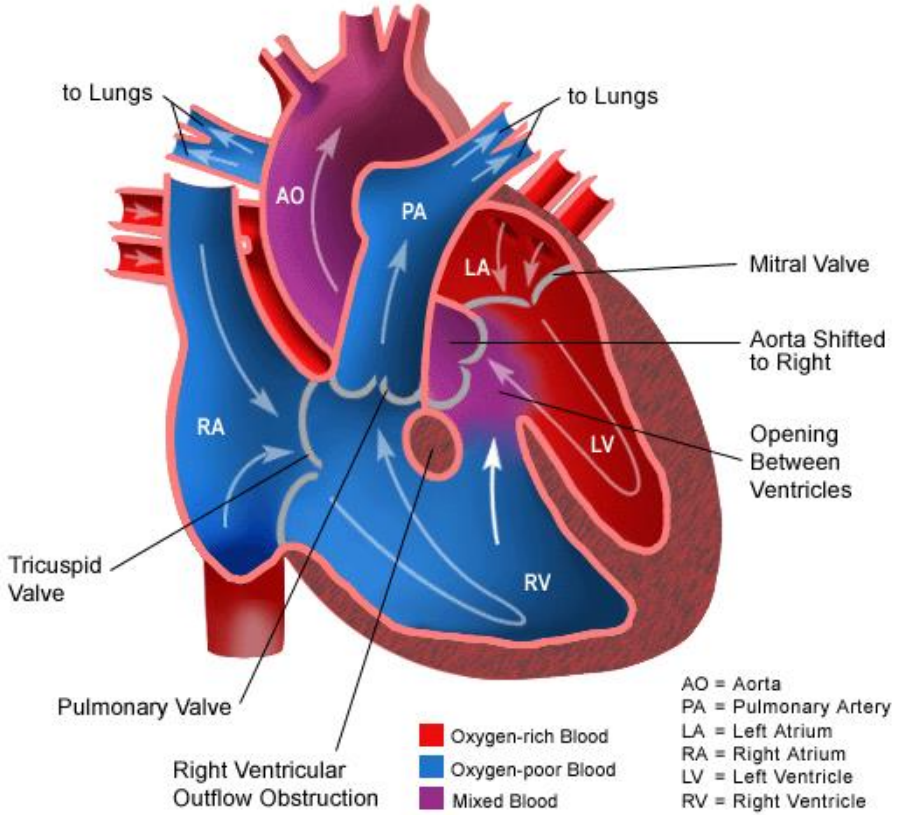
4-Right ventricular hypertrophy


NORMAL HEART
Aorta
Pulmonary artery
Pulmonary valve
Aortic valve
Right ventricle
Left ventricle
Oxygen-poor blood
Oxygen-rich blood
HEART WITH TETRALOGY OF FALLOT
Pulmonary stenosis
Over-riding aorta
Thickened right ventricle
Ventricular septal defect

Tetralogy of Fallot

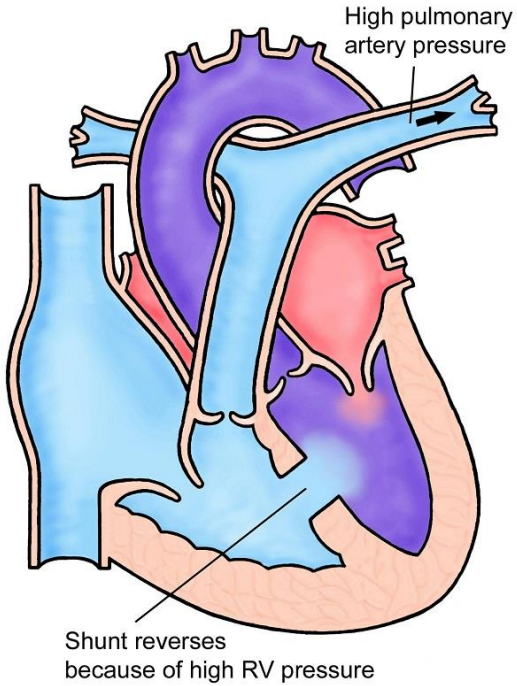
- **Pathophysiology:** Right-to-left shunting secondary to the large ventricular septal defect and pulmonary artery stenosis, resulting in cyanosis.
- Uncorrected tetralogy of Fallot imposes a significant risk to both mother and fetus.
- Surgical correction improves maternal and fetal prognosis.
- Patient is susceptible to decreased venous return. Thus they are sensitive to
  - Excessive blood loss
  - Regional anesthesia.


Tetralogy of Fallot
Four abnormalities that results in insufficiently oxygenated blood pumped to the body
1. Narrowing of the pulmonary valve
2. Thickening of wall of right ventricle
3. Displacment of aorta over ventricular septal defect
4. Ventricular septal defect- opening between the left and right ventricles
A.D.A.M.

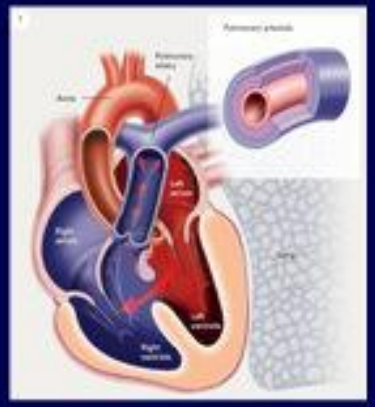

Tetralogy of Fallot (TOF or "Tet")
to Lungs
to Lungs
AO
PA
LA
Mitral Valve
Aorta Shifted to Right
RA
LV
Opening Between Ventricles
Tricuspid Valve
RV
Pulmonary Valve
Right Ventricular Outflow Obstruction
Oxygen-rich Blood
Oxygen-poor Blood
Mixed Blood
AO = Aorta
PA = Pulmonary Artery
LA = Left Atrium
RA = Right Atrium
LV = Left Ventricle
RV = Right Ventricle

Eisenmenger Syndrome

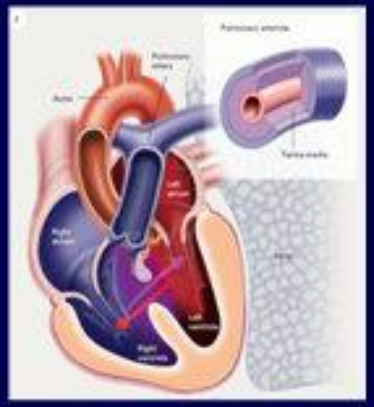
- **It consists of: pulmonary hypertension and either right-to-left or bidirectional shunting through ASD,VSD or PDA.**
- **It is usually a long-term secondary sequela to a congenital cardiac defect that results in left-to-right shunt.**
- **The maternal and fetal prognoses are very bad.**
- **It cannot be corrected surgically.**
- **Termination of pregnancy at 1st trimester.**
- **Regional anesthesia should be avoided.**



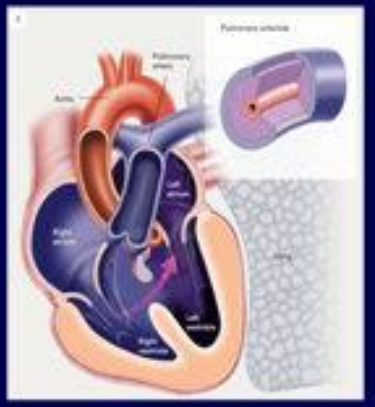
Evolution of Eisenmenger Syndrome



ASD, VSD, or complex defect ↑ Qp and/or PAp, with L-to-R shunting



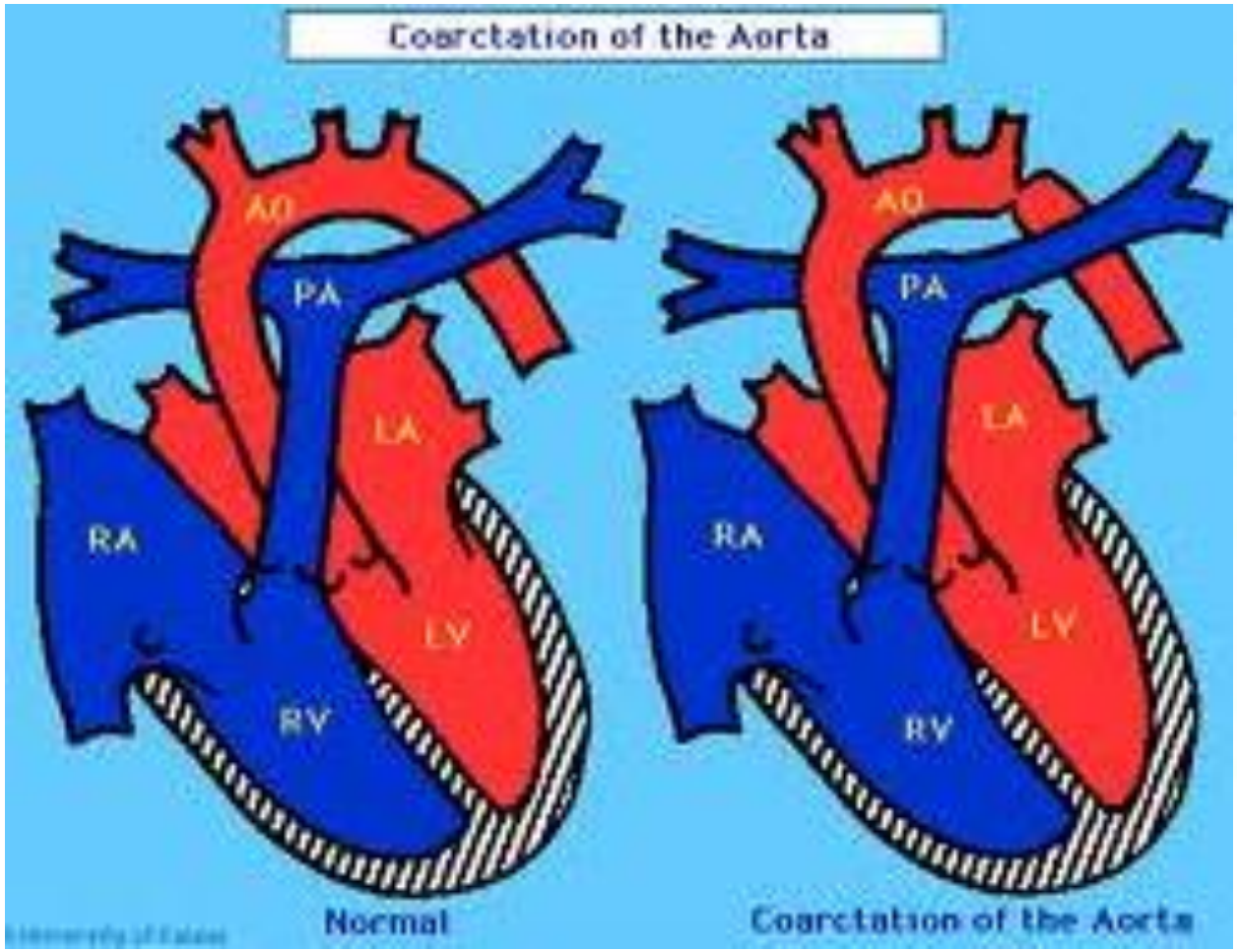
Over time, PVR ↑ resulting in bi-directional flow

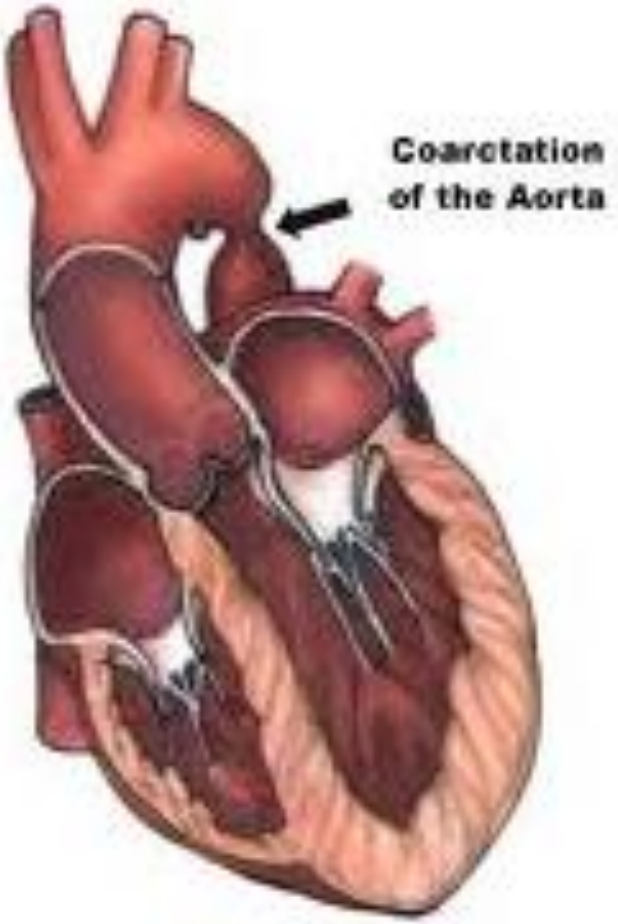


PVR ↑'s: shunt reverses: R-to-L → Eisenmenger syndrome: ↑ cyanotic

Coarctation of The Aorta

- It is uncommon in pregnancy
- There is a stenotic ring at the level of the left subclavian artery and is recognized by hypertension in the right arm only.
- The presenting symptoms may be chest pain, or leg fatigue in severe cases.
- Collateral blood flow may be recognized by palpable pulsations or audible bruits over the ribs or notching of the inferior surface of the ribs on chest X-ray


Coarctation of the Aorta
AO
PA
LA
RA
LV
RV
Normal
AO
PA
LA
RA
LV
RV
Coarctation of the Aorta


Coarctation
of the Aorta

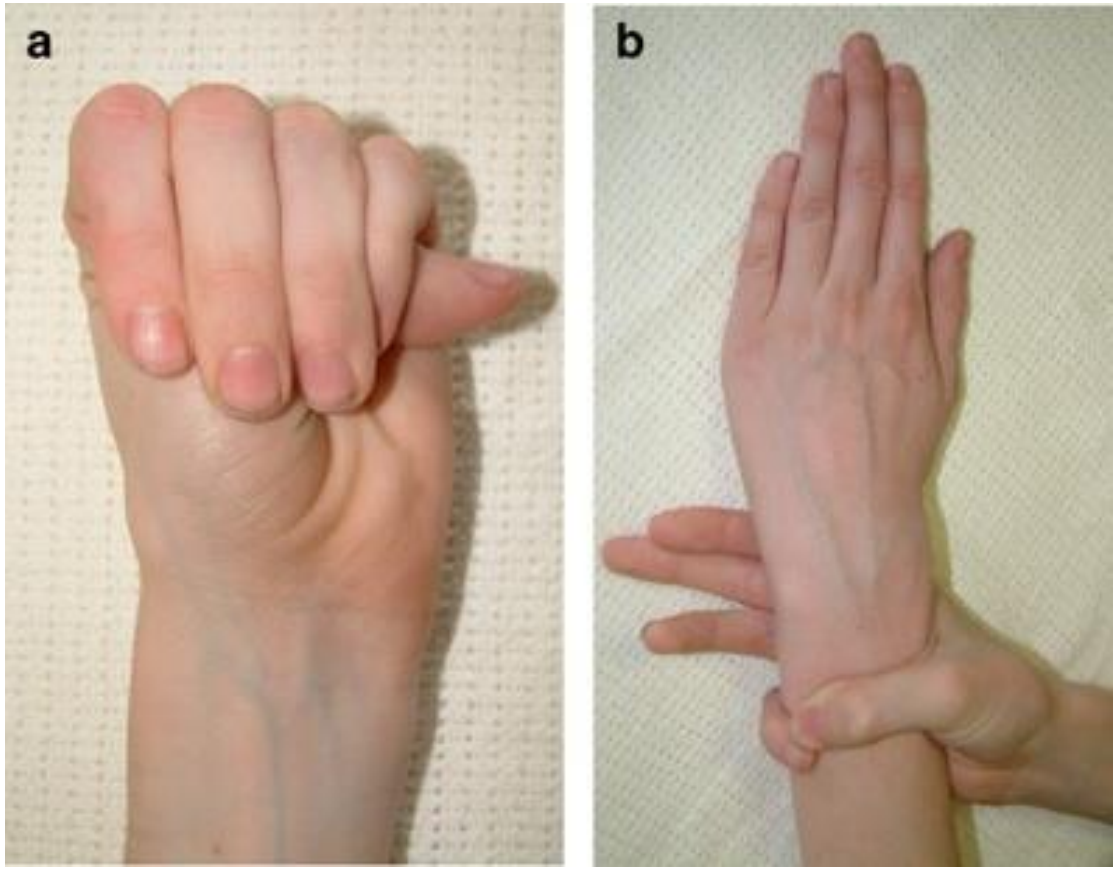
Coarctation of The Aorta

- There is a risk of aortic dissection which may be caused by the hyperdynamic circulation of pregnancy, internal rupture or medial degeneration.
- They may develop rupture of a cerebral aneurysm .
- The coarctation is better surgically corrected before pregnancy.
- Management in pregnancy is mainly: Control of hypertension and Preventing bacterial endocarditis. Regional anesthesia is better .

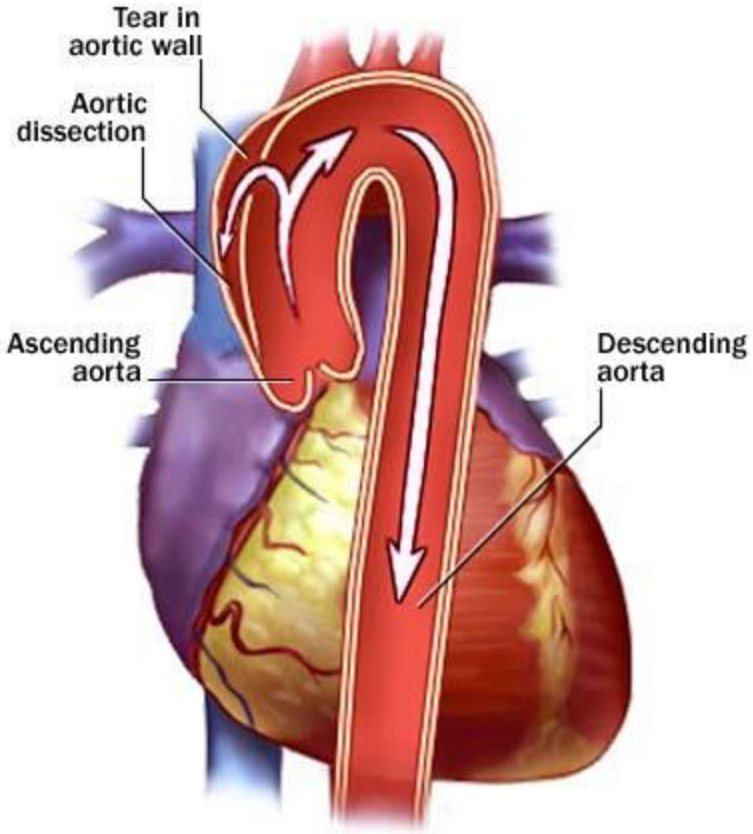
Marfan Syndrome

- Woman be counseled that there is a 50% risk of their offspring inheriting this disorder Those who choose to get pregnant should be carefully evaluated by echocardiography.
- Those with aortic diameters less than 40 mm have a small risk of aortic dissection.
- They should continuously receive beta-blockers (to reduce pulse pressure) and almost complete bed rest and careful monitoring.
- Those with aortic diameter > 40 mm are at high risk of aortic dissection and should be counseled to have first trimester termination or surgical repair of the aorta.

Marfan syndrome



Arachnodactyly (a) positive thumb sign: entire thumbnail protrudes beyond ulnar border of hand. (b) Positive wrist sign: thumb and fifth finger overlap when encircling the wrist.



Marfan syndrome

Aortic dissection occurs when a partial tear in the aorta causes a separation (dissection) of the layers of the aortic wall.

Marfan Syndrome

- **This autosomal dominant disease of connective tissue can result in significant complications including dissection of the aorta and aortic rupture.**
- **The defect is in fibrillin which is a constituent of elastin and is a general defect. However, aortic dilatation and dissecting aneurysm are the most serious complications and are more common during pregnancy.**

Peripartum cardiomyopathy (PPCM)

PPCM is a rare form of congestive heart failure occurring in the peripartum period. The classic criteria of PPCM are:

1-Cardiac failure in the last month of pregnancy or within 5 months of delivery

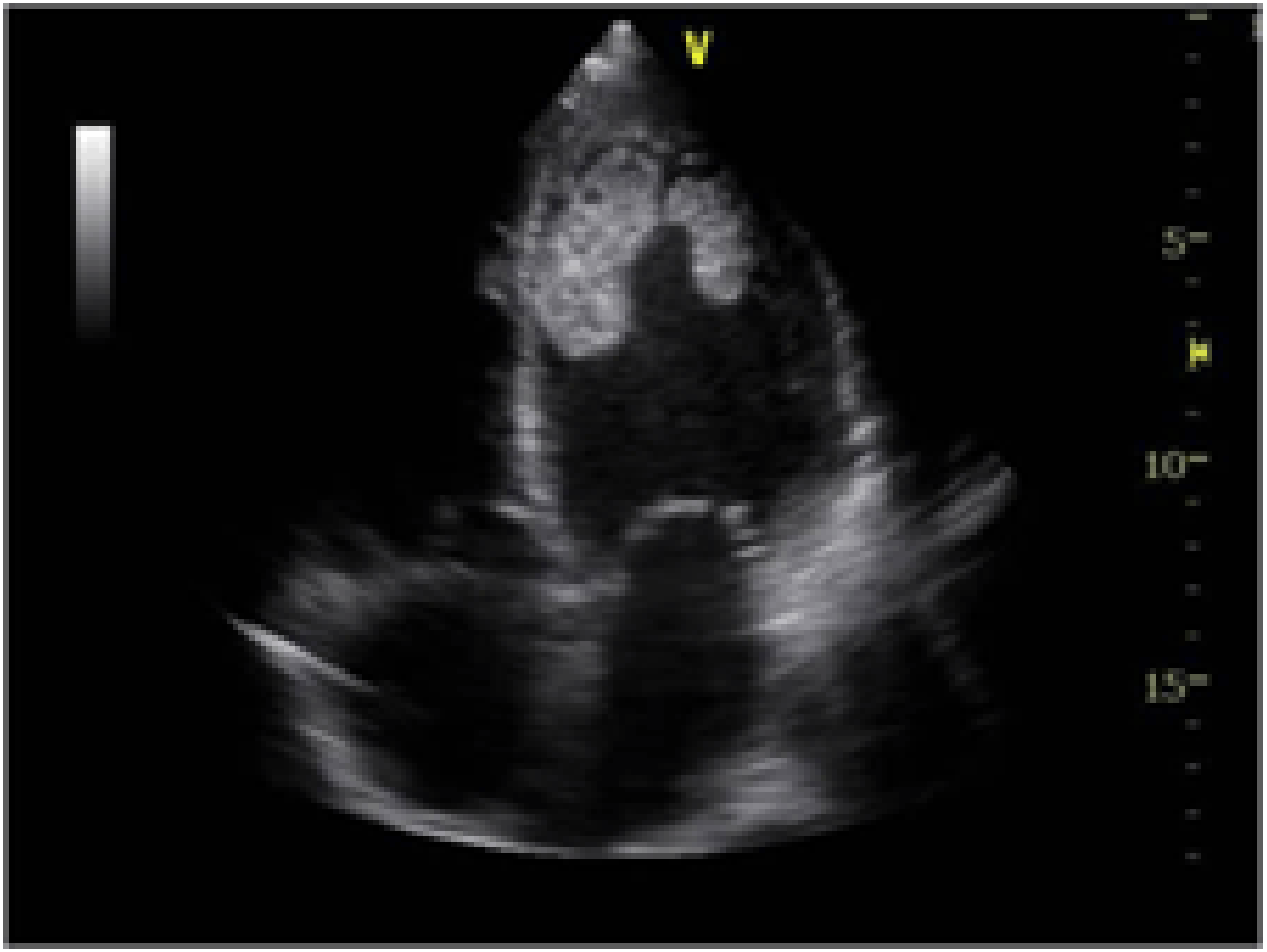
2-Absence of a determinable etiology for cardiac failure

3-Absence of demonstrable heart disease before the last month of pregnancy.

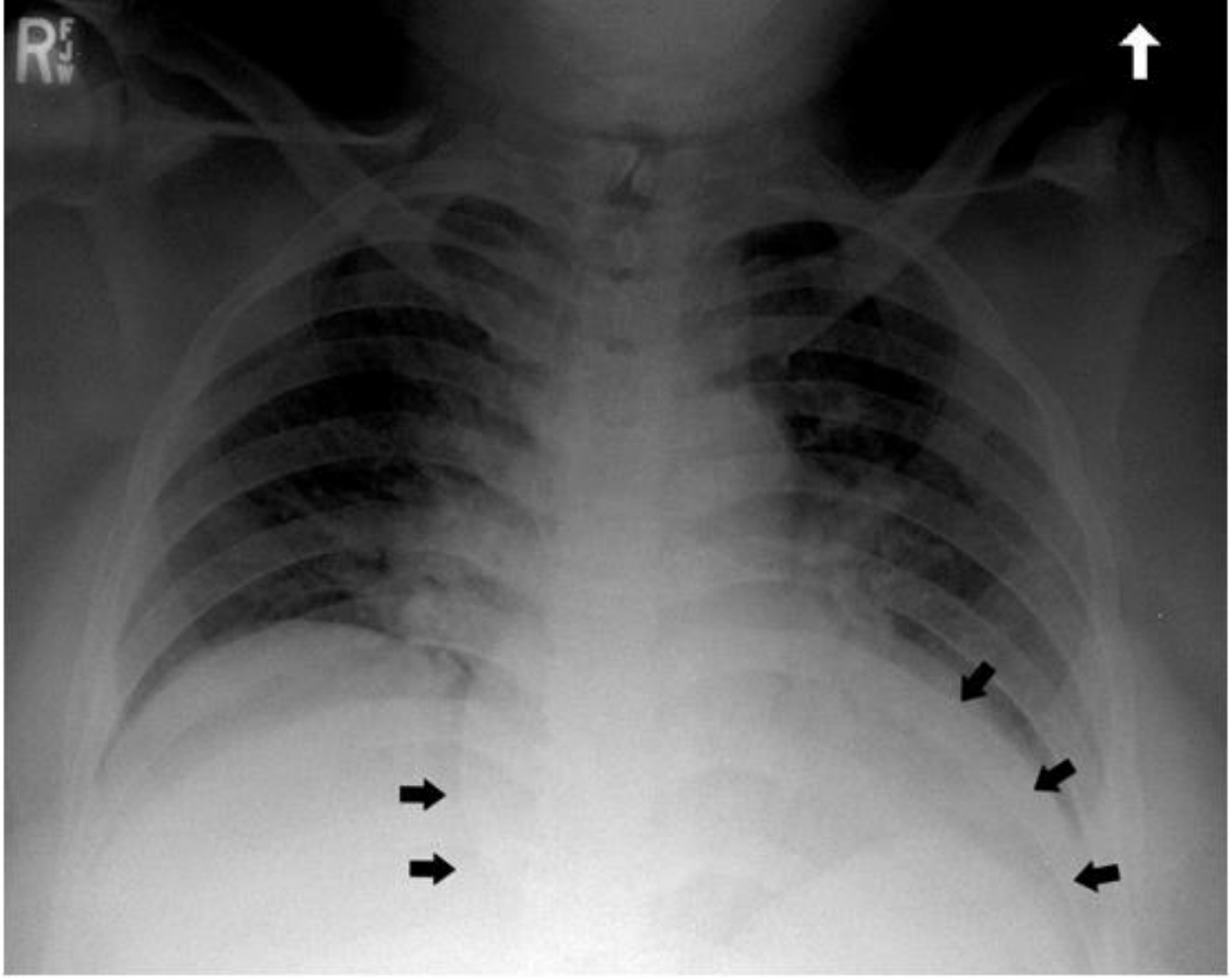
Persistence > 6 onths postpartum carries a bad prognosis

Peripartum Cardiomyopathy

- **Patient presents with symptoms and signs of congestive heart failure. Dyspnea is marked, other symptoms are orthopnea, procordial pain and cough.**
- **The hallmark finding is marked cardiomegaly**
- **ECG confirms increased end-diastolic dimensions.**
- **Therapy usually consists of digitalization, diuretic and low-dose heparin.**

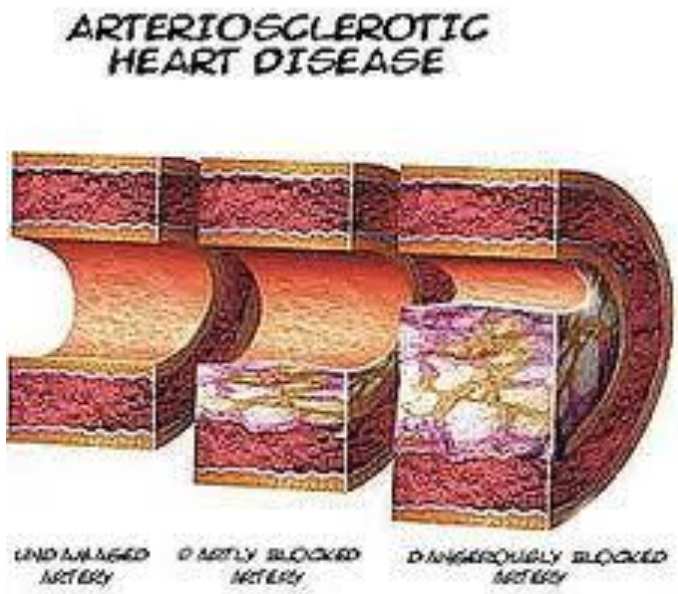


Peripartum cardiomyopathy (PPCM)



Cardiomyopathy with mild pulmonary edema. Anterior-posterior projection chest radiograph of a woman with an abnormally enlarged heart (*black arrows*) and mild perihilar opacification consistent with dilated cardiomyopathy.

Ischemic Heart Disease



Ischemic Heart Disease

- Coronary artery disease which may lead to myocardial infarction is a rare in pregnancy.
- Patient may have the classical risk factors including familial history, smoking, obesity, familial dyslipidemia. hypertension , diabetes mellitus and thrombophilias (as antiphospholipid S.)
- Diagnosis:↑ serum levels of the cardiac-specific contractible protein, *treponin* I
- Pregnancy is usually inadvisable or should be delayed till coronary bypass

Ischemic Heart Disease

- Coronary artery disease which may lead to myocardial infarction is rare in pregnancy.
- Patient may have the classical risk factors including familial history, smoking, obesity, familial dyslipidemia. hypertension , diabetes mellitus and thrombophilias (as antiphospholipid S.)

Ischemic Heart Disease

- **Diagnosis:↑ serum levels of the cardiac-specific contractible protein, *treponin* I**
- **Pregnancy is usually inadvisable or should be delayed till coronary bypass**
- **Treatment is as that of non-pregnancy:**
- **Nitroglycerine and morphine are given**
- **Lidocaine: for malignant arrhythmia. become indicated.**

Ischemic Heart Disease

- Calcium channel blockers or beta-blockers are given if indicated.
- Tissue plasminogen activator can be given remote from delivery
- If the infarct has healed sufficiently, vaginal delivery can be allowed.

Ischemic Heart Disease

- In some women interventional cardiac catheterization may become indicated. Coronary bypass surgery during pregnancy causes high risks.
- Echocardiography, radionuclide (thalium) studies and angiography. If there is no significant ventricular dysfunction, pregnancy will likely be tolerated.

Thank You

Egypt


ArabicOBGYN