

# CASE DISCUSSION

**Dr JAYASREE VEERABOINA**

2nd yr PG

MS OBG

# Normal Cardiovascular changes in Pregnancy

# CARDIAC OUTPUT

- 5<sup>th</sup> wk -- starts ↑
- 12 wks -- 30-35%
- 30-32 wks -- 40%
- During labour -- 50%
- After delivery -- 70-80%

Cardiac Output returns to

The diagram features a central text element 'Cardiac Output returns to' with two large, thick, black arrows pointing outwards. The top arrow curves to the right and points towards the text 'prelabour value-1hr foll.delivery'. The bottom arrow curves to the right and points towards the text 'prepregnant level-4wks'.

prelabour value-1hr foll.delivery

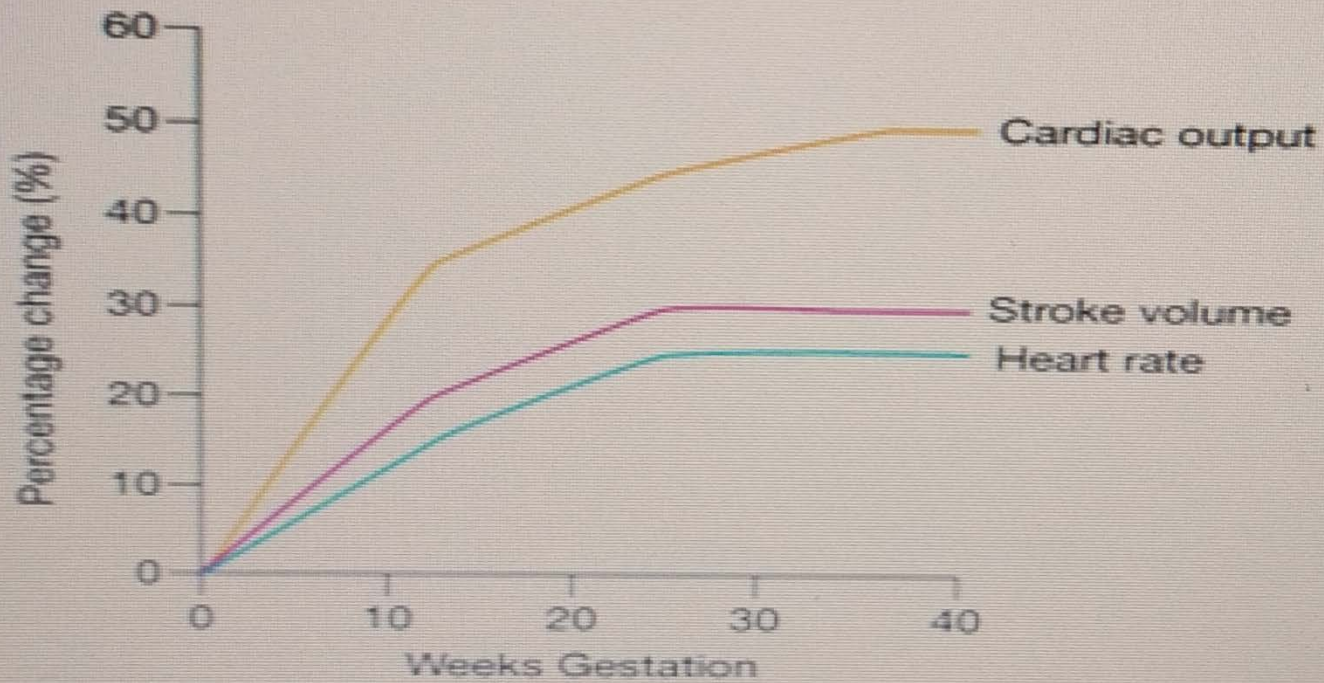
prepregnant level-4wks

- Mechanism for increase CO
  - ↑ stroke volume=27%
  - ↑ heart rate=17%
- Intravascular volume(IVV)
  - ↑ in blood volume starts around 6wks
  - peak of 30-40% by 32wk
- Physiological hemodilution in pregnancy
  - Plasma vol ↑ 40-50%
  - RBC vol ↑ 20-30%
  - IVV expansion is marked by systolic ejection murmur.

- Systemic vascular resistance ↓ 21%  
pulmonary vascular resistance ↓ 34%  
Colloid osmotic pressure ↓ 14%
- Aortic root → ↑ in size and compliance
- Venous pressure- femoral vein pressure 20cm of water (lying down) & 80 -100 cm of water on standing
- BP ↓ 3-5mm Hg systolic & 5-10mm Hg diastolic
- No change in CVP, PCWP

Hemodynamic Parameter	Change During Normal Pregnancy	Change during labor and delivery	Change during postpartum
Blood volume	↑ 40-50%	↑	↓ (autodiuresis)
Heart rate	↑ 10-15 beats/min	↑	↓
Cardiac output	↑ 30-50 %	↑ additional 50%	↓
Blood pressure	↓ 10 mm Hg	↑	↓
Stroke volume	↑ 1st and 2nd trimester; ↓ 3rd trimester	↑ (300-500 mL per contraction)	↓
Systemic vascular resistance	↓	↑	↓

## Maternal Cardiovascular Changes



# HEART

- Displaced to the left and upward
- Apex is moved laterally
- Apparent cardiomegaly on chest x-ray
- ↑ left ventricular end diastolic dimension
- ↑ left ventricular wall mass with mild hypertrophy
- Grade II-III systolic flow murmurs at left lower sternal border



# NORMAL CARDIAC FINDINGS IN PREGNANCY

- Loud s1
- Loud s2 and widely split
- Occasional s3
- Aortic or pulmonary flow murmurs
- Brisk and diffuse apex impulse
- Venous hum
- Mammary souffle

# ABNORMAL CARDIAC SYMPTOMS IN PREGNANCY

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

# ABNORMAL CLINICAL FINDINGS

- Cyanosis
- Clubbing
- Persistent neck vein distension
- Systolic murmur grade 3/6 or above
- Diastolic murmur
- Cardiomegaly
- Persistent arrhythmia
- Persistent split S2
- Criteria for pulmonary hypertension

# PERIODS DURING PREGNANCY WHEN DANGER OF CARDIAC DECOMPENSATION IS HIGH

- 12-16wk (changes of pregnancy begin)
- 28-32 wk( hemodynamic changes peak )
- During labour and delivery
- Immediately following delivery of baby and placental separation (most common)
- 4-5 days following delivery

# PERIPARTUM CARDIOMYOPATHY

A form of dilated cardiomyopathy  
left ventricular systolic dysfunction

**PERIPARTUM CARDIOMYOPATHY IS A  
DIAGNOSIS OF EXCLUSION**

# DIAGNOSTIC CRITERIA

- Development of cardiac failure in the last month of pregnancy or within 5 months after delivery
- Absence of identifiable cause for cardiac failure
- Absence of recognizable heart disease prior to the last month of pregnancy
- Left ventricular systolic dysfunction is best assessed by Echocardiography
  - ejection fraction ( <45%)
  - M-mode fractional shortening (<30%) or both
  - End diastolic dimension more than 2.7cm/sq.m

# ETIOLOGY

- VIRAL MYOCARDITIS
- ABNORMAL IMMUNE RESPONSE TO PREGNANCY
- ABNORMAL RESPONSE TO INCREASE  
HEMODYNAMIC BURDEN TO PREGNANCY
- NUTRITIONAL DEFICIENCIES
- INFALAMMATION
- PROTEOLYTIC CLEAVAGE OF PROLACTIN (16kDa)  
which is cardio toxic
- STRESS ACTIVATED CYTOKINES



# RISK FACTORS

- Age >30 yrs old
- Multiparity
- African ethnicity
- Long term tocolytic therapy with beta blockers
- Multiple gestation
- History of preeclampsia, eclampsia
- Smoking, diabetes
- Cocaine use

# SYMPTOMS

- Progressive dyspnea or orthopnea
- Palpitations
- Cough
- Chest pain
- Dizziness
- Easy fatiguability
- Hemoptysis
- Abdominal discomfort
- Decrease exercise tolerance
- Lower extremity edema
- Nocturia

# SIGNS

- Loud s2
- tachycardia
- Pulmonary rales
- Evidence of raised JVP
- Cardiomegaly with gallop rhythm
- Peripheral edema

# INVESTIGATIONS

ECG

ECHOCARDIOGRAPHY

CHEST X-RAY

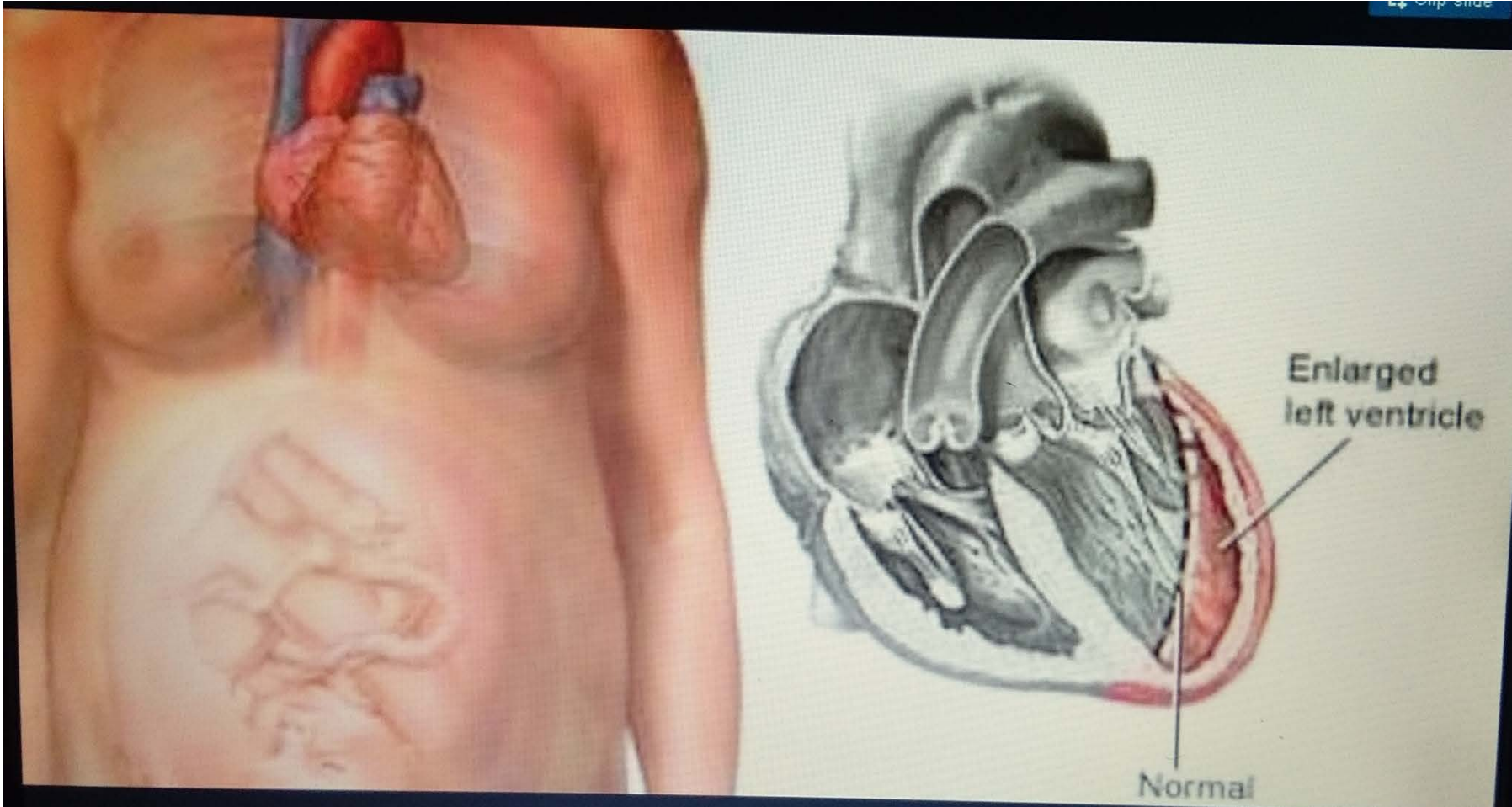
CARDIAC MARKERS

# ECG findings

- Non specific ST and T wave changes
- Atria or ventricular arrhythmias
- Conduction defects

# ECHOCARDIOGRAPHY/DOPPLER

- Reveal enlargement of all four chambers with marked reduction in left ventricular systolic function
- small to moderate pericardial effusion
- Mitral ,tricuspid and pulmonary regurgitation
- Ventricular wall motion, ejection and cardiac output ----decreased
- Pulmonary wedge pressure---increased
- Spherical LV
- Left atrial enlargement

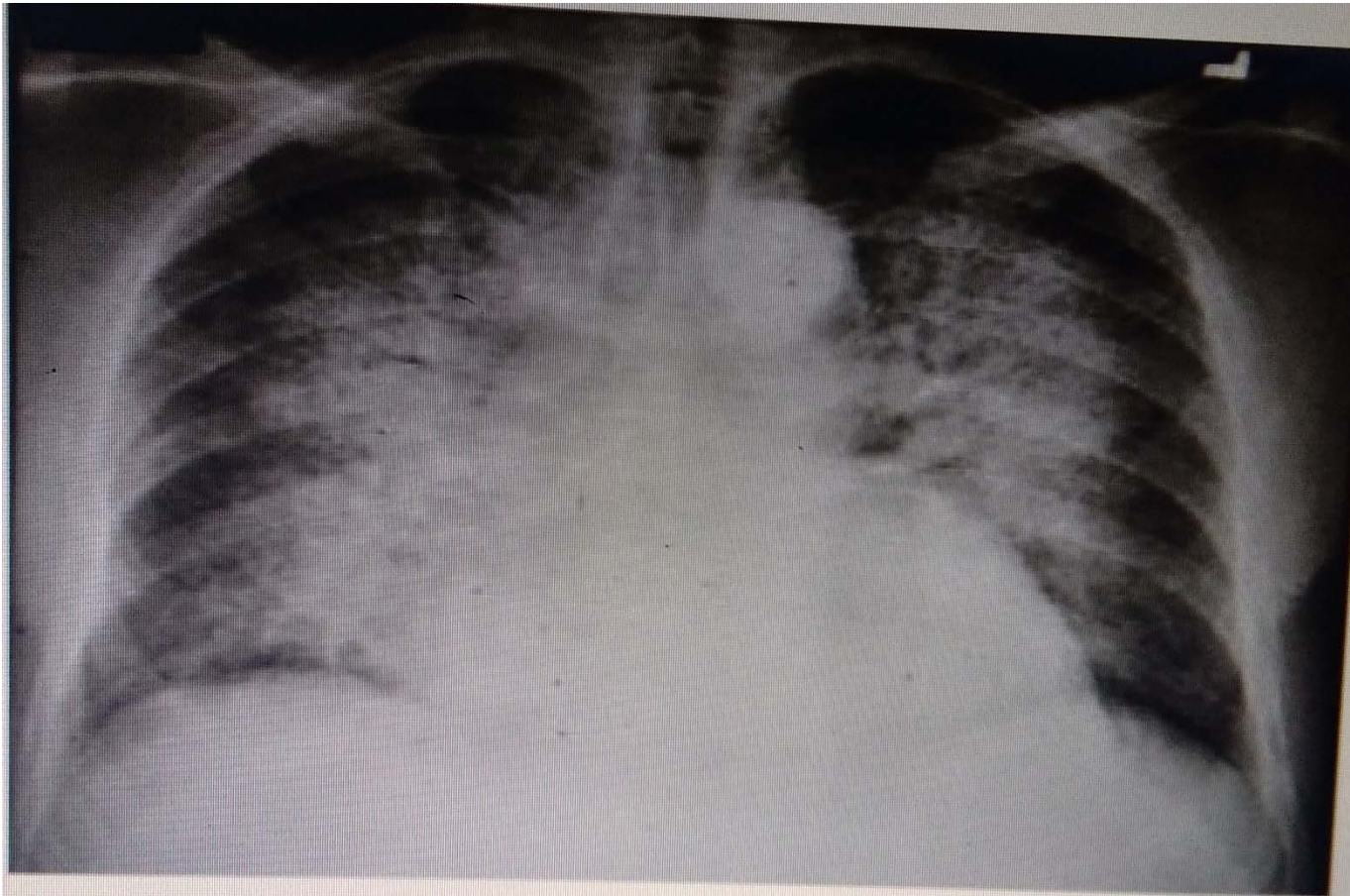


# CHEST RADIOGRAPH

- Cardiomegaly with pulmonary edema
- Pulmonary venous congestion







**Cardiogenic pulmonary edema** Pulmonary edema in

# MANAGEMENT

- Bed rest
- Delivery- preferably vaginal (unless obstetric indication for caesarean-epidural anesthesia is ideal)
- Similar to other forms of CHF
  - IONOTROPES( Digoxin )
  - Beta blockers
  - Diuretics (preload reduction)
  - Vasodilators (afterload reduction )
  - Anticoagulation

## Beta blockers

- IUGR, Hypoglycemia, bradycardia
- Eg: Propranolol©, Abetalol©, Atenolol(D), metoprolol©, Esmolol©

## Calcium channel blockers

- Not teratogenic
- Eg: Verapamil©, Nifedipine©, Diltiazem©

## Vasodilators

- Not teratogenic yet avoid prolonged use of nitroprusside due to possible cyanide toxicity with prolonged use
- Eg: Nitroprusside©, Hydralazine©, Nitroglycerine(B)

## Inotropes

- Not teratogenic
- Eg: Digoxin©, Dopamine©, Dobutamine © Epinephrine©

## Antiarrhythmics

- Concern with phenytoin for fetal hydantoin syndrome & amiodarone for bradycardia and prolonged QT syndrome
- Eg: Lidocaine(B), Procainamide©, Quinidine©, Bretylium©, Phenytoin©, Amiodarone(D)

# HEMODYNAMIC GOALS

- Preservation of myocardial contractility
- Optimization of preload
- Reduction of afterload
- Maintenance of sinus rhythm
- Avoidance of extreme blood pressure and heart rate
- Avoidance of dramatic fall in peripheral blood resistance due to limited cardiac reserve

# INTRAPARTUM MANAGEMENT

- Aim to minimise cardiovascular work
- Avoid aortocaval compression(lateral decubitus or propped up position)
- Adequate pain relief(epidural analgesia)
- Restrict i.v fluids to 75ml/hr
- Oxygen by breathing mask
- Cardiovascular monitoring

- Cut short 2<sup>nd</sup> stage labour (forceps or vaccum)
- Plan the management of 3<sup>rd</sup> stage of labour
- Methergin is absolutely contraindicated
- Prevention of postpartum pulmonary edema by giving i.v Furosemide after placental delivery
- Careful attention to fluid management during labour



# PROGNOSIS

- 50-60% patients show complete or near complete recovery within the first 6 months postpartum
- In others, either continued clinical deterioration leading to early death or persistent left ventricular dysfunction and chronic heart failure results
- There is an initial high risk period with mortality of 25-50% in first 3 months postpartum
- Patients with persistent cardiomegaly at 6 months have a reported mortality of 85% at 5yrs

Mortality (3% -50%)

progressive heart failure

Arrhythmias

Thromboembolism

- PPCM patient may still have decreased contractile reserve even though they have regained normal resting ventricular size
- This can be detected with Dobutamine challenge test
- Early follow up with cardiologist –to review cardiac status & function and to optimize medications

# Subsequent Pregnancy

- Maternal safety in the future
- LV dysfunction & LV dimension at diagnosis generally considered to be the most important prognostic factors
- All PPCM subsequent pregnancy should be considered high risk and should manage in tertiary hospital with multidisciplinary team

**THANKYOU**