Heart disease in pregnancy

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Normal hemodynamic changes during pregnancy

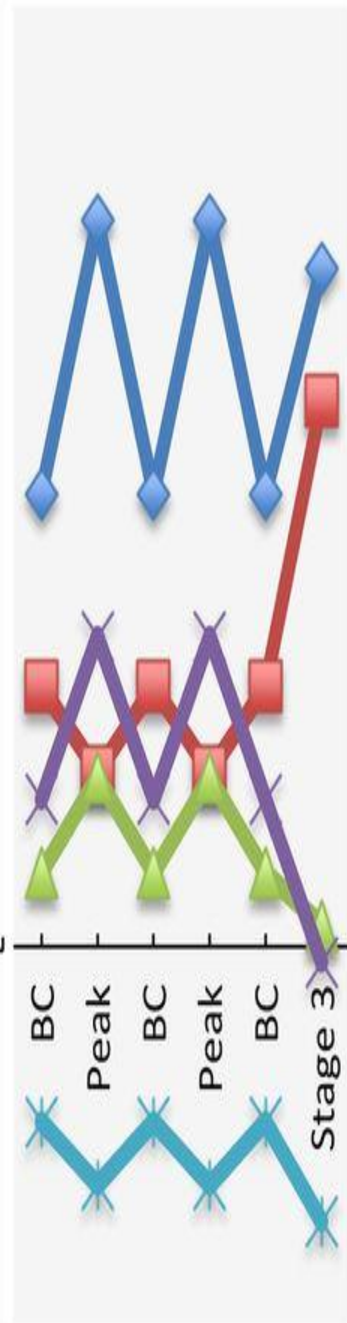
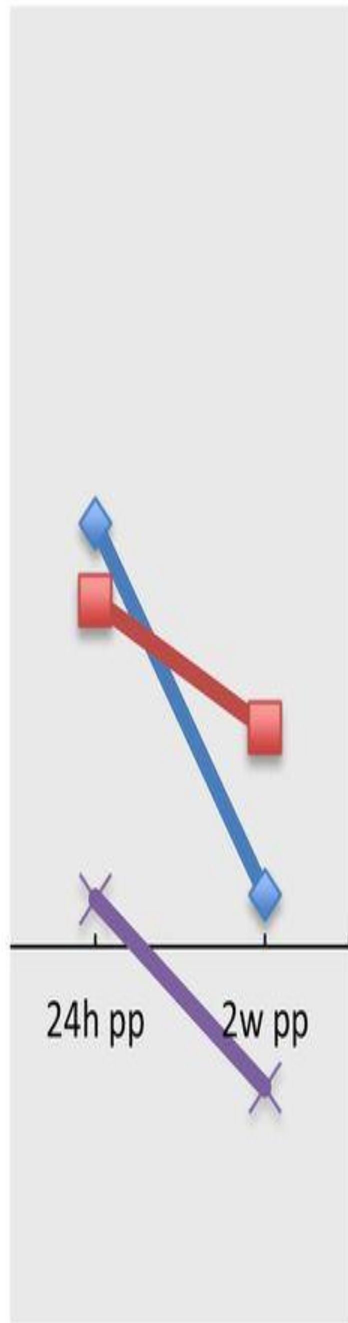
1. **Blood volume increases by 30%.**
2. **Plasma volume increases by 50%.**
3. **Red cell mass increases by 18% when no iron supplement is given and by 36% when iron supplement is given.**
4. **Hemodilution anaemia.**

5. **COP (cardiac output) increases by 40% start at 10 weeks reaches maximum at 24-28wks & remains elevated till parturition, this increase in C.O.P mainly due to increase in stroke volume and later due to increase in H. rate**
6. **Increase in H. rate by 10-15 beats/min**
7. **Decrease in PVR (peripheral vascular resistance) & decrease in pulmonary vascular Resistance & decrease in colloid oncotic pressure**

8. **Supine hypotension.**

9. **Central venous pressure is the same as non pregnant.**

10. **B.P S&D (systolic & diastolic) falls throughout the first 2 trimesters reaching a nadir (lowest point) 24-28w before increasing to non pregnant levels at term.**


A
Cardiac output
Stroke volume
Systolic BP
Heart rate
Total peripheral resistance
% change from baseline*
100
80
60
40
20
0
−20
−40
Pre
5
8
12
16
20
24
28
32
36
38
B
BC
Peak
BC
Peak
BC
Stage 3

C
24h pp
2w pp

Physiological changes during labour and puerperium

1.First stage.

Cardiac output increases by15%. Uterine contractions increases venous return , causing increase in cardiac output

2.Second stage

Increase in intra abdominal pressure (valsalva's) causes increase in venous return and cardiac output.

3.Third stage

Normal blood loss during delivery (around 250-350 ml). It leads to

a. Decrease blood volume

b. Decrease cardiac output.

- After delivery, cardiac output increases again immediately : 60-80%
  - sudden interruption of placental circulation
  - uterine contraction
  - relief of caval compression

- Puerperium:
  - return to normal after 2 weeks

- **The greatest change period in systemic blood circulation and heart burden**
  - **32 --34 weeks**
  - **Intrapartum**
  - **3 days postpartum**
- **Easily induced heart failure**

Heart disease in pregnancy is rare, 1% of all pregnancies.

In UK 50 years ago, rheumatic heart disease account for 90% of all heart disease in pregnancy but since the wide use of Antibiotic in streptococcal infection this figure has fallen dramatically

New York heart association (NYHA) functional classification

Class I: no functional limitation-------- symptoms with extraordinary physical work.

Class II: mild limitation of activity------- symptoms with ordinary physical Work

Class III: marked limitation of activity--------- symp.with less than ordinary work

Class IV: severe limitation of activity----------- symptoms at rest

Maternal risks:

M**aternal mortality** is seen with all forms of heart disease, but mostly likely in **pulmonary hypertension & mitral valve stenosis.**

(**40-50%**) pulmonary hypertension & Eisenmenger's syndrome.

Cardiomyopathy

Rupture or dissection of the aorta

IHD (ischemic heart disease).

Infective endocarditis is rare as routine antibiotics is used

Fetal risks

1-IUGR & preterm delivery in pregnancy Complicated by cyanotic cong. heart disease when total fetal loss may reach 40%

2. Uncorrected coarctation of aorta with IUGR by > 10%

3.The incidence of cong. heart disease in new born baby is 5% if a parent is affected compared to 8 in looo live births general population, so detailed anomaly scan is mandatory with echo study at 24 weeks gestation

Pre-pregnancy management

Awarness of their problem prior to pregnancy; she should be fully assessed before being pregnant.

Maternal & fetal risks carefully explained.

Cardiologist should be involved including cardiac echo.

Any concurrent medical problems should be aggressively treated

If surgical correction is needed, it should be done before pregnancy.

Issues in pre-pregnancy Counseling

Risk of maternal death

Possible reduction of maternal life expectancy.

risk of fetus developing cong. Heart disease

risk of preterm labor &IUGR

Need for frequent hospital attendance & possible admission

Need for intensive maternal &fetal monitoring in labor

Contraindications of pregnancy are:

Eisenmenger's syndrome, severe MS, marfan's syndrome with aortic root dilatation and severe cardiomyopathy

Antenatal management:

It should be a combined care (obstetric / cardiac clinic), by:

1.History: Easy fatigability, SOB, orthopnea, pulmonary congestion (these are S&S of left sided H. failure), weight gain, dependent edema, hepatomegaly (these are S&S of right sided H. failure).

Past hx: previous obstetric complications like stillbirth, IUGR, babies with congenital heart disease and hx of heart surgery

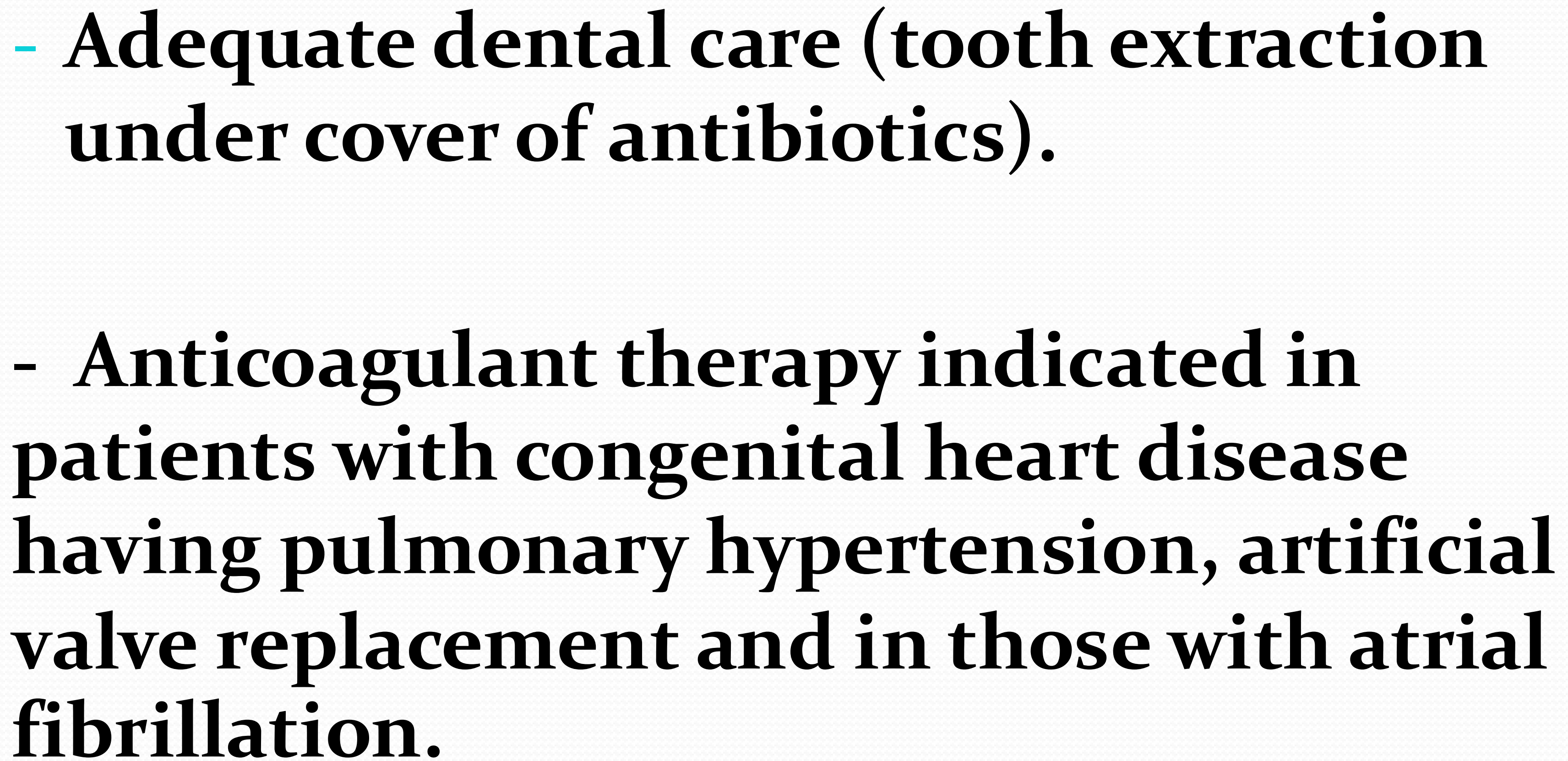
2.Physical examination: P.R & Rhythm, B. pressure, JVP, presence of basal crepitation, ankle and sacral oedema, symphysis fundal height measurement.

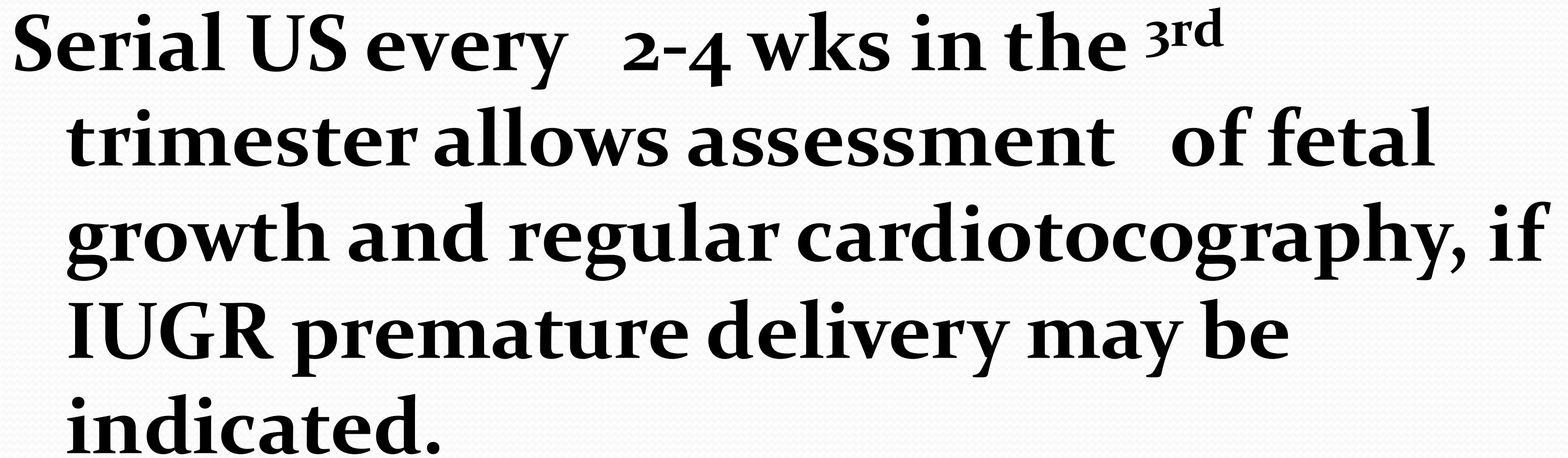
3.Risk factors for the development of heart failure:

Respiratory tract infection, Anaemia, obesity, corticosteroid, tocolytics, multiple gestation, hypertension, arrhythmia, pain related stress, fluid overload

4.Advice during each AN visit:

- Bed rest
- Dietary salt restriction to prevent excessive sodium & water retention
- Prevention & treatment of anaemia
- Rx of any infection especially R.T.I


- Adequate dental care (tooth extraction under cover of antibiotics).
- Anticoagulant therapy indicated in patients with congenital heart disease having pulmonary hypertension, artificial valve replacement and in those with atrial fibrillation.


Serial US every 2-4 wks in the 3rd trimester allows assessment of fetal growth and regular cardiotocography, if IUGR premature delivery may be indicated.

6.Medical treatment

- **Disorder of rhythm may necessitate the use of digoxin**
- **infection should be vigorously treated with antibiotics**
- **pulmonary oedema or cardiac failure require immediate admission & prompt treatment.**

- **morphine or its derivatives relieve anxiety & reduce the increased respiratory rate**
- **SVT treated by vagal pressure, adenosine or IV verapamil**
- **Digoxin is beneficial if there is marked tachycardia or fibrillation**
- **Diuretics e.g. frusemide in a dose 50-100mg I.V.**
- **O_2 therapy**

7.Surgical Rx:

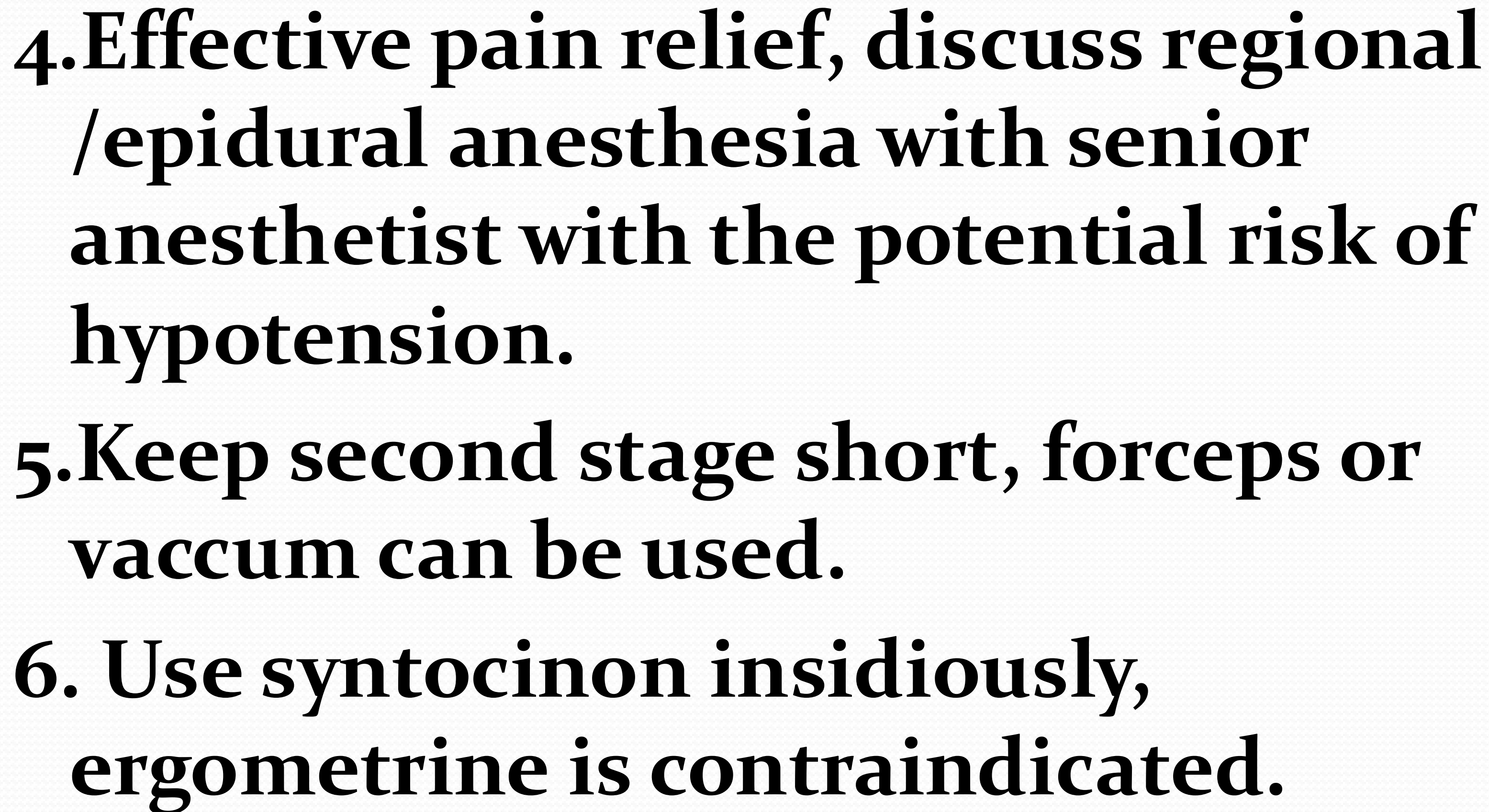
Corrective cardiac surgery is best performed before the patient become pregnant.

Occasionally P.D.A (patent ductus arteriosus) is ligated during pregnancy because of sever degree of left to Right shunt.

Some time in MS (mitral stenosis) in sever symptomatic case balloon valvotomy is carried out during pregnancy.

Management of labor:

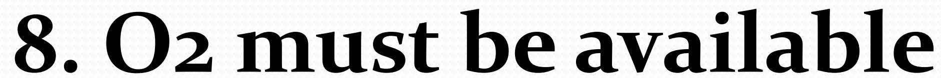
1. Avoid induction of labor if possible
2. Ensure fluid balance.
3. Avoid supine position, the most comfortable position that make breathing easier should be adopted.



4. Effective pain relief, discuss regional /epidural anesthesia with senior anesthetist with the potential risk of hypotension.
5. Keep second stage short, forceps or vaccum can be used.
6. Use syntocinon insidiously, ergometrine is contraindicated.

7. Antibiotics prophylaxis may be indicated to prevent infective endocarditis

using amoxicillin 2gm iv plus gentamicin 120mg at the onset of labour or ruptured membranes or prior to caesarean section, followed by amoxicillin 500mg orally 6 hrs later, if allergy to amoxicillin vancomycin 1gm iv may be used.



9.Cardiac disease is a not specified indication for CS

10.Dehydration, metabolic acidosis & infection of genital tract are always should be avoided

The puerperium

The need for rest doesn't mean complete rest.

Active movement in bed with regular exercise

Early ambulation if immobilization is necessary.

The possibility of anticoagulant therapy must be considered (Prophylactic antibiotics may be indicated)

CONTRACEPTION:

Sterilization may be recommended by cardiologist if acceptable to the patient may be done by laparoscopy 6 weeks postpartum.

Some encouragement to limit family size

Oral contraception & condoms are probably preferable to insertion of IUCD (intrauterine contraceptive device).

Termination of pregnancy:

- **May be considered in a patient with grade III & IV**
- **patient had history of H. failure in previous pregnancy and patient with Eisenmenger's syndrome and pulm. Hypertension**
- **it should be considered early in pregnancy because after 14ws,the risk of termination is probably at least equal to that of well managed pregnancy.**

Mitral stenosis

Is the commonest acquired heart disease account for 90% of Rheumatic valvular problem.

The stenosis (left atrial obstruction) increase left atrial & pulmonary wedge pressure (pulm. oedema & atrial fibrillation may occur), there is fixed C.O.P with limited ability to adopt to increase demands placed on the heart during pregn. by increase intra-vascular volume & heart rate

Prepregnancy care: cardiac echo & cardiologist involvement. In sever stenosis surgical correction should be taken before conception.

During pregnancy: In addition to the usual care B. blocker may be used to control maternal tachycardia, Atrial fibrillation treated by digoxin or cardioversion, sometime in sever symptomatic cases surgery (balloon valvotomy during preg.)