Cardiovascular diseases

In pregnancy

Assoc.Prof.Pawin Puapornpong.
Faculty of Medicine
Srinakharinwirot University
In the past, rheumatic heart disease accounted for the majority of cases.

Now, congenital heart diseases constitute at least half of all cases.

Hypertensive heart disease has become a relatively common cause of peripartum heart failure.
Physiology

Increase cardiac output → 30% - 50%, เพิ่ม ½ of total at 8 wk and then maximize at midpregnancy.

Decrease vascular resistance

Increase PR, stroke volume, diastolic filling time.

Normal left ventricular filling pressure by dilated ventricle.
Hemodynamic change in normal pregnancy

<table>
<thead>
<tr>
<th>Parameter</th>
<th>change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac output</td>
<td>+43</td>
</tr>
<tr>
<td>HR</td>
<td>+17</td>
</tr>
<tr>
<td>Left ventricular stroke work index</td>
<td>+17</td>
</tr>
<tr>
<td>Vascular resistance</td>
<td></td>
</tr>
<tr>
<td>Systemic</td>
<td>-21</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>-34</td>
</tr>
<tr>
<td>Mean arterial pressure</td>
<td>+4</td>
</tr>
<tr>
<td>Colloid osmotic pressure</td>
<td>-14</td>
</tr>
</tbody>
</table>
Diagnosis

- Difficult to diagnose, because murmur, edema, dyspnea are common in pregnancy.
Symptoms

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

- Cyanosis
- Clubbing of fingers
- Persistent neck vein dilatation
- Systolic murmur grade 3/6
- Diastolic murmur
- Cardiomegaly
- Persistent arrhythmia
- Persistent split-second sound
- Criteria for pulmonary hypertension
Diagnostic study

**EKG** → diaphragm is elevated, 15-degree left axis deviation, mild ST change. Atrial and ventricular premature contraction are common in normal pregnancy.

**Chest X-ray** → slight heart enlargement cannot be detected.

**Echocardiography** → noninvasive, some normal pregnancy induces TR and increases left atrial size.
Clinical classification

- **Class 1** – no limitation of physical activity
- **Class 2** – slight limitation of physical activity
- **Class 3** – marked limitation of physical activity
- **Class 4** – inability to perform any physical activity without discomfort.
Risks for maternal mortality

- **Group 1 – minimal risk** 0-1%

  - ASD, VSD
  - PDA
  - Pulmonic or tricuspid disease
  - TOF, corrected
  - Bioprosthetic valve
  - MS, NYHA classes 1 and 2
Group 2 – Moderate Risk

2A: MS, NYHA class 3 and 4
AS
TOF, uncorrected
Marfan syndrome, normal aorta
Previous MI
Aortic coarctation without valve involvement

2B: MS with AF
Artificial valve
Group 3 – Major risk  

- Pulmonary hypertension
- Aortic coarctation with valvar involvement
- Marfan syndrome with aortic involvement
Management of classes 1 and 2

Mortalities rate is low.

หลีกเลี่ยง infection -→ heart failure

No smoking ทำให้เกิด respiratory tract infection

งด illegal drug -→ bacterial endocarditis

ระวังภาวะ CHF -→ persistence basilar rales, nocturnal dyspnea, Tachytycardia, hemoptysis, progressive edema
Labor and delivery

- Normal labor, C/S ถ้ามี indication
- Pulmonary artery catheterization
- Continuous epidural block เพื่อหลีกเลี่ยง hypotension
- Semirecumbent position
- Record vital sign keep PR < 100, RR < 24
- F/E, V/E
Intrapartum heart failure

- จําเป็นต้องรักษาภาวะ heart failure จะต้องรู้ pathophysiology

Puerperium

- ระวังสิ่งกระตุ้น Heart failure, Hemorrhage, anemia, infection

- Tubal sterilization ควรทำหลังจากคลอดเมื่อ stable
Management of class 3 and 4

High mortalities rate

Admit and bed rest is necessary

Epidural analgesia is recommended
Surgically corrected heart disease

- Sx in childhood, 15-20% not Sx because asymptomatic
- complication: thromboembolism or hemorrhage from anticoagulant
- Warfarin prevent embolism but teratogenic, heparin 6-12wk and then continuous warfarin
- stop anticoagulant before delivery
- start 6 hr if NL and 24 hr if C/S
<table>
<thead>
<tr>
<th>Type</th>
<th>Cause</th>
<th>Pathophysiology</th>
<th>Pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitral stenosis</td>
<td>Rheumatic</td>
<td>LA dilate, PH, AF</td>
<td>HF from fluid</td>
</tr>
<tr>
<td>Mitral insufficiency</td>
<td>Rheumatic</td>
<td>LV dilate</td>
<td>improve</td>
</tr>
<tr>
<td>Aortic stenosis</td>
<td>congenital bicuspid valve</td>
<td>LV hypertrophy, decrease CO</td>
<td>life-threatening with preload</td>
</tr>
<tr>
<td>Aortic insufficiency</td>
<td>Rheumatic congenital connective tissue</td>
<td>LV hypertrophy and dilate</td>
<td>improve</td>
</tr>
</tbody>
</table>
Mitral stenosis

- Rheumatic endocarditis causes ¾ in MS.
- LV dilate and PH from increase preload
- Clinical – dyspnea, fatigue, palpitation, cough, hemoptysis, tachycardia → ลด diastolic filling time ต้องรักษา b-block
- AF – aortic embolization, CVA cardioversion
Management

- Limit activities, Sodium restrict, diuretic
- New onset AF → verapamill or electrical cardioversion
- Chronic AF → b- block, digoxin, heparin
- Vaginal delivery and epidural analgesia
- Prophylaxis endocarditis
Mitral insufficiency

- No symptom
- Improve in pregnancy because decrease peripheral resistance is reduced regurgitation
- HF develop from tachyarrhythmia → Rx by b-block
- Prophylaxis endocarditis
Aortic stenosis

- Disease of aging.
- LV hypertrophy, decrease preload → decrease CO  อันตราย  
- Chest pain, syncope, heart failure, sudden death from arrhythmia
- Severe AS extremely dangerous
Management

- Asymptomatic → no Rx but observation only
- Limitation activities and Rx infection
- Balloon valvulotomy is high complication
- ระวัง hypotension, maintain CO
- Epidural analgesia
- V/E and F/E
- Prophylaxis endocarditis
Aortic insufficiency

- LV hypertrophy and dilatation
- Fatigue, dyspnea, edema
- Improve in pregnancy
- If HF $\rightarrow$ Rx sodium restrict, rest, diuretic
- Epidural analgesia
- Prophylaxis endocarditis
Congenital heart disease
ASD

- Risk of ASD in fetus 5-10%
- Congenital → asymptomatic until third or forth decade
- PH is rare
- If CHF develop → Rx
- Prophylaxis endocarditis
VSD

- Spontaneously close in 90% during childhood
- Adult with unrepaired large defect develop HF and PH
- If turn to Eisenmenger syndrome, mortalities rate is 30-50%.
- Prophylaxis endocarditis
PDA

- Some woman with an unrepaired persistent ductus develop PH.
- หลีกเลี่ยง hypotension \( \rightarrow \) reverse blood flow from pulmonary a. to aorta \( \rightarrow \) cyanosis
- Prophylaxis endocarditis
TOF

- Cyanotic heart
- Large VSD, RV hypertrophy, overriding aorta
- Peripheral resistance decrease $\rightarrow$ shunt and cyanosis worsens

Hypoxia, polycythemia $\rightarrow$ preterm, fetal death, LBW
Eisenmenger syndrome

- Secondary pulmonary hypertension
- Rt to Lt shunt
- Most common: ASD, VSD
- Prognosis depend on severity
Pulmonary hypertension

- Primary and secondary
- Limited activities, avoid of supine position, diuretic, oxygen supplement and vasodilate therapy
- Venous return and Rt ventricular filling → maternal death
- Epidural analgesia
Mitral valve prolapse

- Connective tissue disease
- 15% in normal young women
- asymptomatic, rare symptom: palpitation, dyspnea
- clinical improve in pregnancy
- antibiotic prophylaxis
Peripartum cardiomyopathy

- Dx by exclude
- peripartum heart failure but no underlying heart disease
- Bx: myocarditis
- precipitate: anemia, infection, preelampsia
Idiopathic cardiomyopathy in preg

- Prolong \( b \)-mimetic tocolytic provoking cardiomyopathy
- Symptom: CHF, dyspnea, orthopnea, palpitation, chest pain
- Echocardiogram: EF < 45%, increase end-diastolic dimension
- Rx: heart failure
- Idiopathic prognosis better than identifies cause
Infective endocarditis

- **Subacute endocarditis** viridan gr. *Streptococci*. And *Enterococcus* species

- **Acute endocarditis** coaglase positive staphylococci, *S. aureus* in native valve or iv drug abuse, *S. epidermis* in prosthetic valve, *Strep pneumoniae* and *N. gonorrhoeae* in acute and fulminant
Sign and symptom

- Flu-like, anorexia, fatigue, embolic lesion, +blood culture
- Negative echocardiographic: not exclude
- Rx → most viridan: penicillin G iv and gentamicin 2 wk
- Allergy for penicillin: cef – 3 or vancomycin 4 wk
- Other organism → C/S 4-6 wk
- Prosthetic valve 6-8 wk
Antimicrobial prophylaxis

- Moderate-high risk
- Normal labor not indication for antibiotic prophylaxis
- Preterm, PROM, manual placenta removal, 4 degree tear and high–moderate risk must take antibiotic
High risk

- Prosthetic heart valve
- previous endocarditis
- complex congenital cyanotic heart disease
- surgically constructed systemic pulmonary shunts
Moderate risk

- Most other congenital malformation not in high or low risk categories
- acquire valve dysfunction
- hypertrophic cardiomyopathy
- mitral valve prolapse with valve regurgitation
Not recommended

- ASD
- surgically corrected without prosthetic valve
- coronary a. with previous bypass Sx
- mitral valve prolapse without valve regurgitation
- physiologic murmur
- pacemaker
- previous rheumatic without valve dysfunction
Antibiotic

- **High risk**: ampicillin + gentamicin
- **Penicillin-allergic patients**: vancomycin + gentamicin
- **Moderate risk**: amoxicillin or ampicillin
Arrhythmia

- Bradyarrhythmia: permanent artificial pacemaker
- SVT: Rx like non pregnancy, digoxin, adenosine, calcium channel blocker
- VT: cause?, b- block
- AF: underlying?, digitalis to control rate
Coarctation of aorta

- Hypertension in upper extremities and normal or reduced in lower extremities
- Hypertension อาการแย่ลง aortic rupture
- B- block to prevent hypertension
- C/S is recommended
- Prophylaxis endocarditis
Marfan syndrome

- Autosomal dominant
- Systemic connective tissue disease $\rightarrow$ AR, MR, aortic dissection
- C/S if valve dissection
- 50% $\rightarrow$ offspring
Aortic dissection

- Severe chest pain, loss in peripheral pulse, murmur
- Abnormal CXR and angiogram is definite
- Noninvasive iv CT or MRI
- Rx → reduce BP
MI

- Rx like non pregnancy
- Nitroglycerine, morphine, lidocain, calcium channel blocker, b-block
- C/S if indication
- Epidural analgesia
Thank you