Heart Health & Pregnancy: Predicting Cardiovascular Health

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DISCLOSURES: No Disclosures
OBJECTIVES

Physiologic changes in cardiovascular system associated with pregnancy

Cardiovascular risks & complications in pregnancy

- Hypertension
- Diabetes mellitus
- Obesity
- Cardiomyopathy
- Placental abruption

Long term effects of events in pregnancy on cardiovascular health

Long term effects of lactation on maternal health

Physiology of Pregnancy
Cardiovascular Physiologic Changes Associated with Pregnancy

- Pregnancy is a “physiologic stress test”; a hyperdynamic state
- OBGYNs & providers caring for pregnant patients have the information to facilitate changes in care based on maternal risks
- 80-90% of women “take the test”
- 30-40% of women have at least one risk factor that can lead to long term health problems
- 20-30% carry a “predictor” of CVD risk

Cardiovascular System Adaptations

- Blood pressure of the pregnant woman decreases in the 2nd trimester returning pre-pregnancy level in the 3rd trimester.
- Cardiac output increases 25% to 50%
- Plasma volume increases up to 3600mL, pseudoanemia during pregnancy.
- Heart rate increases to 80-90 beats per minute.
- Blood volume increases up to 5,250 mL during pregnancy.
- Underlying heart murmurs may be accentuated or heard for the first time
Cardiovascular risks & Complications in Pregnancy

Hypertension

- Chronic hypertension
  - Pre-existing hypertension requiring intervention
  - Present prior to 20 weeks pregnancy and/or persisting >12 weeks postpartum

- Gestational hypertension
  - Development of hypertension >20 weeks
  - No signs/symptoms of preE

- PreEclampsia/Eclampsia
  - Development of elevated blood pressures accompanied by symptoms and laboratory findings
  - May include proteinuria, fetal growth restriction
Hypertensive Disorders: Chronic HTN

- Control pre pregnancy hypertension with adequate medication
- Ace-Inhibitors are contraindicated in pregnancy (renal damage to fetus) and should be changed if pregnancy desired.
  - Avoid use of Ace-i in women of childbearing age unless adequate birth control (i.e. IUD or sterilization)
- Need baseline labs at time pregnancy detected
- Obtain OBGYN or High Risk consult prior to pregnancy

Hypertensive Disorders: Gestational Hypertension

- Onset of hypertension >20 weeks gestation without previously existing hypertensive disorder.
- SBP >150 OR DBP >90
  - Start treatment if verified BPs in this range.
  - Obtain baseline PIH labs to establish level of proteinuria
- Increased risk for progression of PIH, preE, eclampsia, HELLP syndrome.
  - Monitor closely
  - Patients require increased antenatal surveillance and delivery 37-39 weeks
Hypertensive Disorders: PreE/Eclampsia/HELLP

- PreE: persistent elevated BPs with proteinuria
- With severe features:
  - HA, visual changes, N/V, RUQ/epigastric pain.
  - Delivery indicated at time of diagnosis
- Treat BPs, check weekly labs, antenatal testing
- Delivery 37-39 weeks, sooner prn severe features
- IUGR - growth US q3-4wk.

- HELLP: Hemolysis, elevated liver enzymes, low platelets
- Form of severe PreE
- Liver involvement may progress to hematoma.
- Risk of Stroke
- Risk of death
- Renal involvement.

Hypertensive Disorders: Case Study

- 33 yo G2P0010 at 39.6 weeks - followed outpatient for elevated BPs
  - NICU RN
  - Husband was physician
- S/P vaginal delivery, PPD #1
- Development of severe RUQ pain, N/V
- Abnl vital signs and labs noted.
- Stroke
- Death
- [https://www.youtube.com/watch?v=g6iKAaX9UKQ #action=share](https://www.youtube.com/watch?v=g6iKAaX9UKQ #action=share)
What antihypertensive medication is contraindicated in pregnancy?

- Ace Inhibitors

Diabetes

- Pre-existing DM 1
- Pre-existing DM 2
- Gestational Diabetes Mellitus (GDM)
  - Diagnosed by glucose tolerance testing
  - Early glucose testing in suspected/unknown DM2 (HbA1C & 1hr GTT first trimester)
    - BMI ≥30
    - Age ≥35
    - Strong FHx DM2
What test is required for patients who experienced GDM at 8 weeks postpartum to determine the presence of DM2?

2-Hour Glucose Tolerance Test (GTT)

Obesity

- BMI >30 prior to pregnancy
- Limit weight gain during pregnancy
- Morbid obesity has higher risks of poor maternal and fetal outcomes
- Increased risk of maternal depression
- Thrombotic events
- Hypertensive disorders and preE
- Increases risk of miscarriage & stillbirth
- Increased risk of congenital anomalies
- Increased risk of labor dystocia
  - LGA
  - Shoulder dystocia
Obesity

- Overnutrition leads to dysregulation of maternal and placental metabolism
- Effects regulation of glucose, amino acids and lipids
- Increases risk of obesity in offspring

**Weight Gain During Pregnancy**

Institute of Medicine Recommendations

<table>
<thead>
<tr>
<th>Maternal Weight: Before Pregnancy</th>
<th>Maternal Body Mass Index (BMI)</th>
<th>Recommended range: Total weight gain</th>
<th>Recommended gain per week: 2nd - 3rd Trimesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.5</td>
<td>28-40 lbs.</td>
<td>1 lb. (1-1.3)</td>
</tr>
<tr>
<td>Average/normal weight</td>
<td>18.5 - 24.9</td>
<td>25-35 lbs.</td>
<td>1 lb. (0.8-1)</td>
</tr>
<tr>
<td>Overweight</td>
<td>25 - 29.9</td>
<td>15-25 lbs.</td>
<td>0.6 lb. (0.5-0.7)</td>
</tr>
<tr>
<td>Obese</td>
<td>30+</td>
<td>11-20 lbs.</td>
<td>0.5 lb (0.4-0.6)</td>
</tr>
</tbody>
</table>

Cardiomyopathy

- A form of dilated cardiomyopathy
- Left ventricular systolic dysfunction
- Signs/symptoms of heart failure
- Often unrecognized, as symptoms of normal pregnancy commonly mimic those of mild heart failure.
- Diagnosis of exclusion
- Associated with poorest long-term outcomes in cardiovascular health
- May develop pre/intra/post-partum
  - Cardiac failure in the last month of pregnancy & up to five months postpartum
  - Absence of identifiable cause of cardiac failure
  - Unclear etiology of heart disease prior to last month of pregnancy
  - Left ventricular failure
    - 2D echo depressed ejection fraction
- Incidence: Ranges depending on regional location
  - May be due to ethnic distribution
  - 1 in 4000 deliveries

Cardiomyopathy - Risk factors

- Age >30 years old
- Multiparity
- African Descent
- Maternal cocaine abuse
- Long term tocolytic therapy (>4wks)
- Multifetal gestation
- Hx of PreE, eclampsia, or postpartum HTN
- Nutritional deficiencies
Cardiomyopathy - Etiology

- Unknown
- Nutritional deficiencies
- Small vessel coronary artery abnormality
- Hormonal effects
- PreE/Eclampsia
- Maternal immunologic response to fetal antigen
- Myocarditis
- Pre-existing undiagnosed cardiovascular disease

Cardiomyopathy - Prognosis

- 50-60% pts: complete/near complete recovery w/in the first 6 mo postpartum
- Continued clinical deterioration
  - May lead to early death
  - Persistent left ventricular dysfunction & chronic heart failure
- Initial high risk period
  - Mortality of 25-50% in the first 3 months postpartum.
- Persistent cardiomegaly at 6 mo have a reported mortality of 85% at 5 yrs.
  - Avoid future pregnancy if LV dysfunction persists >6 mo
Cariomyopathy – Case Study

- 30yo G1P1001 PPD #15 presents to the ED with extreme fatigue, mild SOB, worse with exertion.
- Advised likely secondary to newborn care
- Patient sent home, reassured
- Found by husband in bed two days later, died during the night.
- Autopsy revealed advanced cardiomyopathy and death secondary to postpartum cardiomyopathy

Other Contributors to Long-Term Cardiovascular Health
Parity

Parity & Cardiovascular health

- "J-shaped" Curve, with two to four offspring serving as the nadir
- Parity exceeding five increases the CVD risk by almost 60%
Placenta Abruption

- Abrupt separation of the placenta from the uterine wall
- Presents with pain & bleeding
- May be accompanied by shock symptoms

Causes:
- Trauma
- HTN
- Cocaine use
- Ruptured membranes
- Hx abruption
- Parity and AMA

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Abruptio placentae brings increased cardiac risk - and soon. Janc B. Cardiology News. Feb 28, 2018

Intrauterine Growth Restriction

- May accompany other risks factors, i.e. hypertensive disorder
- IUGR without other underlying risk factors, more concerning.
  - what’s causing growth restriction
- Asymmetric IUGR more concerning
- Underlying vascular disorder may be contributing factor
  - Concern for future health CVD issues

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http://www.fetal.com/IUGR/whatisiugr.html
Preterm Delivery

- Delivery <37 weeks gestation
- Spontaneous
- Nearly all studies (4 out of 5) show women with PTD have 2x risk of CVD
- Increase CVD screening in women with Hx PTD
- >2 PTD statistically increases risk

Long-Term Effects of Pregnancy Complications on Maternal Health: A Review
Ran Neiger

What is the most serious cardiac condition in pregnancy/postpartum leading to long-term heart disease?

Cardiomyopathy
Protective Factors

Lactation

“Breastfeeding is a mother’s gift to herself, her baby and the Earth”

Pamela K Wiggins
Effect of Lactation on CVD Risk of Postmenopausal Women in the WHI


- Postmenopausal women
  - 7.9 yr ave

- Lower risk of CVD, HTN, DM and lipid disorder seen in women who breastfed 7-12 months

Lactation and MI in Mid to Late Adult in the Nurse’s Health Study


- Prospective cohort study ~90K
- Women who breastfed for a lifetime total > 2 years = 37% lower risk of coronary heart disease
- Lower stress
- Higher metabolic rate
Lactation & Diabetes

- 30% reduction in the incidence of DM 1 for infants exclusively breastfed for at least three months
- 40% reduction in the incidence of DM 2 – May reflect long term positive effect of breastfeeding

Prenatal health optimization

- It is not our duty as physicians to stifle a woman’s fertility solely based on her preexisting factors, but to educate her on the risks associated with her history and state of health for her short and long-term health benefit
- [https://www.youtube.com/watch?v=TIB_1W-qc14](https://www.youtube.com/watch?v=TIB_1W-qc14)
- Optimize health prior to pregnancy
- PRENATAL counselling and education on control of any preexisting health concerns
- f/u on adverse pregnancy outcomes and counsel patients before pregnancy occurs again.
Take home Message:

- We all need to work together as a multidisciplinary team to optimize women’s health before and after pregnancy.
- Screen patients in your primary care practice by asking if there were any complications during pregnancies.

Questions & Comments

NURSE! THIS ONE IS PREGNANT TOO! WE NEED TO PERFORM ANOTHER C SECTION!