Critical Care in Pregnancy

Society of Critical Care Medicine

The Intensive Care Professionals

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Version 6.3

Objectives

- Describe physiologic alterations in pregnancy
- Discuss diagnosis and management of hypertensive disorders
- Identify manifestations and treatment of HELLP syndrome
- Outline approaches to management of other conditions in pregnancy
- List priorities for managing trauma in pregnancy

Case Study 1

- 28-year-old woman in labor at 34 weeks' gestation
- BP 190/110 mm Hg, HR 125 beats/min, SpO_2 86% in room air
- Severe respiratory distress
- Diffuse bilateral infiltrates on chest X-ray

What are the possible diagnoses?

What are the expected changes in vital signs in pregnancy?

What are the expected changes in vital signs in pregnancy? (Select all that apply)

A. Lower blood pressure
B. Increased heart rate
C. Increased respiratory rate
D. Increased tidal volume

Case Study 1

- 28-year-old woman in labor at 34 weeks' gestation
- BP 190/110 mm Hg, HR 120 beats/min, Spo_2 86% in room air
- Severe respiratory distress
- Pulmonary edema on chest X-ray

What are the expected changes in vital signs in pregnancy?

Physiologic Alterations

- **Cardiovascular**
  - **Increased blood volume, stroke volume, and heart rate**
  - **Normal filling pressures**
  - **Decreased BP in second trimester**
  - **Enlargement of heart chambers**
  - **Compression of vena cava by uterus in third trimester**

Physiologic Alterations

- **Pulmonary**

Increased

- **Respiratory rate**
- **Tidal volume**
- **O_2 consumption**

Decreased

- **$PaCO_2$**
- **Functional residual capacity**
- **O_2 reserve of mother/fetus**

Physiologic Alterations

- Gastrointestinal
  - Decreased esophageal sphincter tone
  - Nausea, vomiting, dyspepsia
  - Increased risk of aspiration
- Hematologic
  - Increase in total plasma volume
  - Dilutional anemia
  - Increased coagulation factors

Case Study 1

- 28-year-old woman in labor at 34 weeks' gestation
- BP 190/110 mm Hg, HR 125 beats/min, SpO_2 86% in room air
- Severe respiratory distress with pulmonary edema

What type of hypertensive disorder is likely in this patient?

What additional evaluations are needed to help with diagnosis?

Case Study 1

- 28-year-old hypertensive woman in labor at 34 weeks' gestation
- Anuric for 2 hours
- Urine protein 4+
- Hemoglobin 11 g/dL, platelets 170,000/mm^3
- Normal hepatic function tests

What type of hypertensive disorder is likely in this patient?

What type of hypertensive disorder is likely in this patient? (Choose the single best answer)

A. Chronic hypertension
B. Pregnancy-induced hypertension
C. Preeclampsia
D. Eclampsia
E. HELLP syndrome

Case Study 1

- 28-year-old hypertensive woman in labor at 34 weeks' gestation
- Anuric for 2 hours
- Urine protein 4+
- Hemoglobin 11 g/dL, platelets 170,000/mm^3
- Normal hepatic function tests

What type of hypertensive disorder is likely in this patient?

Hypertensive Disorders

- Severe preeclampsia
  - Preeclampsia with end-organ involvement
  - Severe systolic or diastolic hypertension
  - Impaired liver function or RUQ pain
  - Progressive renal insufficiency
  - Pulmonary edema
  - Cerebral dysfunction or headache
- Eclampsia
  - Preeclampsia with generalized seizures

Case Study 1

- 28-year-old woman in labor with severe preeclampsia

What interventions are needed?

- Hospital admission
- Oxygen supplementation
- Seizure prophylaxis
- Blood pressure control
- Fetal and maternal monitoring
- Obstetric consultation, delivery

Severe Preeclampsia/ Eclampsia

- Seizure prophylaxis/treatment
  - Administer magnesium sulfate IV or IM
  - Eclampsia or severe preeclampsia (impending seizures)
  - Monitor respirations, reflexes, urine output, consciousness
- Blood pressure control
  - Goal = diastolic BP 90-100 mm Hg
  - Hydralazine, labetalol, nicardipine
  - Avoid precipitous drops

Case Study 1

- 28-year-old hypertensive woman in labor at 34 weeks' gestation
- Hemoglobin 10 g/dL, platelets 70,000/mm^3
- AST 150 U/L, ALT 100 U/L, bilirubin 2.4 mg/dL

What type of disorder is likely?

How would the management differ from that for severe preeclampsia?

HELLP

- **H**emolysis: microangiopathic anemia, ↑bilirubin or LDH
- **E**levated **L**iver enzymes
- **L**ow **P**latelets: <150,000/mm^3
- Onset typically 27-36 weeks, although can occur until 1-2 days postpartum
- Differentiate from acute fatty liver, TTP, HUS, sepsis
- Urgent delivery

Postpartum Hemorrhage

- Etiologies
  - Uterine atony, pelvic hematomas, lacerations, DIC
- Signs of hypovolemia occur late
- Treatment
  - Fluid resuscitation
  - Blood products
  - Medical management of uterine atony
  - Embolization and/or surgery

Thromboembolic Disease

What tests are appropriate in pregnancy?

- Doppler ultrasonography, V/Q scanning, CT angiography (most effective)

What is appropriate treatment in pregnancy?

- Low molecular weight or unfractionated heparin
- Avoid warfarin

Thromboembolic Disease

How is anticoagulation managed during delivery?

- Unfractionated heparin stopped 4-6 hours before delivery
- Low-molecular weight heparin stopped 12 hours before delivery
- Resume 6-24 hours after delivery
- Transition to warfarin after delivery

Peripartum Cardiomyopathy

- Onset: last month of gestation to 5 months postpartum
- Typical presentation of heart failure
- Usual management of heart failure
  - Fluid management
  - Inotropic support
  - Afterload reduction
  - Anticoagulation
- Early delivery is not helpful

Conditions Affected by Pregnancy

- **Asthma**
  - **Inhaled β-agonists, corticosteroids safe**
  - **Hypercapnia indicates respiratory failure**
- **Septic pelvic thrombophlebitis**
  - **Empiric antibiotics**
  - **Consider anticoagulation**
- **Amniotic fluid embolism**
  - **Shock, cardiopulmonary failure, DIC**

Trauma in Pregnancy

- Left lateral position to decrease caval compression
- Changes in blood pressure are late indicators of hypovolemia
- Blood loss compromises the fetus first
- Fetal monitoring
- Evaluate uterine irritability
- Consider Rho(D) immune globulin
- Obstetric consultation

Mechanical Ventilation

- Smaller endotracheal tube
- Adjust ventilator parameters
  - SpO_2 ≥94%
  - PaO_2 >70 mm Hg (9.3 kPa)
  - $PaCO_2$ 30-32 mm Hg
- Increased aspiration risk during intubation
- Noninvasive ventilation may increase aspiration risk

Advanced Life Support

- Follow guidelines
- Left lateral decubitus position or manual displacement of uterus
- Compressions slightly above center of sternum
- Rapid delivery within 4-5 min to improve maternal circulatory status

Pharmacotherapy

- Assess risks and benefits of drugs
- Consider effects on uteroplacental blood flow
- Avoid warfarin, ACE inhibitors, diazepam, phenytoin
- Consult a clinical pharmacist

Questions

Key Points

- Cardiac output decreases due to caval compression in third trimester
- Magnesium sulfate is used for seizure prophylaxis/treatment in preeclampsia/eclampsia
- Preeclampsia is diagnosed by hypertension with proteinuria after 20 weeks' gestation
- Lowering BP to normal is not necessary in hypertensive disorders of pregnancy

Key Points

- Heparin anticoagulation is used to treat pulmonary embolism
- Aggressive resuscitation is needed in postpartum hemorrhage
- Treatment priorities for the pregnant patient with trauma are the same as for the nonpregnant patient
- Signs of hypovolemia are delayed
- Rho(D) immune globulin should be administered after trauma when indicated

Key Points

- Indications for intubation and mechanical ventilation are the same as for the nonpregnant patient
- Perimortem cesarean delivery should be considered early
- Consider potential adverse effects of medications on the fetus