The Effects of Maternal HELLP Syndrome on the Neonate

Purpose and Goal: CNEP # 2114

- Learn about maternal HELLP Syndrome
- Learn about effects of HELLP Syndrome on the fetus and neonate

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Requirements for successful completion:

- Successfully complete the post-test
- Complete the evaluation form
Learning Objectives

- Describe the maternal risks of HELLP Syndrome
- Describe the neonatal risks of HELLP Syndrome
- Describe at least 2 NICU complications of HELLP Syndrome

Introduction

- HELLP Syndrome is complicated
- It consists of a variety of symptoms
- It probably represents severe preeclampsia
- 48,000 women develop HELLP each year
- Short term risks include:
  - SGA fetus
  - Preterm birth
- Long term risks include:
  - Renal disease
  - Cardiovascular disease
  - Chronic hypertensive disease
- If left untreated HELLP can lead to:
  - Stroke
  - Liver rupture
  - Maternal death
- Delivery eventually leads to resolution
- Recognizing the risks to the neonate
  - Can help reduce morbidity
  - Can help reduce mortality
Gestational Hypertension Disorders

- Gestational hypertension disorders
  - Are induced by pregnancy
  - Resolve in the post-partum period
- The hypertensive disorders include:
  - Gestational hypertension
  - Preeclampsia/Eclampsia
  - HELLP Syndrome
- The disorders are caused by:
  - Placental dysfunction
  - Maternal vascular dysfunction
- Gestational hypertension is a clinical diagnosis
  - New onset of hypertension
  - On at least 2 occasions
    - At least 4 hours apart
  - Systolic blood pressure >140 mmHg
  - Diastolic blood pressure >90 mmHg
- Gestational hypertension is considered severe
  - When systolic pressure is >160 mmHg
  - When diastolic pressure is >110 mmHg
- Gestational hypertension is considered
  - Preeclampsia with severe features
  - When blood pressures are severe
  - When signs of preeclampsia are present
- 10-50% of women with gestational hypertension
  - Subsequently develop preeclampsia
- Preeclampsia is diagnosed with signs of:
  - Proteinuria
  - End organ dysfunction
- 10-20% of women with gestational hypertension
  - Subsequently develop HELLP Syndrome
• HELLP Syndrome is diagnosed with signs of:
  • Hemolysis
  • Elevated liver enzymes
  • Low platelet counts
• Of note: up to 15-20% of women with HELLP
  • Do not have hypertension
  • Do not have proteinuria
• The rate of mortality with HELLP Syndrome is 8-60%

Risk Factors for Hypertension Disorders

• There are several risk factors for hypertension
  • They apply to early onset hypertension
  • They also apply to late onset hypertension
  • They apply to all hypertension disorders:
    • Gestational hypertension
    • Preeclampsia/Eclampsia
    • HELLP Syndrome
• The significance of risk is based on individual factors
• Major risk factors for hypertension include:
  • First pregnancy
  • Family history of preeclampsia
  • Preeclampsia in a previous pregnancy
    • Eight-fold increased risk
  • Chronic hypertension
    • Blood pressure >130/80
    • Five-fold increased risk
  • Vascular disease
  • Chronic renal disease
  • Diabetes mellitus
    • Gestational
    • Pregestational
- Autoimmune disease
  - Antiphospholipid syndrome
  - Systemic lupus erythematosus
- Obesity
  - Three-fold increased risk
- IUGR fetus
- Multifetal gestation
- In vitro fertilization
- Of note: tobacco users have a decreased risk
- Of note: nulliparity is not a risk factor for HELLP
  - >50% of affected women are multiparous

**Pathophysiology of HELLP Syndrome**

- The pathogenesis of HELLP Syndrome is unclear
- It likely involves both maternal and fetal factors
- The placenta plays a significant role
  - Shallow placental attachment
  - Failure to remodel placental arteries
  - Failure to establish good placental blood flow
- Inadequate uteroplacental blood flow
  - Results in hypoxic trophoblast tissue
  - Promotes exaggerated placental stress
  - Leads to poor fetoplacental vasculature
- Placental secretion of antiangiogenic factors
  - Results in widespread vascular dysfunction
  - Results in thrombotic microangiopathy
    - Leading to hypertension
    - Leading to proteinuria
    - Leading to HELLP Syndrome
- One subset of HELLP is thought to be caused by:
  - Thrombotic microangiopathy
  - A systemic inflammatory disorder
  - Which is caused by complement dysregulation
• Another subset of HELLP is thought to be caused by:
  • Fetal long-chain 3-hydroxyacyl dehydrogenase deficiency
  • Which is not related to maternal heterozygosity
• Microangiopathy and activation of intravascular coagulation
  • Can account for all findings in HELLP Syndrome
• This may or may not be treatable without prompt delivery

Signs and Symptoms of HELLP Syndrome

• HELLP Syndrome has a variable presentation
• The onset of symptoms is generally rapid
• The most common symptoms include:
  • Pain
    • Shoulder pain
    • Epigastric pain
    • Right upper quadrant pain
  • Nausea
  • Vomiting
  • Malaise
• Less common symptoms include:
  • Headache
  • Visual changes
  • Jaundice
  • Ascites
• Hypertension and proteinuria are present
  • In 85% of HELLP
  • But both may be absent
• Serious maternal morbidity may be present
  • DIC
  • Stroke
  • Abruption
  • Acute kidney injury
  • Pulmonary edema
Liver hematoma
Retinal detachment
Thrombocytopenia related bleeding is unusual
Mucosal
Hematuria
Petechiae
Ecchymosis
Symptoms generally present between 27-37 weeks
Up to 30% of HELLP may develop in the post-partum period
Of note: symptoms may worsen up to 48 hours following delivery

Diagnosis and Management of HELLP Syndrome

The diagnosis of HELLP is based on abnormalities
Hemolysis
Elevated liver enzymes
Low platelet counts
Laboratory criteria for diagnosis include:
Hemolysis
Burr cells
Schistocytes
Bilirubin ≥1.2 mg/dL
Haptoglobin ≤25 mg/dL
Lactate dehydrogenase ≥600 IU/L
Severe anemia
Hgb <8 g/dL
Elevated liver enzymes
AST ≥2 times normal
ALT ≥2 times normal
Low platelet counts
• <100,000 cells/microL

• HELLP Syndrome can be subclassified
  • Based on the severity of thrombocytopenia
  • Class 1 = platelet count ≤50,000 cells/microL
  • Class 2 = platelet count >50,000 cells/microL
  • Class 3 = platelet count >100,000 cells/microL

• HELLP can be confused with other disorders
  • Acute fatty liver disease of pregnancy
  • Thrombotic thrombocytopenia purpura
  • Pregnancy-related hemolytic-uremic syndrome

• In HELLP, there is markedly abnormal:
  • Angiopathy
  • Liver dysfunction

• Women with the following require urgent management
  • Severe hypertension
    • IV antihypertensive therapy
    • To reduce the risk of stroke
  • Abnormal fetal heart tracing
  • Low biophysical profile score
  • Severe epigastric or upper right quadrant pain
    • Ultrasound, CT or MRI scan
    • To assess for hepatic swelling
    • To assess for hepatic bleeding
    • To assess for possible hepatic rupture
  • DIC, pulmonary edema, acute kidney injury
    • Stabilize and promptly deliver

• Liver hemorrhage or rupture is a life-threatening complication
  • Blood transfusion is critical
    • Platelets
    • Red blood cells
  • Volume replacement is critical
  • Prompt delivery after stabilization
A liver trauma surgeon should be consulted
Prompt delivery is the only effective treatment for HELLP
Candidates for prompt delivery include:
- Pregnancy >34 weeks gestation
- Pregnancy below the limit of viability
- Placental abruption
- In utero fetal demise
Delivery may be delayed <48 hours in other cases:
- To complete a course of steroids
- To treat with magnesium sulfate
  - To prevent maternal seizures
  - To offer fetal neuroprotection
    - 24-32 weeks gestation

The Effects on the Fetus and Neonate

- Perinatal morbidity and mortality
  - Are higher in the fetus than the mother
- The effects on the neonate is related to age
- Infants delivered at <32 weeks gestation
  - Are at highest risk
  - Have a 32% mortality rate
- Infants delivered at >32 weeks gestation
  - Are at lowest risk
  - Have a mortality rate of 8%
- The rate of stillbirths with HELLP Syndrome
  - Are 51/1,000 pregnancies in the USA
- The rate of neonatal deaths with HELLP Syndrome
  - Are 8-60% in developed countries
  - Including stillbirths and neonatal death
- The leading causes of mortality include:
  - IUGR
- Prematurity
- Asphyxia
- Placental insufficiency
- Placental abruption
- The leading causes of morbidity include:
  - Thrombocytopenia
  - Interventricular hemorrhage
  - Long-term neurological complications
- Neonatal thrombocytopenia occurs in 15-38%
  - Platelet counts <150,000 cells/microL
- Thrombocytopenia places the neonate at risk for:
  - Interventricular hemorrhage
  - Poor neurodevelopmental outcomes
- The greatest risks to the neonate from HELLP are:
  - IUGR
    - Caused by ↓ placental blood flow
    - Placing the neonate at risk for:
      - Asphyxia
      - Cold stress
      - Polycythemia
      - Hypoglycemia
      - Poor brain growth
  - Asphyxiation
    - Placing the neonate at risk for:
      - Neonatal distress
      - Hypoxic-ischemic encephalopathy
  - Placental abruption
    - Placing the neonate at risk for:
      - Hypovolemia
      - Hypotension
      - Platelet dysfunction
- The overall greatest risk to the neonate is preterm birth
- There are several risks associated with prematurity
• Anemia
• Infection or sepsis
• Respiratory distress
• Apnea and bradycardia
• Electrolyte imbalances
• Necrotizing enterocolitis
• Patent ductus arteriosus
• Interventricular hemorrhage
• There are several long-term risks associated with prematurity
  • Chronic lung disease
  • Visual problems
  • Hearing impairment
  • Learning difficulties
  • Developmental delays
• Recognition and management of risks improve outcomes

Other Important Neonatal Considerations

• HELLP Syndrome impacts the entire family
  • Economic impact
  • Emotional impact
  • Social impact
• The burden on the family goes beyond the diagnosis
  • Of the mother
  • Of the neonate
• A diagnosis of HELLP Syndrome during pregnancy
  • Increases the risks for morbidity
  • Increases the risks for mental disabilities
  • Increases the risks for physical disabilities
• Additionally, a premature birth is an added stressor
  • Financial concerns
  • Emotional concerns
• Quality of life concerns
• Family stability concerns
• The impact of a NICU hospitalization is significant
  • According to the March of Dimes
    • The average NICU stay is $76,164
    • And $180,811 for neonates <32 weeks
    • Which is 9 times more than a term birth

Summary

• HELLP Syndrome develops in up to 1% of pregnancies
• The most common presentation sudden onset pain
  • Epigastric pain
  • Right upper quadrant pain
• The diagnosis of HELLP is based on 3 factors:
  • Hemolysis
  • Elevated liver enzymes
  • Low platelet counts
• The outcome for mothers is generally good
  • But serious complications can arise
• The greatest risk to the neonate is prematurity
  • Preterm delivery is common
  • Low birthweight is common
• Understanding HELLP Syndrome improves outcomes

References


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