Episode 162: Hypertensive Disorders of Pregnancy with Juanita Henao

On this episode: Dr. Jed Wolpaw and Dr. Juanita Henao

In this 162nd episode I welcome Dr. Henao back to the show to discuss hypertensive disorders of pregnancy and how to manage them.

CLARIFICATIONS:
During our discussion of treatment of eclamptic seizures Dr. Henao said benzos were first line treatment. This is assuming the patient is already getting magnesium. For test questions, the answer for first line treatment should be Mg. In reality, patients will likely get both at the same time.
Serum Mg concentrations can be reported as mmol/L, meq/L or mg/dL. The important ranges to know for testing (though in reality different people may get symptoms at different times) are a therapeutic range of 2-3.5 mmol/L or 4-7 mEq/L or 5-9 mg/dL; A loss of patellar reflexes at >3.5, >7, >9; Respiratory paralysis at >5, >10, >12 and cardiac arrest at >12.5, >25, >30. EKG changes including prolonged PR and widened QRS happen in much the same range as loss of patellar reflexes, maybe a bit before but there is a lot of overlap.

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Categories of Hypertensive Disorders of Pregnancy

0:00 – 13:14

- Chronic hypertension = hypertension present before 20 weeks of pregnancy without proteinuria
    - Hypertension = SBP > 140mmHg and/or DBP > 90mmHg on two occasions 4 hours apart
    - ¼ of patients with either chronic hypertension or gestational hypertension will develop preeclampsia → need to monitor closely
    - Patients on hypertensive medications are included in this category
- Gestational hypertension = hypertension present after 20 weeks of pregnancy
    - Same definition of hypertension as chronic hypertension
- Chronic hypertension with superimposed preeclampsia = hypertension present before pregnancy and patient develops new onset proteinuria or early manifestations of preeclampsia
    - Preeclampsia definitions are the same as below
    - Prognosis could be worse than those with just preeclampsia
- Preeclampsia = SBP > 140mmHg and DBP >90mmHg on two occasions 4 hours apart WITH proteinuria
    - Proteinuria = ≥ 300mg in 24hr urine collection OR protein: creatine urine ratio > 0.3 OR urine dipstick > 1+
    - In 2017, ACOG changed diagnostic criteria to say proteinuria does not have to be present if any of the following severe features of preeclampsia are present:
        - Thrombocytopenia = platelet count < 100 000
        - Renal insufficiency = serum creatinine concentration > 1.1 or creatine that is doubling
        - Impaired renal function = elevated liver transaminase 2x normal, pulmonary edema
        - Neurological manifestations of preeclampsia = persistent headache, visual abnormalities
        - (addition at 32:45) SBP > 160mmHg and/or DBP > 110mmHg
    - Risk of developing preeclampsia is 7-8% out of all pregnancies in US
    - ACOG redefined preeclampsia and severe preeclampsia to preeclampsia with or without severe features

Risk Factors for Preeclampsia by Time of Onset

13:15 – 18:44

- Early vs. late-onset preeclampsia
    - Early-onset = preeclampsia present before 34 weeks; 20% of patients with preeclampsia
        - Strong genetic component (eg. history in family, history of preeclampsia with previous pregnancy)
    - Late-onset = preeclampsia present after 34 weeks; 80% of patients with preeclampsia
        - Risk factors for late-onset: obesity, chronic hypertension, diabetes, chronic kidney disease, advanced maternal age, teenage pregnancies, autoimmune disorders (eg. lupus, antiphospholipid syndrome), multiple gestations, IVF

- IVF is a risk because believed to have stronger immunological response
    - Pathogenesis of preeclampsia is hypothesized to include immunological response to placenta
    - Theory that father component plays a role; women frequently exposed to partner's semen has ↓ likelihood of developing

- Post-partum preeclampsia = manifest with preeclampsia for the first time up to 8 weeks post-partum → include on differential of patient presenting with post-partum headaches
    - ~5% of patients are diagnosed post-partum

Pathophysiology of Preeclampsia

18:45 – 22:29

- Spiral arteries = end branches of uterine arteries that provide blood supply to placenta
- In normal pregnancy, spiral arteries dilate and invade myometrium to decrease resistance and increase nutrient supply to fetus.
    - Spiral arteries are resistant to vasoactive stimuli
- In preeclampsia, impaired remodeling of spiral arteries in placenta
    - Spiral arteries remain small, constricted and are hyperactive to vasoactive stimuli → decreased placenta perfusion, small placental infarcts, less blood supply to fetus → increased risk IUGR
        - Fetus continues to grow so this could worsen throughout pregnancy
    - Release of antiangiogenic factors into maternal circulations → widespread endothelial dysfunction → hypertension, proteinuria
- Still a lot that we do not know

Other Related Disorders

22:30 – 24:44

- HELLP syndrome = hemolysis, elevated liver enzymes, low platelets
    - Included in spectrum of eclampsia disorders, but is its own disorder
    - Increased risk of HELLP syndrome if have preeclampsia
- Acute Fatty Liver of Pregnancy
    - Occurs with or without HELLP syndrome and/or preeclampsia

Prevention

24:45 – 27:37

- Aspirin 81mg is used as preventative measure in patients with risk factors starting at 16 weeks and continued until 8 weeks post-partum
    - In preeclampsia, there is increase in thromboxane A2 relative to prostacyclin
        - Thromboxane A2 is potent vasoconstrictor
        - Prostacyclin is vasodilator
    - Aspirin inhibit thromboxane A2 to reduce risk of preeclampsia
- Another study looked at Vitamin C as prevention → did not show beneficial results
    - In preeclampsia, there is increase ROS secondary to vasoconstriction
    - Vitamin C is an antioxidant

Why is preeclampsia bad?

27:38 – 29:49

- If not enough fetal and placenta perfusion, fetus is not going to grow → IUGR, prematurity, intrauterine fetal demises
- Preeclampsia is multisystem disease with endothelial damage → patients could develop pulmonary edema, renal insufficiency, DIC, strokes (hemorrhagic stroke is highest risk of mortality associated with eclampsia)

Treatment

29:50 – 45:59

- Patient with chronic hypertension without preeclampsia in labour:
    - Medications used to control BP: labetalol (1st line), hydralazine (1st line), and nifedipine
        - Eg. labetalol 10mg → progressively increasing dose based on patient's response
    - Monitoring for early detection of worsening symptoms
    - Fetal monitoring for reassuring heart rate patterns
- Patient with preeclampsia in labour:
    - Antihypertensive medications
    - Magnesium for seizure prophylaxis: start with 2g to 4g bolus and then infusion
        - Measure serum levels → therapeutic range is around 6-7mg/dL
        - Mechanism: magnesium attenuates vascular response to vasopressors and dilates vascular beds in brain; NOT an antihypertensive
        - Magnesium also has neuroprotective effects for premature fetus
    - **Clarification: Serum Mg concentrations can be reported as mmol/L, meq/L or mg/dL. The important ranges to know for testing (though in reality different people may get symptoms at different times) are a therapeutic range of 2-3.5 mmol/L or 4-7 mEq/L or 5-9 mg/dL; A loss of patellar reflexes at >3.5, >7, >9; Respiratory paralysis at >5, >10, >12 and cardiac arrest at >12.5, >25, >30. EKG changes including prolonged PR and widened QRS happen in much the same range as loss of patellar reflexes, maybe a bit before but there is a lot of overlap.
    - Side effects of magnesium depends on serum level:
        - Therapeutic range → flush, warm, nausea, sedated
        - 7-12mg/dL → loss of deep tendon reflexes
        - 10-15mg/dL → arrhythmias (eg. prolonged PR, widened QRS, heart blocks)
        - 15-20mg/dL → respiratory depression and/or asystole
- Patients not indicated for expectant management and need to be delivered immediately regardless of gestational age:
    - Patients with eclampsia
    - Patients with pulmonary edema
    - Patients with DIC
    - Patients with renal insufficiency
    - Placental abruption
    - Any abnormal fetal testing
- Patients without serious conditions:

    - Expectant management → admitted and monitored closely, do not have to be delivered right away
        - Monitored for severe features that do not resolve → indication for delivery
- Patients with eclamptic seizures:
    - Control with benzodiazepine → bolus of 2g magnesium sulfate → propofol
        - ** During our discussion of treatment of eclamptic seizures Dr. Henao said benzos were first line treatment. This is assuming the patient is already getting magnesium. For test questions, the answer for first line treatment should be Mg. In reality, patients will likely get both at the same time.
    - Protect patient's airway
    - Monitor fetus → if have reassuring HR patterns, continue to monitor patient
- Delivery: communicate with obstetrician regarding mode of delivery
    - Vaginal delivery → early administration of neuraxial (eg. continuous epidural, CSE, dural puncture epidural)
        - Place catheter early because: 1) patients may have declining platelets; 2) by decreasing pain, decreases circulating catecholamines which helps decrease BP and improve uteroplacental perfusion
    - C-section → neuraxial anesthesia preferred over GA (patients will be a difficult airway)
        - Neuraxial techniques: eg. single shot spinals, continuous epidural
        - If have to do GA:
            - Anticipate difficult airway → use smaller tube, have video laryngoscope and fiberoptic ready
            - Laryngoscopy causes sympathetic response → risk of stroke
                - Consider esmolol, remifentanil bolus, small nitroglycerin bolus

Summary

46:00 – End

- Preeclampsia is a progressive disease
- It could present postpartum
- It should not be taken lightly
- Stay tuned because there's a lot of research going on regarding the pathophysiology of the disease that will shed light on preventative measurements!

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