Unpreventable Eclampsia: New Ideas and Protocols for Prevention & Treatment

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- I have no conflicts of interest with this presentation material.

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Case Study #1

Focus: Core Principles in Eclampsia Management

Case Study #1 - 01

- 20 years old, AA, G_1P_0 at 33 $^{6/7}$ weeks
- Prenatal care since 10 weeks
- Medical and surgical history benign
- Screening tests this pregnant – all NEG
- No history of hypertension or chronic disease prior to pregnancy
- Presents to OB provider's office for scheduled visit

Case #1 - 02

33 $^{6/7}$ wks

- Vital signs and assessment:

Parameter	Value
Blood Pressure (BP)	148/84 mm Hg 142/81 mm Hg (repeat in 15 min)
Heart Rate (HR)	90 /min
Respiratory Rate (RR)	19 /min
Temperature (T)	98.0° F (O) /36.7° C
Fetal Heart Rate (FHR)	140 /min

O = oral

Case #1 - 03

33 $^{6/7}$ wks

- Vital signs and assessment: (cont')

Parameter	Value
Vaginal exam	Dilatation: FT to 1 cm Effacement: 20% Station: -2 Position: Posterior Consistency: firm
Membranes	Intact (IBOW)
Uterine activity	Reports occasional "tightening", no contractions at this time

*FT = finger tip, IBOW= intact bag of waters

33 6/7 wks

Case #1 - 04

- Vital signs and assessment: (cont')

Parameter	Value
Urine protein – quantitative spot check ("dipstick")	"Trace"
Preeclampsia (PEC) Signs + Symptoms	• Denies headache, visual changes, diplopia, blurred vision, other visual abnormalities. • Denies chest pain, epigastric pain, RUQ pain, high back pain. • Denies bruising, spotting, abnormal bleeding • Denies nausea and/or vomiting • Denies decreased urine output or changes in elimination

33 6/7 wks

Case #1 - 05

- Vital signs and assessment: (cont')

Parameter	Value
Physical assessment	A+O x 3, PERRLA; Cranial nerves grossly intact; H&N without bruits; lung fields CTA, denies SOB, wheezing, cough, fever, congestion; heart rate – rhythm regular, normal rate, with soft murmur, benign for pregnancy; Abdomen soft to palpation, no tenderness, no bruits; Moves all 4 extremities without problems; denies weakness, unstable gait, trips/falls, states continues daily walks.
Mental health/well-being	Denies significant increase in stress, continues to work (sedentary) without problems; states she and significant other excited about baby; negative depression screen.

Case #1: Clinical Question

Based on the prior recorded data, this patient most likely has …

1. Normal advancing pregnancy
2. Pre-hypertension
3. Hypertension of pregnancy
4. Preeclampsia with severe features

Case #1: Clinical Question

Which category of ACOG's "Hypertension in Pregnancy" does this patient have at this time?

1. Gestational hypertension
2. Preeclampsia-eclampsia
3. Chronic hypertension
4. Chronic hypertension with superimposed preeclampsia-eclampsia

Case #1: Clinical Question

What percentage of patients with gestational hypertension develop preeclampsia-eclampsia later in pregnancy?

1. Less than 10%
2. 20% to 50%
3. 60% to 75%
4. 80% to 100%

33 6/7 wks

Back to the Patient…

- Labs are drawn and sent to evaluate for evidence of organ system insult or damage, and to assess for conditions that would change the patient's diagnosis to preeclampsia-eclampsia, or other complications.
- An outpatient 24-hour urine collection is ordered and instructions on the procedure are given.
- Fetal assessment and ultrasound studies are done and show normal findings (reactive NST, biophysicial profile score 6/8, normal Doppler flow studies and normal fetal growth).

Case #1: Clinical Question

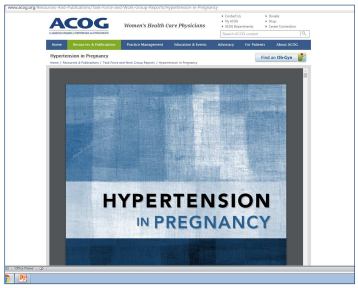
To assess patients with gestational hypertension for progression to preeclampsia-eclampsia (and other complications), what lab tests are recommended by ACOG and how often should the testing occur?

ACOG, 2013 pp. 31-33.

ACOG's "Hypertension in Pregnancy" 2013 Guideline

ANSWER

- Currently available via open access from ACOG's website at:
- http://www.acog.org/Resources-And-Publications/Task-Force-and-Work-Group-Reports/Hypertension-in-Pregnancy



ACOG's "Hypertension in Pregnancy" 2013 Guideline

ANSWER

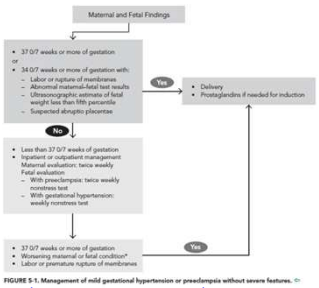


FIGURE 5-1. Management of mild gestational hypertension or preeclampsia without severe features.

http://www.acog.org/Resources-And-Publications/Task-Force-and-Work-Group-Reports/Hypertension-in-Pregnancy (accessed 5-4-2016)

Case Study #1: Plan

33 6/7 wks

- The patient is scheduled for additional assessment studies with a Maternal-Fetal Medicine (MFM) practice group (to be seen in 2 days)
- She is also instructed on fetal kick counts, self-assessment of blood pressure at home, and signs and symptoms of preeclampsia-eclampsia and other findings that should prompt her and her family to immediately return to the office or the L&D unit.
- A follow-up appointment is scheduled in 4 days (to review the MFM consult results and to evaluate her again.
- A RN will also contact the patient by phone every 48 hours to check on her condition, communicate the lab tests' results, ask the patient her kick counts and self blood pressure monitoring values.

Case #1: Clinical Question

The multiple tests for fetal assessment are ordered because:

1. There is limited evidence on which fetal assessment test is predictive or "works" in high risk patients.
2. There is NO one specific test that accurately predicts which fetus will develop hypoxemia or die in patients with hypertension of pregnancy.
3. Although Doppler studies are promising in identifying abnormal blood flow and therefore, compromise of the fetus, they are probably best used in combination with other tests for greater predictive value.
4. All of the above

Case #1: 35 0/7 weeks

- Pt returns to office with c/o, "Not feeling well," fatigue, malaise
- Blood pressure:
  - 152/92, 148/90, 148/89
- Proteinuria – trace (dipstick)
- NST nonreactive, AFI WNL
- Admitted to L&D for further workup and observation

35 0/7 wks Case #1: L&D Admit

- Awake, alert and oriented x3
- Vital signs: BP 144/84 mmHg, HR 100/min, RR 20/min, Temp – afebrile
- Denies SOB, chest pain, epigastic pain, back pain/arm/neck pain
- States has had some nausea but no vomiting
- States has headache (HA)
- Denies blurred vision, scotoma (blind spot), diplopia (double vision), normal visual fields, PERRLA
- EFM – category 2 tracing (no decels, no accels), mod variability

35 0/7 wks Case #1: L&D Labs

Test	Value	Comments
CBC:		
Hgb	8.9 g/dL	Low
Hct	21.3%	Low
Platelets	85,000	Low (thrombocytopenia)
Comments:	"Abnormal RBCs"	(suggests possible hemolysis)
Basic Metabolic:		
CO2	21 mmHg	Low
Glucose	101	WNL
BUN	30	High
Creatinine	0.9	WNL

35 0/7 wks Case #1: L&D Labs (cont')

Test	Value	Comments
Liver Function:		
Alanine transaminase (ALT)	110 U/L	High (>2 x nml)
Aspartate transaminase (AST)	91 U/L	High (>2 x nml)
Lactate dehydrogenase (LDH)	2130 U/L	High

35 0/7 wks Case #1: L&D Labs

- Based on presentation findings and lab results, the patient is diagnosed with Preeclampsia WITH Severe Features.

Case #1: Clinical Question

- In addition to "preeclampsia with severe features", what diagnosis does the patient have?

1. Eclampsia
2. Renal insufficiency/failure
3. Gestational diabetes
4. HELLP Syndrome

Case #1: Decision to Deliver

- The diagnosis of HELLP syndrome at a gestational age where the odds of newborn survival are good in a Level III NICU, results in the decision to deliver the patient.
- Plan: Vaginal delivery is preferred unless fetal or maternal condition requires immediate cesarean section.

Case #1: Maternal Stabilization

- Maternal stabilization prior to induction of labor or scheduled cesarean section is critical to prevent further maternal-fetal morbidity or mortality in patients with preeclampsia.
- Magnesium sulfate is ordered to prevent seizure activity (eclampsia) during labor, delivery and recovery.

Case #1: Maternal Stabilization

Stabilization of patients with preeclampsia with severe features

1. PREVENT Seizures with Magnesium Sulfate*
   - 4-6 gram loading dose (over 20 minutes)
   - 1-2 grams/hour maintenance dose (ACOG, 2013, p.40)
2. PREVENT Stroke, Abruption, Organ System damage
   - Control Blood Pressure
     - Systolic trigger: Treat at 160 mmHg** (ACOG, 2013, p.33.)
     - Diastolic trigger: Treat at 105-110 mmHg (ACOG, PB 33_2002, reaffirmed 2012)
3. Support Maternal Cardiopulmonary Function (oxygen transport assessment and support)
   - Support organ systems and fetus
4. The "Right Care – Right Place - Right People"
   - Transfer to advanced MATERNAL high-risk unit with NICU
   - Consultation: MFM, Critical Care Medicine, Anesthesia, Obstetrician, etc.

*also reduces rate of abruption; **in patients with co-morbidities, trigger may be lowered to 150-155 mmHg (SOGC Guidelines HYTN, 2014)

Case #1: Clinical Question

- When compared to women with preeclampsia WITH severe features, what type of risk do women with HELLP syndrome have for eclampsia (*grand mal seizures*)?
  1. Increased
  2. Decreased
  3. The same

Case #1

- The magnesium sulfate loading dose of 6 grams is started to run as a add-on (*"piggyback"*) solution to the patient's main intravenous line (IV), via an infusion pump set to deliver the drug over 20 minutes.
- When completed, the loading dose will be followed by a 2 grams/hour maintenance dose.

Case #1 (cont')

- Immediately after the loading dose is started, the patient has a grand mal seizure.
- The Automated BP device is unable to read the BP or HR.
- The pulse oximeter (SpO2) is alarming and unable to obtain a signal.
- The external FHR (USG) tracing is disrupted most likely due to maternal movement.
- The external EFM toco is capturing the tonic-clonic seizure activity.

Case #1

- IV is infiltrated – tubing entangled in side rails when placed in "up" position
- EFM/CTG: Fetal bradycardia of 70 bpm beginning ~ 40 seconds after the start of the seizure

Case #1: Clinical Question

What is the most effective first line anticonvulsant agent for eclampsia?

1. Magnesium sulfate
2. Diazepam (Valium®, Valrelease®)
3. Phenytoin (Dilantin®, Phenytek®)
4. Carbamazepine (Tegretol®, Carbatrol®, Epitol®)

MAGPIE Study and Follow-up

CONCLUSIONS:

- ✓ Magnesium sulfate superior to placebo
- ✓ Magnesium sulfate superior to diazepam (Valium, Valrelease, Diastat)
- ✓ Magnesium sulfate superior to phenytoin (Dilantin, Prompt, Di-Phen, Phenytek)
- ✓ Magnesium sulfate superior to other anti-seizure medications

Eclampsia Collaborative Group. Which anticonvulsant … Lancet 1995;345:1455-1463. (Historic). Magpie Trial Group. Do women with pre-eclampsia… The Magpie Trial: a randomized, placebo-controlled trial. Lancet 2002;359:1877-1890. (Historic)

Case #1: Clinical Question

If the patient has *another* grand mal seizure (after the 6 gram load) what is the next drug that should be administered?

1. Magnesium sulfate
2. Diazepam (Valium®, Valrelease®,Diastat®)
3. Phenytoin (Dilantin®, Phenytek®)
4. Carbamazepine (Tegretol®, Carbatrol®, Epitol®)

Eclampsia Collaborative Group. Which anticonvulsant … Lancet 1995;345:1455-1463. (Historic). Magpie Trial Group. Do women with pre-eclampsia… The Magpie Trial: a randomised, placebo-controlled trial. Lancet 2002;359:1877-1890. (Historic)

Case #1: Back to the Patient

- Anesthesia is stat paged for airway management and potential intubation.
- Magnesium sulfate loading dose is not infusing (IV infiltrated). Visually, there is ≥ 80% of the loading dose remaining in the bag.
- The grand mal seizure has lasted ~ 60 seconds and continues.

Case #1: Clinical Question

The tonic-clonic seizure movements obstruct obtaining IV access. If an eclamptic seizure does not stop and IV access cannot be obtained, what other route is recommended for magnesium sulfate administration?

1. Intra-abdominal (peritoneal cavity)
2. Via an E-T tube
3. Intramuscular (IM)
4. None of the above

Case #1: Clinical Question

- What is the INTRAMUSCULAR (IM) dose for magnesium sulfate for this patient (during an eclamptic seizure without a prior loading dose)?*
  - A. 2 grams
  - B. 4 grams
  - C. 6 grams
  - D. 8 grams
  - E. 10 grams

*ACOG District II, Safe Motherhood Initiative, Severe Hypertension in Pregnancy Checklist, accessed 6-1-2015 at http://www.acog.org/-/media/Districts/District-II/PDFs/SMI/v2/SevereHTNinPregnancyAugust2014PDFOct2014.pdf?la=en

Case #1

- 70 to 80 seconds into the seizure, the tonic-clonic muscle activity begins to slow.
- Anesthesia personnel are able to place an intravenous (IV) line.
- The original loading dose of magnesium sulfate (that is already in the room and on a pump), is connected (piggyback) to the main IV line.
- The loading dose infusion is restarted.

Case #1: Clinical Question

What type of IV solutions are considered "best practice" for this patient during initial stabilization? NOTE: May be more than one correct answer

A. Lactated Ringers (Plain LR)

B. D_5LR

C. 0.9%NaCl

D. 0.24%NaCl

Case Study #1 (cont')

- The 6 gram magnesium sulfate loading dose is programmed for infusion and will be followed by a 2 gram/hour maintenance infusion.
- Within 3 minutes of the eclamptic seizure onset with the accompanied FHR deceleration, the FHR begins to increase toward the admission baseline.

Case Study #1

- Post seizure: Pt is postictal with Cheyne-Stokes-type breathing.
- Vital signs: *10 minutes intervals*

Parameter	0:00	0:10	0:20	0:30
BP (mmHg)	178/112			
HR (bpm)	129			
RR (/min)	42			
SpO2 (%)	88			
FHR (bpm)	75			

Case Study #1: Clinical Question

- To control blood pressure, what are the three antihypertensive medications that are recommended by ACOG as "first line" options?
- 1.
- 2.
- 3.

Case Study #1

- Post seizure: Pt is postictal with Cheyne-Stokes-type breathing.
- Vital signs: *10 minutes intervals*

Parameter	0:00	0:10	0:20	0:30
BP (mmHg)	178/112	168/107	150/103	154/98
HR (bpm)	129	132	123	117
RR (/min)	42	28	32	30
SpO2 (%)	88	90	93	95
FHR (bpm)	75	130	180	160

QUESTION: If a cesarean section was required for delivery, HOW should the magnesium sulfate be administered for the surgery?

1. After the loading dose of 6 grams, the magnesium sulfate can be discontinued for surgery, and re-started on admission to the PACU.
2. After a total dose of 6 grams, the magnesium sulfate can be discontinued AS LONG AS THE TOTAL TIME OF IT BEING OFF IS LESS THAN 60 MINUTES; and re-started on admission to the PACU.
3. Magnesium sulfate may NOT be discontinued for surgery or transport.

QUESTION: How long after delivery should the magnesium sulfate infusion continue?

1. Until the patient shows signs and symptoms of disease recovery.
2. A minimum of 6 hours post delivery.
3. A minimum of 12 hours post delivery.
4. A minimum of 24 hours post delivery.

Recent studies show that a key vulnerable time for maternal death and severe morbidity from preeclampsia is in the postpartum period (after discharge).

QUESTION: What is currently recommended for patients who have preeclampsia, chronic hypertension or gestational hypertension PRIOR TO DISCHARGE from the hospital?

1. Make an appointment to see a provider in one week.
2. Discharge instructions that include S&Ss of worsening preeclampsia.
3. Instruction to schedule annual appointments to assess for chronic hypertension, renal disease, glucose intolerance, cardiovascular disease and vascular abnormalities.
4. All of the above.

Summary and Conclusions