Postpartum hypertension, preeclampsia and eclampsia

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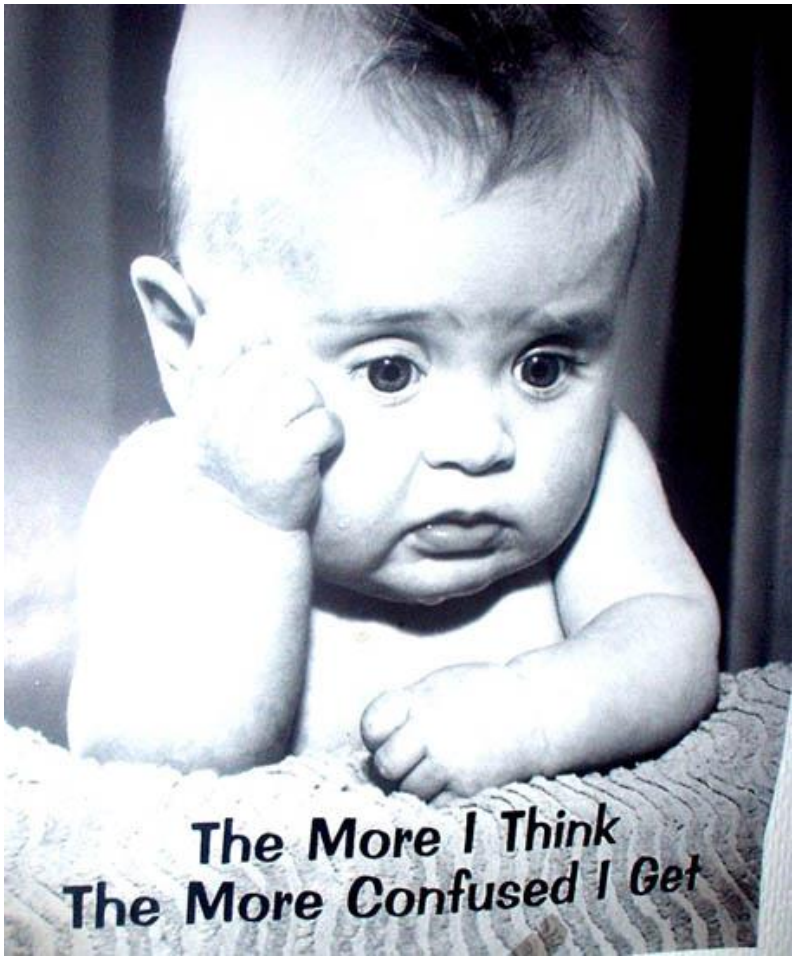
MAGEE-WOMENS RESEARCH INSTITUTE

Confusing concept

- Preeclampsia only occurs in pregnancy – placenta is required
- Delivery “cures” preeclampsia
- How can preeclampsia happen postpartum?



Postpartum hypertension-preeclampsia - eclampsia

- Incidence
- Etiology and differential diagnosis
- Evaluation
- Management
- Education

Incidence

- Difficult to ascertain
- BP check at 6 weeks postpartum visit
- Mild hypertension not reported
- Usually asymptomatic
- If symptomatic, often seen and managed in ED
  - 0.3% of all PP visits to ED due to PP hypertension and preeclampsia

Clark SL et al. AJOG 2010.

Incidence

- Limitations of research studies
  - Single center
  - Inpatient, immediate PP stay (2-6 days)
  - Readmissions
- Prevalence of de novo postpartum hypertension or preeclampsia = 0.3 – 27.5%
- PP preeclampsia/eclampsia 5.7%
  - 63-66% de novo
  - ~15% eclampsia
- Morbidity and mortality

Clark SL et al. AJOG 2010.
Matthys LA et al. Obstet Gynecol 2004.
Al-Safi Z et al. Obsetet Gynecol 2004.
Sibai BM. AJOG 2012.

Morbidity and mortality

- Eclampsia
- Pulmonary edema
- PP cardiomyopathy
- HELLP
- Endomyometritis
- thromboembolism
- Maternal death (1 maternal death in each study of ~150 PP readmissions)

Matthys LA et al. Obstet Gynecol 2004.
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PP eclampsia – Incidence

- 50% developed after delivery
- 26% developed >48h after delivery
- Usually less than one week
- Most common symptom = headache
- 0.3-1% mortality
- Other complications
- Most recover, but some evidence of persistent white matter lesions and impaired cognitive function

Leitch CR et al. BJOG 1997.
Chames MC et al. AJOG 2002.
Aukes AM et al. AJOG 2009.
Aukes AM et al. AJOG 2007.

Case 1

- 32yo G2P2 PPD#6 – brought in to local hospital by ambulance after a witnessed generalized tonic-clonic seizure – she was intubated, started on a dilantin load in ED and transferred to UPMC-Presby Neuro ICU
- MRI – posterior leukoencephalopathy, ?vasculopathy
- OB called 14 hours after admission for vaginal bleeding

Case 2

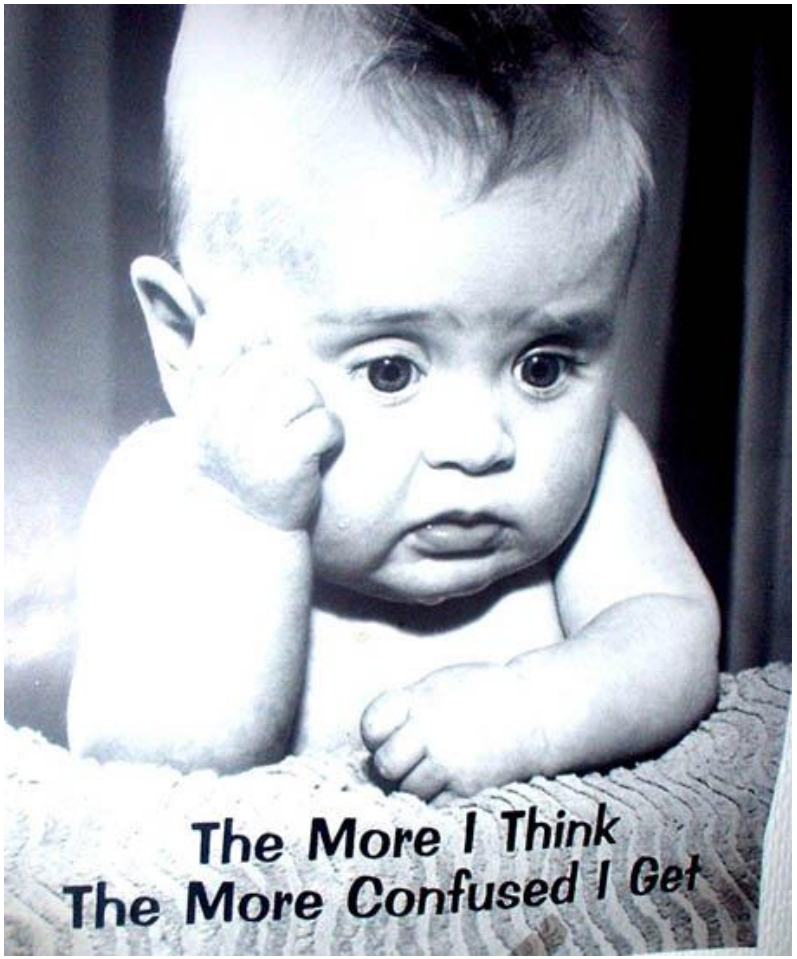
- 34yo G1P1 POD#5 presented to MWH-ED with “feeling unwell” nausea/vomiting – in ED developed sudden-onset of severe headache and BP 180/110
- Course significant for being healthy
- IOL at 38w – mild preeclampsia
  - Magnesium sulfate - seizure prophylaxis
  - Misoprostil – cervical ripening
  - Pitocin - labor augmentation
  - Epidural
- Primary LTCS for arrest of dilation at 8cm
- Discharged to home on POD#3

Case 3

- 30yo G1P0101 POD#7 presents to ED with severe hypertension (on labetalol) and intermittent headache
- s/p primary LTCS for breech at 31w, severe IUGR, AEDF, oligohydramnios and severe hypertension and unrelenting headache – discharged home on POD#4
- BP in ED 170/110 – took 500mg of labetalol at home

Pathophysiology?

- Maternal endothelial dysfunction = major feature of preeclampsia
- Time course of resolution may be variable
- Most PP preeclampsia/eclampsia within 2w of delivery
- Persistent endothelial dysfunction up to 11 months post-delivery in women with early onset preeclampsia



Blaauw J et al. Obstet Gynecol 2005.

Etiology and differential diagnosis

- New onset PP hypertension-preeclampsia
- Persistence/exacerbation of HTN in women with pre-existing GH-preeclampsia
- Preexisting HTN
  - Chronic hypertension with or without superimposed preeclampsia
  - Renal disease
- Cerebral vascular syndrome
- Cerebral venous thrombosis
- Stroke
- Post-dural puncture headache
- Other hypertensive and/or neurologic disorders (coincident with pregnancy)

TABLE

Etiology/differential diagnosis of postpartum hypertension

Etiology	Key findings to consider
New-onset hypertension-preeclampsia	Onset 3-6 d postpartum without headaches
Volume overload	Large volume of fluids, regional analgesia, delayed mobilization
Medications/drugs	Nonsteroidal analgesics, ergot derivatives
Ibuprofen, indomethacin	Peripheral and cerebral vasoconstriction, headaches
Phenylpropanolamine, ephedrine	Peripheral and cerebral vasoconstriction, headaches
Ergotamine, ergonovine	Vasoconstriction, headaches, nausea, vomiting, seizures
Persistence of GH-preeclampsia	Preexisting condition antepartum/in labor
Late-onset eclampsia	Headaches, visual changes, seizures, absent neurologic deficits
HELLP syndrome	Nausea/vomiting, epigastric pain, low platelets, increased liver enzymes
Preexisting/undiagnosed hypertension	Hypertension prior to pregnancy, or <20 wk
Preexisting renal disease	Proteinuria or hematuria <20 wk
Hyperthyroidism	Palpitations tachycardia, sweating, dry skin, heart failure
Primary hyperaldosteronism	Refractory hypertension, hypokalemia, metabolic alkalosis
Pheochromocytoma	Paroxysmal hypertension, headaches, chest pain, hyperglycemia
Renal artery stenosis	Hypertension that is refractory to treatment
Cerebral vasoconstriction syndrome	Sudden thunderclap headaches, visual changes, neurologic deficits
Cerebral venous thrombosis/stroke	Onset 3-7 d, gradual or acute headaches, seizures, neurologic deficits
TTP/hemolytic uremic syndrome	Hemolysis, severe thrombocytopenia, neurologic symptoms, normal liver enzymes

GH, gestational hypertension; *HELLP*, hemolysis, elevated liver enzymes, and low platelet; *TTP*, thrombotic thrombocytopenic purpura.

Sibai. Postpartum hypertension-preeclampsia. Am J Obstet Gynecol 2012.

Pre-existing GH-preeclampsia

- HTN and proteinuria usually resolve within one week (data variable)
- Decrease in BP within 48h of delivery
- Increase in BP 3-6d PP
- Unrecognized preeclampsia
- Neurologic and/or laboratory abnormalities may first present PP period
- Similar for superimposed preeclampsia

Walters BN et al. Lancet 1987.

Postpartum neurologic symptoms – with or without hypertension

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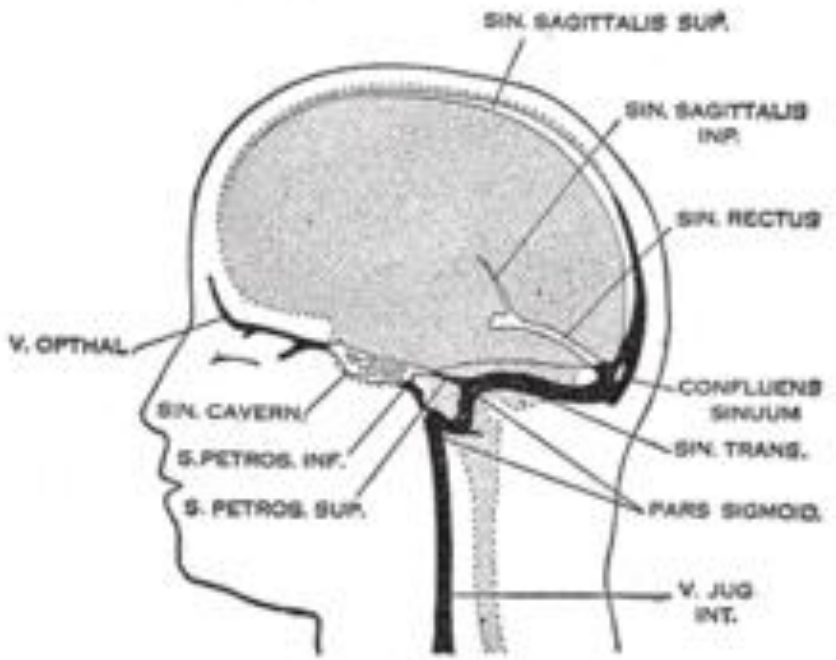
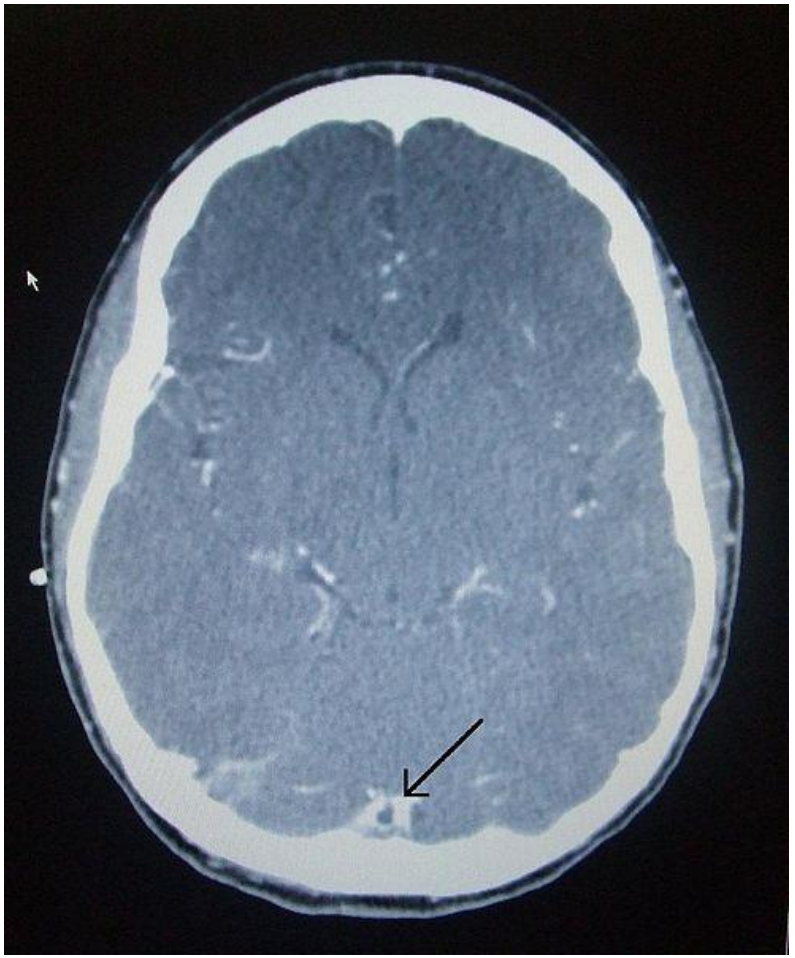
Central venous thrombosis





Postpartum hypertension – other causes coincident with pregnancy

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PP Eclampsia - Evaluation

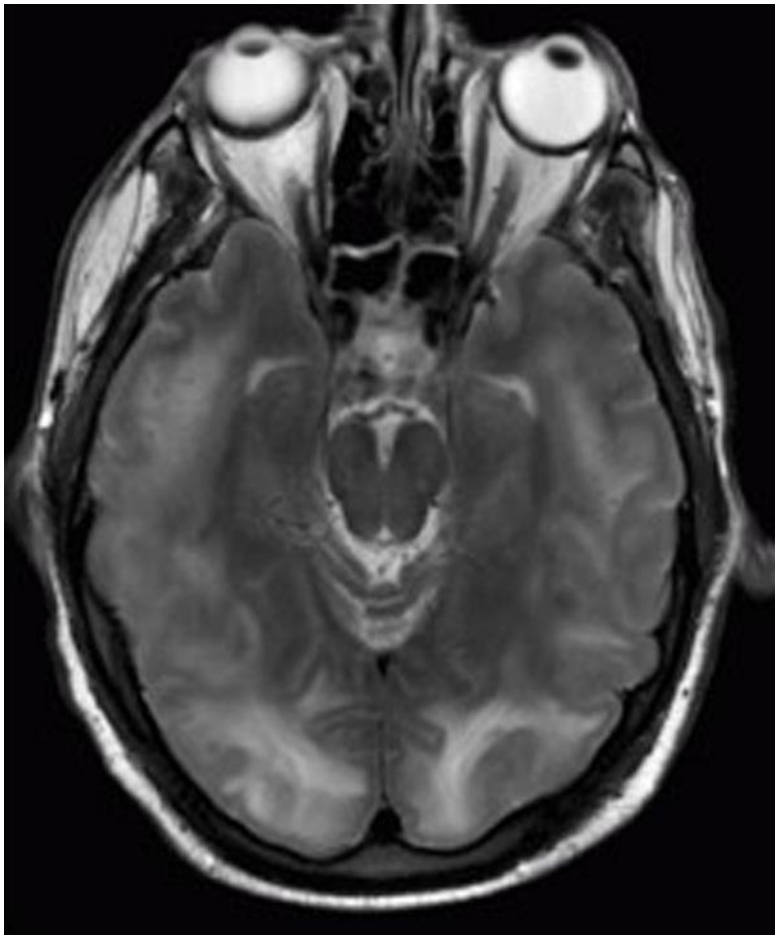
- ABCs!!!!
- Evaluation and management - simultaneous
- History
  - Presenting symptoms/signs
  - Pregnancy history
  - Delivery and PP course
  - Medications
- Physical exam
  - BP, pulse, oxygen saturation
  - Neuro exam
  - Cardiopulmonary exam
- Laboratory studies
  - Proteinuria
  - CBC with platelets, LFTs, Cr, LDH
- Neuro-imaging
  - Consider non-contrast head CT
  - MRI/A/V
- Multi-disciplinary approach

PP Eclampsia - Management

- ABCs!!!!
- Magnesium sulfate IV
  - 4-6g loading dose over 20-30minutes
  - 2g IV continuous infusion
  - Can be used IM if no IV access
  - More effective than placebo, phenytoin, diazepam., lytic cocktails
- Acute blood pressure management
- Other organ involvement with appropriate treatment
  - Pulmonary edema – diuresis
  - Renal failure – dialysis
- Neuro-imaging
  - Non contrast CT scan
  - MRI

- Multi-disciplinary approach

Posterior reversible encephalopathy syndrome (PRES)



- Sudden elevations in BP exceed normal cerebrovascular auto-regulatory capacity → regions of forced vasodilation and vasoconstriction, especially in arterial boundary zones
- Disruption of end capillary pressure → ↑hydrostatic pressure, hyperperfusion, extravasation of plasma/RBC → vasogenic edema

Zeeman GG et al. Chp 13 Chesley's hypertensive disorders of pregnancy 2009.

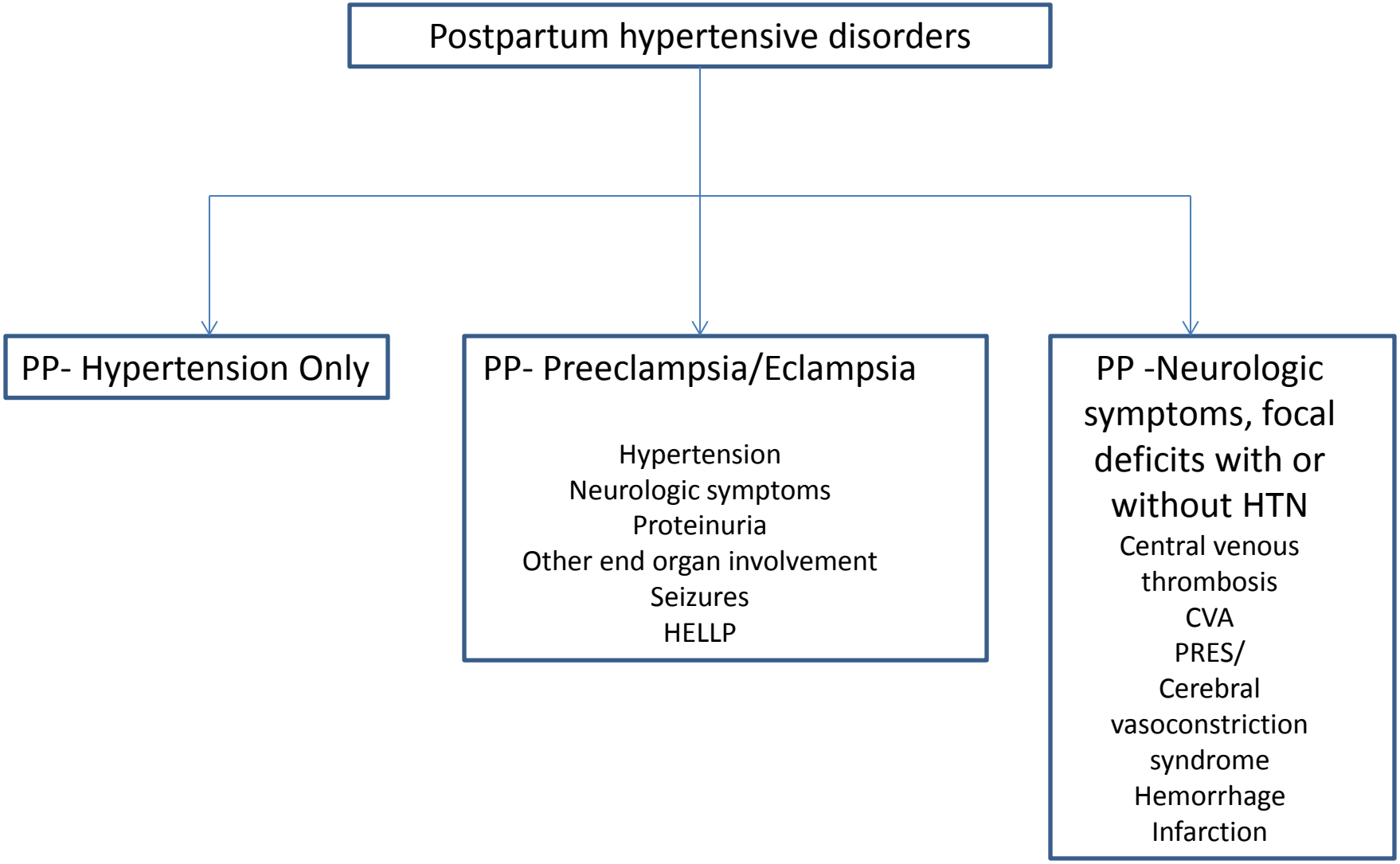
Evaluation

- History
  - Presenting symptoms/signs
  - Pregnancy history
  - Delivery and PP course
  - Medications
- Physical exam
  - BP, pulse, oxygen saturation
  - Neuro exam
  - Cardiopulmonary exam
    - PP cardiomyopathy (23-46% associated with HDP)
- Laboratory studies
  - Proteinuria
  - CBC with platelets, LFTs, Cr, LDH
- Neuro-imaging
  - Consider non-contrast head CT
  - MRI/A/V
- Multi-disciplinary approach

Common things are common

- Most common cause of hypertension beyond 48h after delivery
  - GH
  - Preeclampsia
  - Chronic HTN
  - Preexisting or de novo

- Initial management depends on history, symptoms, clinical findings, lab testing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Neurologic symptoms
Proteinuria
Other end organ involvement
Seizures
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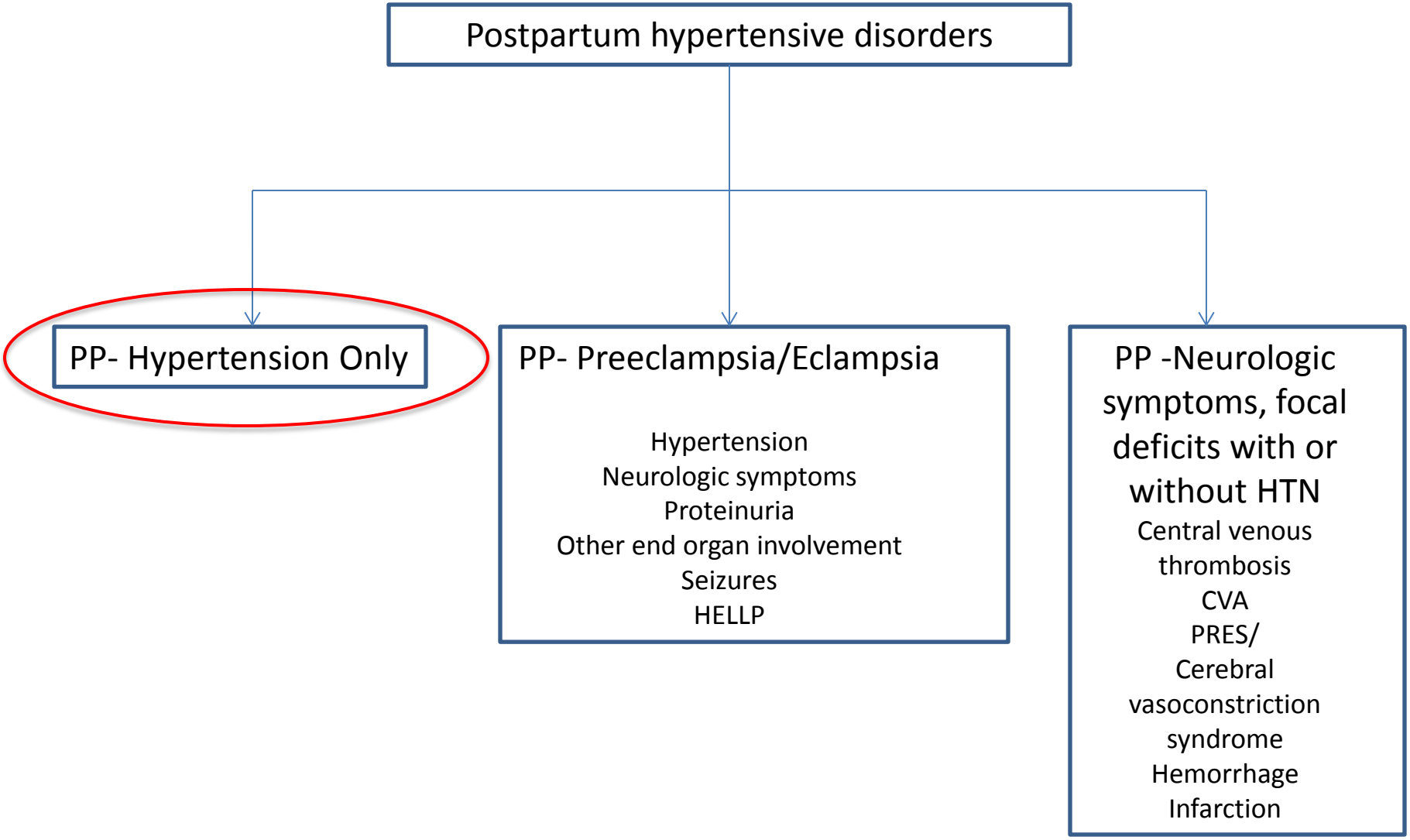
Central venous thrombosis
CVA
PRES/ Cerebral vasoconstriction syndrome
Hemorrhage
Infarction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PP Hypertension only - management

- BP control
- Antihypertensive meds if >150/100
- Acute management (aggressive)
  - IV hydralazine
  - IV labetalol
  - Po nifedipine
- Chronic management
  - Oral nifedipine XL
  - Labetalol
  - Diuretics (furosemide, hydrochlorothiazide)
  - Methyldopa
  - Enalapril, captopril
  - (breast-feeding)

PP Hypertension only - management

- Home BPs
- Frequent visits
- Symptom monitoring
- Likely need to decrease dose or discontinue after 1-2 weeks
- Some will have persistent HTN = chronic HTN
- Consider other causes if persistent, severe elevations or other associated symptoms
  - Hyperaldosteronism
  - Renal artery stenosis
  - Pheochromocytoma
  - Hyperthyroidism
  - PP cardiomyopathy

Drugs for the acute management of hypertension†

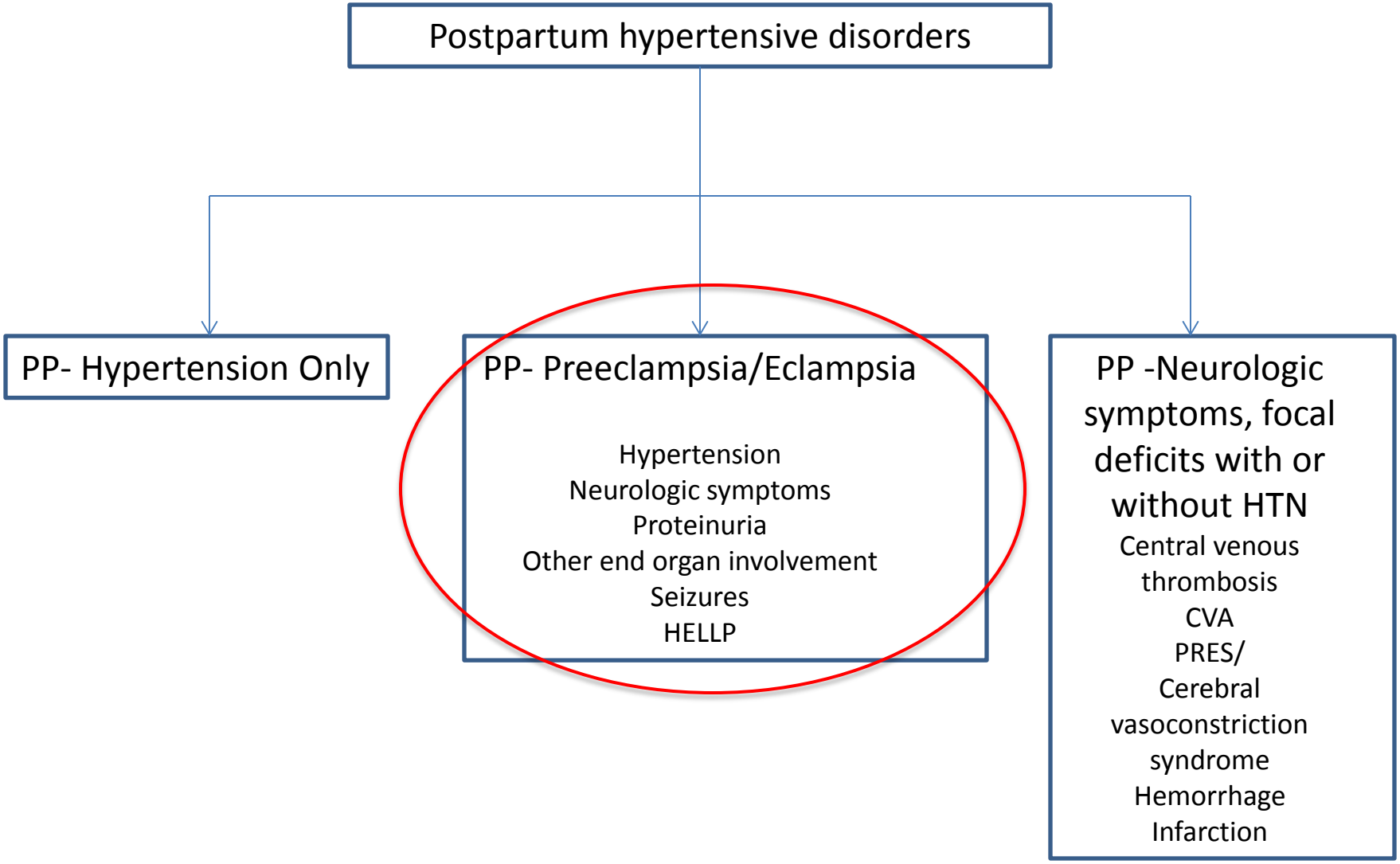
Drug (FDA Category)	Mechanism of Action	Dose	Onset of Action	Comments†
Labetalol (C)	α- and β-adrenergic antagonist	10-20mg IV, then 20-80 mg every 20-30 minutes to a maximum dose of 300mg OR continuous infusion 1-2mg/min IV*	5-10 min	Considered a first line agent during pregnancy. Less tachycardia and fewer side effects. Avoid in patients with asthma or congestive heart failure.
Hydralazine (C)	Arteriolar vasodilator, smooth muscle relaxant	5mg IV or IM, then 5-10 mg IV every 20-40 minutes OR continuous infusion 0.5 – 10 mg/hour	10-20 min	Higher or frequent dosing associated with maternal hypotension, headaches and fetal distress – may be more common than other agents.
Nifedipine (C)	Calcium channel blocker	10-20 mg orally, repeat in 30 minutes if needed; then 10-20mg every 2-6 hours	10-20 min	May observe reflex tachycardia, headaches.
Sodium Nitroprusside (C)		0.25-20 mcg/kg/min IV*	Within seconds	Relatively contraindicated and agent of last resort; longer use associated with cyanide toxicity.

* Continuous IV infusions should be used only in an ICU setting

† All agents are associated with headache, flushing, nausea, and tachycardia (likely due to hypotension and reflex sympathetic activation), these side effects are less with labetalol

Oral antihypertensive drugs used for the management of chronic hypertension

Drug (FDA Category)	Mechanism of Action	Dose	Maximum Dose	Comments
Labetalol (C)	α- and β-adrenergic antagonist	200-2400 mg/day orally in 2-3 divided doses	2400 mg/day	Well-tolerated. Potential bronchoconstrictive effects.
Nifedipine (C)	Calcium channel blocker	30-120 mg/day orally of a slow release preparation	120 mg/day	Do not use sublingual form. Side effects include headache, flushing, tachycardia; once a day dosing may improve compliance.
Methyldopa (B)	Centrally acting α2-receptor agonist	0.5-3g/day orally in 2-3 divided doses	3 g/day	Childhood safety data up to 7 years. May not be as effective in control of severe hypertension. Side effect profile includes lethargy.
Hydrochlorothiazide (C)	Thiazide diuretic	12.5-50 mg/day orally	50 mg/day	Not used as a primary agent in pregnancy and considered an adjunctive agent; theoretical concerns of reduced intravascular volume and decreased uterine blood flow in pregnancy; electrolytes should be monitored.
Hydralazine (C)	Vasodilation, smooth muscle relaxant	50-300 mg per day orally in 2-4 divided doses	300 mg/day	Not used as a primary agent in pregnancy and considered an adjunctive agent; may be used in combination with a sympatholytic agent (e.g., methyldopa or labetalol) to prevent tachycardia.
Angiotensin converting enzyme inhibitors/angiotensin receptor blockers		Associated with anomalies		CONTRAINDICATED IN PREGNANCY AND PRECONCEPTION PERIOD – However, captopril and enalapril are compatible with breast feeding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PP – preeclampsia- managemenet

- Magnesium sulfate for seizure prophylaxis
  - 24-48h
- BP control
- Treatment of other associated complications
- Neuro-imaging
  - Particularly if no resolution of BP and neuro sxs

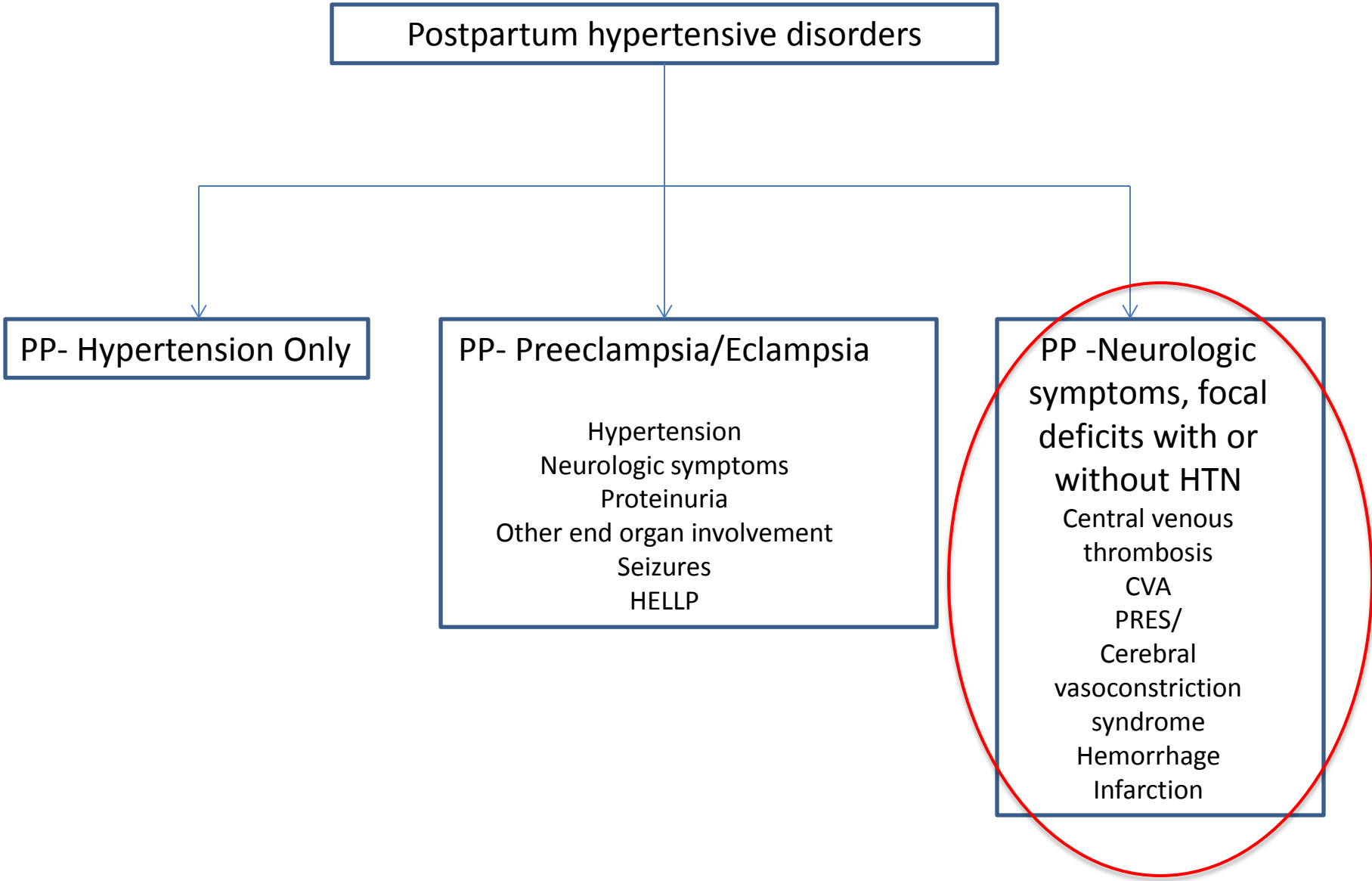
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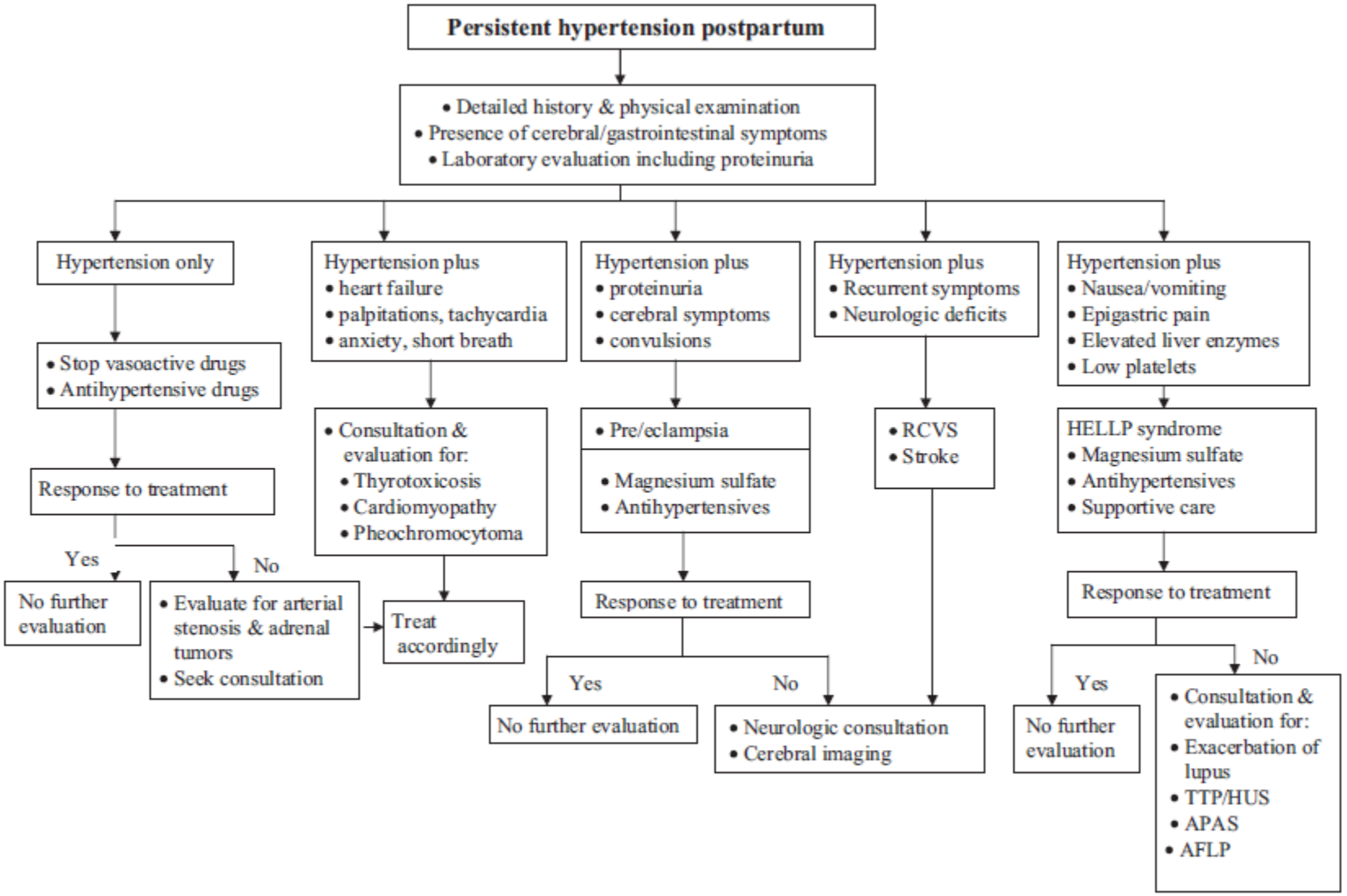
FIGURE

Recommended evaluation and management of women with postpartum hypertension



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Sibai. Postpartum hypertension-preeclampsia. Am J Obstet Gynecol 2012.

Education

- Emergency departments
- Primary care providers
- Family practitioners
- Patients
  - Routine discharge instructions for all PP women

Ask Your Doctor or Midwife

Preeclampsia

What Is It?

Preeclampsia is a serious disease related to high blood pressure. It can happen to any pregnant woman.

Risks to You

- Seizures
- Stroke
- Organ damage
- Death

Risks to Your Baby

- Premature birth
- Death

Signs of Preeclampsia


Stomach pain


Headaches


Feeling nauseous; throwing up


Seeing spots


Swelling in your hands and face


Gaining more than 5 pounds in a week

What Should You Do?

Call your doctor right away. Finding preeclampsia early is important for you and your baby.

For more information go to www.preeclampsia.org

PREECLAMPSIA *foundation*

Preeclampsia is a disorder of pregnancy. Know the symptoms, trust yourself.

SIGNS & SYMPTOMS

- ❑ high blood pressure
- ❑ protein in your urine
- ❑ sudden weight gain
- ❑ swelling of the hands, feet or face
- ❑ headache that won't go away
- ❑ changes in vision
- ❑ upper abdominal pain or chest pain
- ❑ breathing with difficulty, gasping, panting

If you have one or more of these signs and symptoms, you should see your doctor or go to an emergency room immediately.

TODAY'S DATE

- ❑ My BP was _____/_____
- ❑ My proteinuria was *(circle one)*
  None Trace 1+ 2+ 3+ 4+
  or _____ mg/dl
- ❑ I've gained ____lbs in _____weeks

Visit online **www.preeclampsia.org** *or call Toll-Free* 800-665-9341

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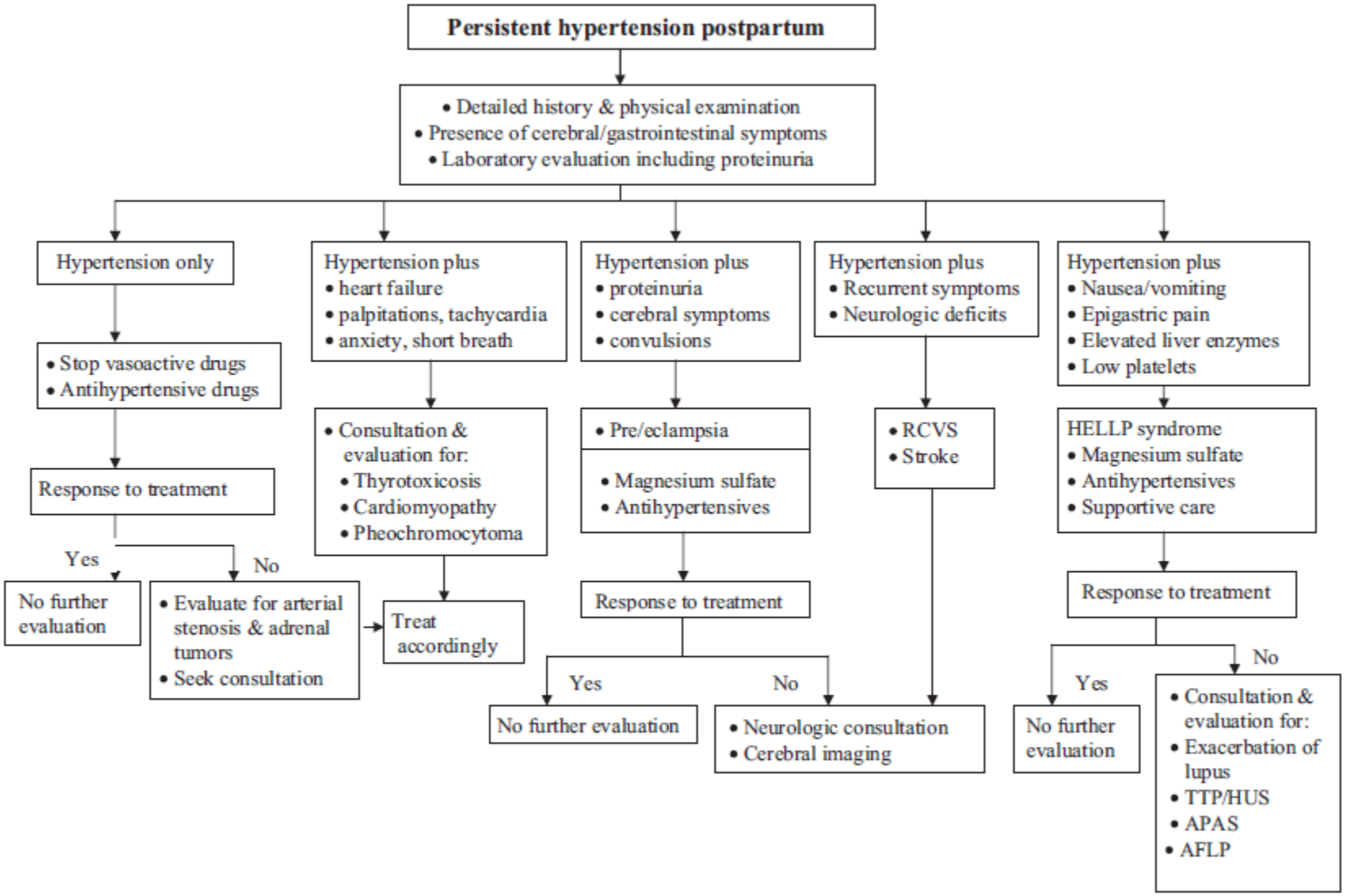

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- MRI – posterior leukoencephalopathy, ?vasculopathy
- OB called 14 hours after admission for vaginal bleeding
- PP Preeclampsia management – complete recovery

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  - Magnesium sulfate - seizure prophylaxis
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- Discharged to home on POD#3
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- Neuroimaging – intracranial hemorrhage
- Neurology management

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- s/p primary LTCS for breech at 31w, severe IUGR, AEDF, oligohydramnios and severe hypertension and unrelenting headache – discharged home on POD#4
- BP in ED 170/110 – took 500mg of labetalol at home
- PP preeclampsia management with aggressive diuresis and BP control

Postpartum Hypertension/Preeclampsia

For women diagnosed with gestational hypertension, preeclampsia, or superimposed preeclampsia, we suggest that blood pressure be monitored in the hospital or that equivalent outpatient surveillance be performed for at least 72 hours postpartum and again 7–10 days after delivery or earlier in women with symptoms.

Quality of evidence: Moderate

Strength of recommendation: Qualified

For all postpartum women (not just women with preeclampsia), we suggest that discharge instructions include information about the signs and symptoms of preeclampsia as well as the importance of prompt reporting of this information to their health care provider.

Quality of evidence: Low

Strength of recommendation: Qualified

Healthy Mom
and
healthy baby!

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