HEADACHE MANAGEMENT IN EXPECTANT MOTHERS AND POST DELIVERY: EVIDENCE-BASED GUIDELINES AND BEST PRACTICES

Chilvana Patel MD
Rakhi Dimino MD
05-03-2024
OBJECTIVES:

- Analyze and differentiate between primary and secondary headache
- Assess the implication of physiological changes
- Integrate interdisciplinary collaboration with comprehensive assessment and individualized patient centered plan that considers their unique maternal, emotional, and social circumstances.
CHALLENGES IN PREGNANCY

Guidelines risks vs benefits??

- Drugs not tested in pregnant individuals
- No clinical trials
- Disability
- Outcomes on maternal and fetal health
- Individualized approach
- Frequency and dosing of medication
- Combinations of medications
- Indication for use

Safety

- Loss of pregnancy
- Fetal malformation (early pregnancy)
- Developmental outcomes (late brain development stages)
- Fetal growth retardation
- Preterm birth
- Perinatal complications
PRIMARY VERSUS SECONDARY HEADACHE

Primary headache (ICHD 3)

- Is not the symptom of the underlying disease, but the condition itself
- They are caused by independent patho-mechanisms and not by other disorders

- Tension headache
- Migraine headache
- Trigeminal Autonomic Cephalgias
  - Cluster Headache
  - Paroxysmal hemicrania/Hemicrania Continua
  - Shortlasting unilateral neuralgiform headache attacks: SUNCT/SUNA
- Other Primary Headache disorders
  - Primary cough headache
  - Primary exercise headache
  - Hypnic headache etc.....
SECONDARY HEADACHE

- Exacerbation of preexisting medical condition
  - IIH

- Initial manifestation of primary central nervous system related problem –
  - ICH with AVM

- Neurological problem unique to pregnancy and the postpartum period
  - PRES with preeclampsia

RED FLAGS

- Systemic symptoms and signs
- Neurological symptoms and signs (1 hour)
- Onset – sudden (thunderclap)
- Old age – above 50
- Pattern change/ Progression
- Precipitated by Valsalva Maneuver
- Position aggravation
- Papilledema
- Gestational age, Third trimester
- Abnormal labs: abnormal liver enzymes, elevated creatinine, platelet abnormalities
MIGRAINE DIAGNOSTIC CRITERIA AND EPIDEMIOLOGY

Migraine without aura ICHD3, 2018

80% females with migraine experience the attacks

About 60% improves after 1\textsuperscript{st} trimester

Migraine with Aura less likely to improve

Migraine with or without aura can be first symptoms during pregnancy

Robbins MS et al. Neurology. 2015 Sep 22;85(12):1024-30
Sances G, Granella F et al Cephalalgia. 2003 Apr;23(3):197-205,
THE FACTS

- **Association of Migraine (maternal)**
  - Cerebrovascular events (6.8-8 times)
  - Pre-eclampsia & Hypertensive disorders with aura (1.4- times)
  - Hypercoagulable disorders including central venous sinus thrombosis

- **Association of Migraine (fetal)**
  - Low birth weight (1.1-1.8 times)
  - Preterm birth (1.2-1.7 times)
  - Spontaneous abortion possibly

- **Monitor for complications**
Brain Tumor Imaging for Diagnosis and Surveillance

- **Non-contrast MRI** is best modality (less than 3T magnet)
- Use of **Gadolinium** when maternal benefit outweighs risk to fetus
- CT head contraindicated d/t ionizing radiation (only for emergency stroke or hemorrhage)
- Shielding of uterus
- Intrauterine exposure is about 1/3rd of maternal exposure
- Per guideline limit exposure to 50 mGy
- Cumulative exposure at or above 150 mGy – high risk for congenital malformation and 3% lifetime risk for cancer
CASE 1

PRECONCEPTION COUNSELLING

30 years old woman with history of migraine without aura

- Migraine frequency 6 days/month, well-controlled on Sumatriptan rescue

20 % women avoid pregnancy due to fear

Maximize nonpharmacological lifestyle recommendations
- Sleep regular hours, avoid naps
- Consume 4-6 portions daily
- Exercise regularly
- Hydrate 64-128 ounces daily
- Minimize caffeine
- Avoid triggers
- Maintain work schedule
CASE 2 RESCUE TREATMENT

JP is 30 years old female with G2P1 who is 16 weeks of pregnant
No improvement of improvement after 1st trimester
Frequency 1-2/week, associated with nausea
Use of Rizatriptan prior to pregnancy, but has not used since pregnant

<table>
<thead>
<tr>
<th>First-line</th>
<th>Second-line</th>
<th>Avoid</th>
<th>Contraindication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen</td>
<td>Triptans</td>
<td>Indomethacin</td>
<td>Ergots</td>
</tr>
<tr>
<td>NSAIDS (12-20 weeks)</td>
<td>ASA 81</td>
<td>Opiates</td>
<td>Gepants</td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>Ondansetron</td>
<td></td>
<td>Lasmiditan</td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>Prochlorperazine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lidocaine</td>
<td>Promethazine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caffeine</td>
<td>Prednisone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuromodulation??</td>
<td>Butalbital</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONTROVERSIES

Triptans

- Comprehensive literature regarding safety (Post-marketing registry study, national registry database studies, case control study, other cohort studies)
- Not associated with increased risk of major congenital malformations or spontaneous abortion
- Avoid use in hypertensive disorders, IUGR, placental insufficiency

Butalbital

- Increase risk of cardiac malformation

Acetaminophen

- Association with autism, ADHD, language delay in girls
- Duration of use, higher doses
- Recommend using only when needed


LOCAL INJECTION THERAPY AND OTHERS

- Occipital nerve blocks/ Trigger point injection
  SC lidocaine has good evidence for safety
  May also be used monthly or quarterly as preventive strategy
- Cyproheptadine
- Steroids
- Limited oral opioids (avoid parenteral)
- Cyclobenzaprine
- NSAIDs if in 2nd trimester
# PREVENTIVE TREATMENT

## Table 2. Interventions for Prevention of Headaches in Pregnancy*

<table>
<thead>
<tr>
<th>Drug or Therapy</th>
<th>Class</th>
<th>Recommendation</th>
<th>Potential Associated Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amlodipine$^{1,2}$</td>
<td>Calcium channel blocker</td>
<td>Consider as first line use for prevention</td>
<td>None</td>
</tr>
<tr>
<td>Cyproheptadine$^1$</td>
<td>Antihistamine</td>
<td>Consider as first line use for prevention</td>
<td>None</td>
</tr>
<tr>
<td>Diphenhydramine$^1$</td>
<td>Antihistamine</td>
<td>Consider as first line use for prevention</td>
<td>None</td>
</tr>
<tr>
<td>Nifedipine$^{1,2}$</td>
<td>Calcium channel blocker</td>
<td>Consider as first line use for prevention</td>
<td>None</td>
</tr>
<tr>
<td>Verapamil$^{1,2}$</td>
<td>Calcium channel blocker</td>
<td>Consider as first line use for prevention</td>
<td>None</td>
</tr>
</tbody>
</table>

*Please refer to the American College of Obstetricians and Gynecologists (ACOG) guidelines for full recommendations and considerations.

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Headaches in Pregnancy and Postpartum

ACOG
The American College of Obstetricians and Gynecologists

utmb Health

SAMPLE FOOTER TEXT

20XX 13
**UPDATES OF PREVENTIVE MEDICATIONS**

<table>
<thead>
<tr>
<th>First line</th>
<th>Second line</th>
<th>Third line</th>
<th>Avoid when possible</th>
<th>Contraindicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nifedipine</td>
<td>Propranolol</td>
<td>Gabapentin</td>
<td>Candesartan</td>
<td>Topiramate</td>
</tr>
<tr>
<td>Verapamil</td>
<td>Amitriptyline</td>
<td>Pregabalin</td>
<td>CGRP monoclonal Antibodies</td>
<td>Valporic acid</td>
</tr>
<tr>
<td>Nortriptyline</td>
<td>Riboflavin</td>
<td>Gepants</td>
<td>Methergine</td>
<td></td>
</tr>
<tr>
<td>Cyclobenzaprine</td>
<td>Magnesium</td>
<td>Venlaflaxine</td>
<td>Feverfew</td>
<td></td>
</tr>
<tr>
<td>Cyproheptadine</td>
<td>Magnesium</td>
<td>Lisinopril</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Onabotulinum toxin A considered as second/third line  
Safety of herbs and supplements not studied

ONABOTULINUM TOXIN

First case during pregnancy in 1996

Almost certain does not cross placenta

POLO JM ET AL. LANCET. 1996 JUL 20;348(9021):195

500 cases of onabotulinum toxin A use during pregnancy have been reported

- Recent cumulative update from Allergan safety database (29 years of data)
- 397 eligible pregnancies
- 30% for migraine; 35% aesthetic
- 95% prior to conception or in the first trimester
- No increased signal of safety problems


Case series of ~55 patients treated with onabotulinum toxin A for chronic migraine throughout pregnancy

- Live full-term births of healthy babies with no organ malformations

Summers JE et al. Safety of using onabotulinumtoxinA for the treatment of chronic migraine in pregnancy. Presented at: Virtual Annual Scientific Meeting; AHS
TAKE HOME MESSAGES

- Most of patients do not continue Onabotulinum treatment during pregnancy
  - Reassuring data, but cannot be conclusive
- Systemic spread after local injection
- Improvement in migraine symptoms
- Dose and Duration of treatment
- Risk versus benefit
- Discuss with patients and Document well
CGRP ANTAGONIST

- Participates in placental implantation and cell differentiation
- Placental vessel relaxation
- Inadequate response to CGRP – in development of pre-eclampsia
- WHO (Vigibase) database- no increase reporting of safety events compared to Triptans
- Bottom line- no strong date- DO NOT USE


Chauhan M et al. Endocrinology. 2022 Jan 1;163(1):aqab204


## SUPPLEMENTS AND HERBS

<table>
<thead>
<tr>
<th>Magnesium</th>
<th>CO Q10</th>
<th>Riboflavin</th>
<th>Feverfew/Butterbur</th>
</tr>
</thead>
<tbody>
<tr>
<td>- IV more than 5 days</td>
<td>- 200mg daily</td>
<td>- Safety at higher does not established</td>
<td>- Contraindicated</td>
</tr>
<tr>
<td>- ACOG (risks vs benefits)</td>
<td>- Second half</td>
<td></td>
<td>- Increase abortion</td>
</tr>
<tr>
<td>- Not first line</td>
<td>- No adverse fetal outcomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Continue for those already on</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECONDARY HEADACHE : PREGNANCY SPECIFIC CONSIDERATION

- Preeclampsia/ eclampsia
- Cerebrovascular accident (ischemic or Hemorrhagic)
- Reversible Cerebral Vasoconstriction Syndrome (RCVS)
- Cerebral venous sinus thrombosis
- Idiopathic Intracranial Hypertension
- Pituitary Apoplexy
- Post spinal tap headache
- Chiari Malformation
- Intracranial tumor
CASE 3

36 years old G1P0 women who is 34 weeks pregnant presented with new onset headache and intermittent blurring of vision for last 1 week. She has been using over the counter medication (Acetaminophen) 3-4 times a day without any relief.

Exam- vitals HR 70/min, BP 162/110, RR-18/min, afebrile

No neurological deficits
HYPERTENSIVE DISORDERS OF PREGNANCY
ACOG 2013

- Chronic Hypertension
- Preeclampsia (with or without severe features)
- Superimposed Preeclampsia
- Gestational Hypertension
- Eclampsia
- HELPP Syndrome
PREECLAMPSIA DIAGNOSTIC CRITERIA

**BLOOD PRESSURE**
- \( \geq 140 \text{ mm Hg systolic} \) or \( \geq 90 \text{ mm Hg diastolic} \) on two occasions at least 4 hours apart at 20 weeks’ gestation
- \( \geq 160 \text{ mm Hg systolic} \) or \( \geq 110 \text{ mm Hg diastolic} \); hypertension can be confirmed within a short interval (minutes)

**AND**

**PROTEINURIA**
- \( > 300 \text{ mg per 24-hour urine collection} \) OR protein-creatinine ratio \( > 0.3 \text{ mg/dL} \)
- Dipstick reading of 1+ (used only if other methods are not available)

*OR in the absence of proteinuria, new-onset of any of the following:*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrombocytopenia</td>
<td>Platelet count ( &lt; 100,000/\text{mm}^3 )</td>
</tr>
<tr>
<td>Renal insufficiency</td>
<td>Serum creatinine concentrations ( &gt; 1.1 \text{ mg/dL} ) or a doubling of serum creatinine</td>
</tr>
<tr>
<td>Impaired liver function</td>
<td>Elevated serum concentrations of liver transaminases to twice normal levels</td>
</tr>
<tr>
<td>Pulmonary edema</td>
<td></td>
</tr>
<tr>
<td>Cerebral or visual symptoms</td>
<td></td>
</tr>
</tbody>
</table>
HYPERTENSIVE DISORDERS

Chronic Hypertension

• Hypertension prior to pregnancy or prior to 20 weeks of gestational age
• Hypertension after 20 weeks of gestational age but persists 12 weeks post partum
• Medication optimization

Superimposed Preeclempsia

• New proteinuria in chronic hypertensive patients after 20 weeks of gestational age
• Sudden increase in protein, pressures, other findings in patient with nephrotic syndrome and hypertension prior to 20 weeks
HYPERTENSIVE DISORDERS

Gestational hypertension
- Not preeclampsia
- BP $\geq$ 140/90 mm Hg
- 10% eclamptic patients with seizures but no proteinuria
- May associated with poor outcome

HELLP syndrome
- Hemolysis
- Elevated liver enzymes
- Low platelets
EPIDEMIOLOGY

- Prevalence 4.6% pregnancy worldwide, 3.4% in USA
- Prevalence increases near the term (2.7% after 34 weeks, 0.3% before 34 weeks) and up to 23 days postpartum, can be up to 6 weeks
- Clinical features: Headache, vision changes, weight gain, swelling, nausea, shortness of breath, right upper quadrant pain
- Risk factors

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Relative risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior Preeclampsia</td>
<td>8.4</td>
</tr>
<tr>
<td>Chronic hypertension</td>
<td>5.1</td>
</tr>
<tr>
<td>Pregestational DM</td>
<td>3.7</td>
</tr>
<tr>
<td>Multi-gestational pregnancy</td>
<td>2.9</td>
</tr>
<tr>
<td>FH of preeclampsia</td>
<td>2.9</td>
</tr>
<tr>
<td>History of Auto-immune disease</td>
<td>1.8-2.8</td>
</tr>
<tr>
<td>Obesity BMI &gt;30</td>
<td>2.8</td>
</tr>
<tr>
<td>First pregnancy</td>
<td>2.1</td>
</tr>
<tr>
<td>Chronic renal failure</td>
<td>1.8</td>
</tr>
</tbody>
</table>
COMPLICATIONS

Short term maternal complication

• PRES Posterior Reversible Leukoencephalopathy Syndrome
• Stroke, 36% of stroke in pregnancy due to eclampsia/preeclampsia
• Liver hemorrhage or rupture
• Acute Pancreatitis

Fetal complications

• Growth restriction
• Preterm delivery
• Placental abruption
• Fetal loss
MANAGEMENT

Depends on gestational age

Definite treatment is delivery of fetus, decrease maternal and fetal complications

Deliver the fetus -

• Preeclampsia with severe features, GA ≥ 34 weeks
• Preivable gestational age
• Fetus or mother status not stable

If GA < 34 weeks and fetus and mother stable

• Antenatal steroids Dexamethasone
• BP control
• Magnesium
• If severe features, deliver at 34 weeks
• Without severe features deliver at 37 weeks

Hypitat trial 30% reduction in maternal mortality and morbidity

utmb Health
BP MANAGEMENT

- Acute setting
  - Hydralazine – 5-10 mg q15-20 mins
  - Labetalol- 20 mg iv; 40 mg iv 10 mins, 80mg iv 10 mins; not more than 220mg in a single episode (chronic)
  - Nifedipine 10 mg oral, repeat in 30 minutes; SL hypotension (chronic)
ECLAMPSIA – LIGHTENING STRIKE

- Bossier du Sauvages
- Prevalence- 1 in 200– 3500 pregnancy
- GTC in pregnancy in the absence of seizure disorder
- No predictors for patients who will develop seizure
- Headache most common symptom
Magnesium

Intramuscular in 1900

Intravenous 1920

MgSO4-
• 6 gm load and 2 gm iv or 5 gm im buttock

Randomized control trials in 1990 demonstrated superiority

NNT – 60

Keppra for seizure prevention under investigation
RESOLUTION OF SYMPTOMS

- Postpartum HTN worsen in 1-2 weeks and normalize in 4 weeks
- Resolution of Headache in hours
- Resolution of proteinuria - weeks
- Swelling - 48 hours
ASA low dose, by 16 weeks

Decrease 10-20% preeclampsia in mod- high risk pregnancy

2019 Cochrane metanalysis

Preterm preeclampsia occurred in 13 of 798 participants (1.6%) in the aspirin group, as compared with 35 of 822 (4.3%) in the placebo group (adjusted odds ratio in the aspirin group, 0.38; 95% confidence interval, 0.20 to 0.74; P=0.004)
LIFELONG RISKS

Gestational age at delivery and severity also determines the lifelong risks

<table>
<thead>
<tr>
<th>Severity</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>2.0</td>
</tr>
<tr>
<td>Moderate</td>
<td>3.0</td>
</tr>
<tr>
<td>Severe</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Lifetime intervention decrease risk from 4-13%

<table>
<thead>
<tr>
<th>Disease</th>
<th>Lifetime risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>3.7</td>
</tr>
<tr>
<td>Ischemic Heart disease</td>
<td>2.2</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.8</td>
</tr>
<tr>
<td>Venous Thromboembolic events</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Schwartz et al Ana J Med 2010
### Observation cohort nurses’ health study 2

- Never or curtailed lactation was associated with increased risk of HTN compared to > 6 months of exclusive and >12 months of total lactation per child

### Nurses health study

- 23% reduction in cardiovascular risks for women BF 2+ years in lifetime

### Risk of Lifetime DM 2 increase when term pregnancy is followed by < 1 month of BF

### No BF more likely to develop DM2 compared to nullipara and those with BF 1-3 months

### Lactmed site

### No need for pump and dump with contrast

### Can pump prior contrast or medication dosing

- Staube Ob/Gyn 2009
- Staube AM J EPI 2011
- Kaiser women in California
22 year old female presented as G3P3L3, 5 days after normal vaginal childbirth with bitemporal headaches. Vitals BP- 107/77 Pulse-83. D2 hospitalization, she developed right hemiparesis; motor strength 4/5
Pregnancy-associated stroke

- Ischemic, hemorrhagic, CVST, PRES
- 50% in postpartum, 40% in 3rd trimester
- Incidence: 11-34/100,000 = 3X
- RF: peripartum infection
RISK FACTORS LEADING TO STROKES

Pregnancy related factors

- Hypertensive disorders of pregnancy
  - Reversible Cerebral Vasoconstriction Syndrome (RCVS) / Postpartum Cerebral Angiopathy
  - Cerebral Venous Sinus thrombosis
  - Hypercoagulable state
  - Peripartum Cardiomyopathy
  - Amniotic fluid embolism
  - Gestational trophoblastic disease

Non-pregnancy related factors

- Age more than 35 years
- African American
- Migraine with Aura
- Hypertension / Heart disease
- History of smoking & substance abuse
- History of Inherited thrombophilia
- History of Antiphospholipid Syndrome
- Arterial dissection / atherosclerotic disease
Physiologic changes of pregnancy can lead to higher risk of stroke

- Hypercoagulable state
- Venous stasis
- Insulin resistance
- Vascular remodeling and decreased distensibility
- Increase lipids
- Water retention
- Increased cardiac output
SPECIAL CONSIDERATION

Gestational DM
- Is associated with stroke
- 7 times higher risk to develop DM in later life
- Early subclinical atherosclerosis and cardiovascular disease
- Increased risk of gestational hypertensive disorder

Migraine with Aura
- Higher risks of Preeclampsia → CVA
- Migraine with aura + Oral Contraceptive use – Odd ratio 7.1
- Migraine with aura + smoking – Odd ratio 9.03
- Other co-morbidities: cervical artery dissection, increase PFO prevalence, hypercoagulable/inflammatory state
SUSPECTING STROKE / STROKE ACTIVATION

- History – symptom onset, last seen normal
- Vital signs
- Serum Glucose
- CT Head and CT Angio Head and Neck
- MRI Brain
- Cardiac monitoring
- Work up for hypercoagulable states
Candidate for reperfusion therapy TPA

Candidate for thrombectomy

Blood pressure management – with and without preeclampsia

Single or dual antiplatelet therapy

Best method and timing of delivery - multidisciplinary discussion with involvement of stroke expert
INTRACRANIAL HEMORRHAGE

Arteriovenous Malformation
Aneurysm
Cavernous Malformation
Moyamoya disease
Trauma

Most commonly due to Hypertensive Disorders of Pregnancy (55%),

60 % postpartum period

Secondary to RCVS

Mortality is high, 50%

Method of Delivery – C Section/ routine, regional anesthesia (multidisciplinary approach)

Bateman BT et al Neurology 2006; 67: 424-429
Dias et al Neurosurgery 1990, 27: 855-865
Kim Y et al Neurosurgery 2013; 72: 143-149
Gross and Du et al, Journal Neurosurgery 2017; 126 : 1079-1087
Gross and Du et al Jour clin Neurosurgery 2013; 20: 44-48
Church et al Neurosurgery 2019; 134 :10-16
CEREBRAL VENOUS SINUS THROMBOSIS
AHA 2024 guidelines

- Incidence 1/2500-10000
- Common during postpartum and puerperium period
- Higher risk after delivery, infection, and hypertension
- Clinical features: Headache, seizures, encephalopathy, focal deficits, blurring of vision (papilledema)

Diagnosis - MRI Brain/MRV (TIME OF FLIGHT)
Management - LMWH throughout the pregnancy
  - Postpartum LMWH or Vit K Antagonist
    INR 2-3 for at least 6 weeks

Future pregnancy is not contraindication
  - Prophylaxis with LMWH during pregnancy and postpartum period
<table>
<thead>
<tr>
<th>Postpartum Angiopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertensive disorders of Pregnancy → disrupted cerebrovascular autoregulation</td>
</tr>
<tr>
<td>Thunderclap headache is common presentation, SAH, ICH</td>
</tr>
<tr>
<td>Usually self limiting</td>
</tr>
<tr>
<td>SSRI use</td>
</tr>
<tr>
<td>MRA</td>
</tr>
<tr>
<td>Delivery</td>
</tr>
<tr>
<td>Mortality 14 %</td>
</tr>
<tr>
<td>Hypertensive disorders of pregnancy, RCVS</td>
</tr>
<tr>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Loss of cerebral autoregulation</td>
</tr>
<tr>
<td>C/F: uncontrolled BP, headaches, seizures, blurred vision</td>
</tr>
<tr>
<td>MRI: Gold standard</td>
</tr>
<tr>
<td>Mx: discontinue offenders, Lower BP, treat seizures</td>
</tr>
<tr>
<td>Deliver the fetus</td>
</tr>
<tr>
<td>Mechanical ventilation: PaCO2: 30-32 mmHg</td>
</tr>
<tr>
<td>Vasopressors: Norepinephrine and the Phenylephrine</td>
</tr>
<tr>
<td>Idiopathic</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>Previous history of IIH</td>
</tr>
<tr>
<td>Outcomes are not different in nonpregnant women</td>
</tr>
<tr>
<td>Mild papilledema- monitor (if no vision loss, no/minimal headache)</td>
</tr>
<tr>
<td>Restricted weight gain (salt restriction diet)</td>
</tr>
<tr>
<td>Acetazolamide- 2\textsuperscript{nd} trimester (Cat C), Topamax (Cat D, oral clefts)</td>
</tr>
<tr>
<td>Headache – mange headache if no vision loss</td>
</tr>
<tr>
<td>LP</td>
</tr>
<tr>
<td>Optic nerve sheath fenestration/shunt</td>
</tr>
<tr>
<td>Uterine contraction, Valsalva – increase ICP in pregnancy 3.4 cm H2O, 10.8 cm H2O without IIH; labor 70 cm H2O</td>
</tr>
</tbody>
</table>
## POST DURAL PUNCTURE HEADACHE

Onset 24-48 hours dural puncture but may be 5 days

Postural nature of HA, occurring within 15 mins of standing and resolution within 15 minutes of laying down

Conservative-Bed rest, hydration, analgesics; caffeine not supported by literature

Epidural blood patch - lower than puncture site

Effectiveness after 24 hours of dural puncture

First patch – instant relief 70-97%; second patch rarely needed

If no improvement after 2 patches, Neuroimaging should be considered

Rare Subdural hematoma- tearing and leaking of bridging veins across subdural space, can be life threatening

C/I to patch - Sepsis, cellulitis at the site and coagulation abnormalities
MY INSPIRATION
THANK YOU

“A journey of a thousand miles begins with a single step”

— Confucius