



Headache and Hormones

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Disclosures: Teshamae Monteith, MD, FAHS



Consultant/Advisory Boards: AbbVie, Teva, Axsome, Merz, Lundbeck, Pfizer

Honoraria: Medscape, Massachusetts Medical Society, American Headache Society, American Academy of Neurology, Neurodiem, Academic CME, AbbVie

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Learning Objectives



Upon completion of this activity, learners will be able to

- Describe the impact of hormones on headache over a woman's lifetime
- Understand the approach to treatment of migraine in pregnancy and lactation
- Identify considerations around migraine with aura and hormone treatments

Not covered today: Gender-affirming hormone therapy (GAHT)



Why Do Hormones Deserve a Talk?



- Headache is more prevalent in women
- Any headache disorder: lifetime prevalence women vs men 73.3% vs 65%
- Migraine: lifetime prevalence women vs men 21% vs 11%
- Headache disorders often change when hormones change
- Treatment often modified in different life stages e.g. pregnancy, lactation

Hormone Changes to Keep in Mind



- Menarche
- Menstrual periods
- Pregnancy and lactation
- Hormonal contraceptives
- Menopause
- Hormone replacement



Hormone Changes to Keep in Mind



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Case: Reena, 13F



- Reena had her first menstrual periods earlier this year
- She and her mother report that she had a very bad headache after staying up late studying for an exam
- She had to leave the exam to vomit then felt better after sleeping it off
- Is this just a stress headache?

Migraine and Menarche



- Migraine is more prevalent in boys before age 7
- Prevalence is roughly equal in girls and boys from age 8-11
- After puberty, migraine prevalence rises in girls and remains higher over the rest of the lifespan
- Reena likely has migraine!

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Case: Reena, 19F



Reena reports headache starting 1 day before her menstrual periods, causing her to miss university classes, accompanied by nausea and photophobia. **Why is she having these attacks?**

- a) Decreasing progesterone before periods is triggering the attacks
- b) The estrogen drop before menstruation is triggering the attacks
- c) Stress is the most likely cause
- d) Genetics are the most likely cause



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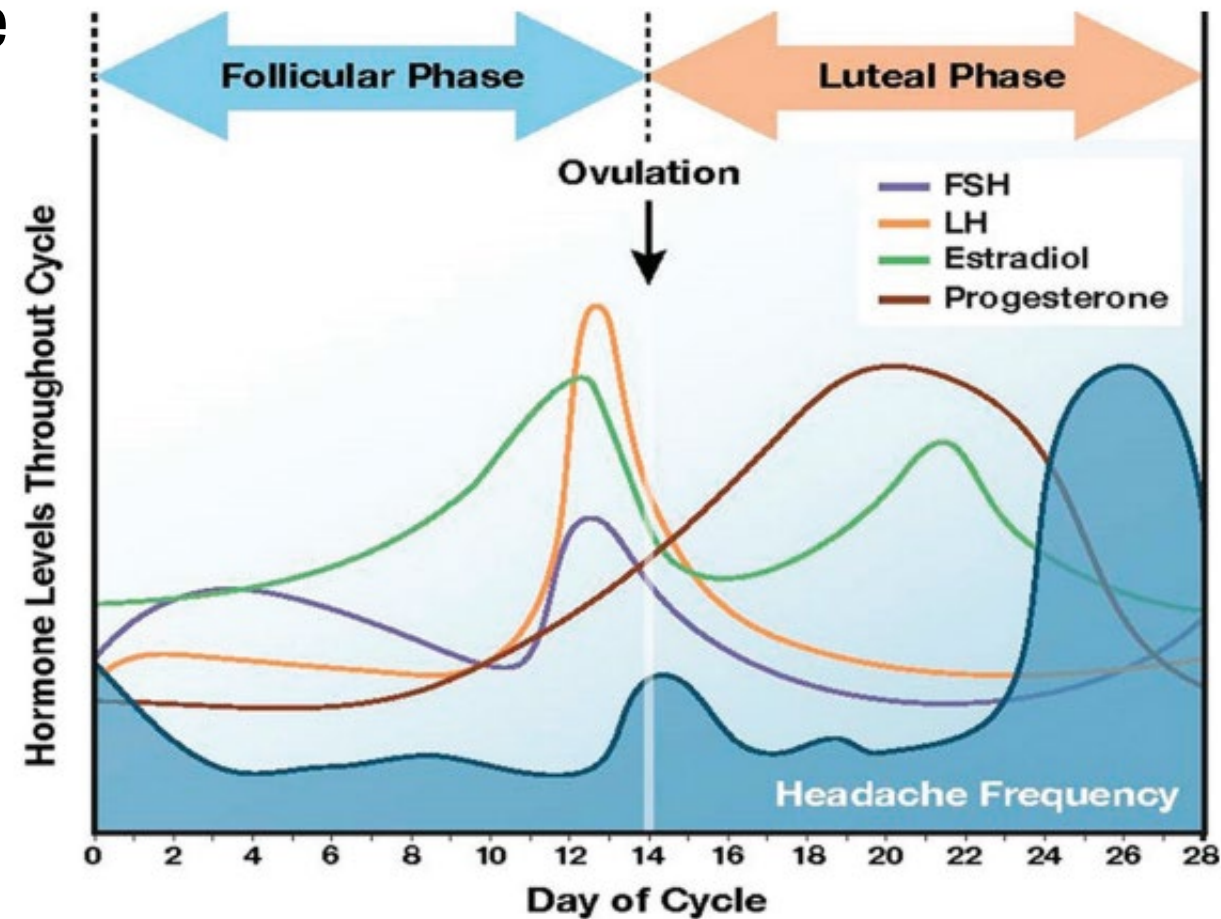


Menstrually-Related Migraine (MRM)



- Attacks occur on D-2 to D+3* of the cycle at least 2/3 of the time
- Estrogen drop thought to be trigger
- Menstrual attacks are often more severe and treatment-resistant
- Typically without aura

*There is no D0



Menstrually-Related Migraine (MRM) Treatment



- Menstrual attacks can drive overall frequency
- Consider mini-prevention if predictable cycles and attack timing
- Even with headache at other times, improving menstrual component can improve migraine overall
- Standard migraine treatment can also still apply
- Sumatriptan-naproxen combo pill and ubrogepant have some data specifically for MRM

Menstrually-Related Migraine (MRM) Mini-Prevention

- Time starting 1 day before expected headache, not necessarily D+1 of period
- NSAID
- Naproxen or nabumetone 500mg bid x 5-7 days
- Mefenamic acid 500mg tid x 5-7 days
- Triptan
- Naratriptan 2.5mg bid, frovatriptan 1-2.5mg bid, or zolmitriptan 2.5mg bid x 5-7 days
- Ubrogepant bid x 3-5 days (anecdotal evidence, no medication overuse risk)

Menstrually-Related Migraine (MRM): Other Options



- Minimize periods
- Continuous oral contraceptive
- Progesterone IUD
- Magnesium taken from ovulation until period onset
- Add-back estrogen patch (may just delay attack onset until after stopping)

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Case: Reena, 23, Pregnant at GA 8 Weeks



- Reena presents to ER with a typical migraine attack accompanied by a new visual aura lasting 20 minutes
- Headache has resolved, BP normal, neuro exam including fundi is normal

Should you scan this patient?



Headache in Pregnancy



- Pregnancy often thought of as a red flag in **SNOOP**
- Prevalence of secondary headache disorders in pregnancy 25-45%*
- Post-partum, even higher at 50-75%*
- Secondary etiologies:
 - Hypertensive disorders of pregnancy (preeclampsia, PRES)
 - Vascular disorders (stroke, bleed, RCVS)
 - Space-occupying lesions (pituitary tumor/apoplexy)
 - Infections

*Among those presenting to medical attention

Headache Red Flags in Pregnancy (PREGNANT HA)



- P**roteinuria
- R**apid onset (thunderclap)
- E**levated BP or temperature
- G**estational age 3rd trimester
- N**eurological signs/symptoms
- A**ltered level of consciousness
- N**o headache hx, or hx of secondary headache disorder
- T**hrombocytopenia/thrombocytosis
- H**igh liver function tests or CRP
- A**gonizingly severe

Case: Reena, 23, Pregnant at GA 8 Weeks



What can you counsel her about migraine trajectory in pregnancy?

- a) Migraine is not usually impacted by pregnancy
- b) Migraine typically worsens in pregnancy
- c) Migraine typically improves in pregnancy

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Pregnancy and Migraine



- Course in T1 is variable, but hormone fluctuations can be challenging
- Migraine usually improves by T2
- 50-80% of women with migraine have improvement or cessation of migraine attacks in T2 and T3
- More common in those with history of menstrually-related migraine
- More common in those without aura
- Some patients have new aura in pregnancy (likely estrogen-related)
- Migraine is a risk factor for preeclampsia/eclampsia, reversible cerebral vasoconstriction syndrome (RCVS)

Treating Migraine in Pregnancy and Lactation



- Quality of evidence in both pregnancy and lactation is generally POOR
- Multiple forms of bias are likely at play
- True randomized, controlled studies generally do not exist
- Studies typically do not examine long-term outcomes for children
- Untreated migraine increases maternal distress, which is associated with worse fetal neurodevelopmental outcomes
- Shared decision-making is key



Pregnancy and Migraine



- Prioritize non-pharmacological strategies (e.g. lifestyle, mindfulness, yoga) when possible
- Nutraceuticals
- Magnesium, avoid high dose (high-dose IV magnesium → fetal bone demineralization)
- Vitamin D is probably good for both mom and baby
- Not great evidence for CoQ10/others in pregnancy

Pregnancy and Migraine: Acute Treatment



- Acetaminophen +/- caffeine (especially helpful if external caffeine is limited)
- Metoclopramide
- Lidocaine nasal spray
- ?Sumatriptan: increased rate of spontaneous abortions in triptan users versus healthy controls - prioritize alternatives in T1 and while trying, if possible
- NSAIDs e.g. ibuprofen in T2
- AVOID opioids, butalbital

Pregnancy and Migraine: Preventive Treatment



- Nerve blocks (lidocaine preferred in pregnancy) can be considered first-line as per IHS global practice recommendations
- Oral options
- Propranolol: IUGR if BP drops too low, stop by end T3
- Amitriptyline: stop prior to delivery to avoid neonatal withdrawal
- ?Memantine
- ?OnabotulinumtoxinA
- Published registry data and one small prospective study do not suggest harm, toxin is mechanistically unlikely to go systemic and cross placenta

Figure 1: Non-invasive Neuromodulation Devices FDA-Cleared for Headache Therapy



A Electrical Trigeminal Neurostimulator
(eTNS, CEFALY)



B Transcutaneous Electrical Nerve Stimulator
(TENS, HEADATERM-2)



C Single Pulse Transcranial Magnetic Stimulator
(sTMS, SAVI DUAL)



D Non-invasive Vagal Nerve Stimulator
(nVNS, GAMMACORE SAPPHIRE)



E Remote Electrical Neuromodulation
(REN, NERVIO)



F Combined External Occipital-Trigeminal Neurostimulator
(COT-NS, RELIVION MG)

Case: Reena, 23, Pregnant at GA 35 Weeks



Reena has not had any migraine attacks since GA 12 weeks. She wants to know what to expect if she chooses to breastfeed. **What do you tell her?**

- a) No migraine treatments are safe in lactation
- b) She will likely remain headache-free post-partum
- c) Lactation can worsen migraine
- d) Migraine may worsen when periods resume

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Migraine and Lactation



- Lactation can be protective especially with lactational amenorrhea
- The immediate post-partum period can be difficult as estrogen drops

Migraine and Lactation



- Similar nonpharmacological/vitamin suggestions as before
- Riboflavin, magnesium felt safe in lactation
- Acute: acetaminophen +/- caffeine, ibuprofen, sumatriptan, eletriptan, lidocaine nasal spray, metoclopramide, ondansetron, Cefaly/Headaterm
- Preventive: amitriptyline, propranolol, verapamil, ?candesartan, nerve blocks, ?onabotulinumtoxinA

Case: Reena, 24, 10 Months Post-Partum



Reena notes that headaches worsened over the last 2 months and she is having 12 migraine days per month. She is still breastfeeding and thinks she might want to get pregnant again in the next 1-2 years. **Is a CGRP-targeted therapy safe for her?**

- a) Ubrogepant is a good option in lactation
- b) Atogepant is a good option in lactation
- c) A CGRP monoclonal antibody is a good option in lactation
- d) An oral agent would usually be tried before a CGRP-targeted option



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CGRP-Targeted Treatments in Women



- CGRP monoclonal antibodies
 - Pregnancy: Stop at least 5-6 months prior to planning pregnancy due to $T_{1/2}$ 1 month
 - Lactation: Not studied, not typically recommended
- Gepants
 - Pregnancy: Not recommended; given $T_{1/2}$, stop at least 5 days before trying
 - Lactation: Not typically recommended (but small gepant studies suggest levels in breastmilk are low)

Pregnancy Planning and Migraine



- 50% of pregnancies are unplanned → revisit plans and contraceptive use at each visit!
- STOP teratogenic/potentially harmful oral meds before trying
- Especially valproate, topiramate, candesartan, CGRP-targeted meds
- It may be reasonable to stop oral preventives in general before trying since most women improve in pregnancy
- Acute treatment: consider split month strategy while trying (can use less safe options such as NSAID+triptan between period and ovulation, then stop until next period)

Hormone Changes to Keep in Mind



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- Menopause
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Case: Reena, 27F



Reena reports visual aura (scintillating scotoma) lasting 45 minutes, once every few months. She has painful periods but is healthy and not a smoker.
What do you advise her about hormonal contraception?

- a) A high-dose estrogen pill (50-100mcg/day) is the best option to reduce migraine attacks
- b) Low-dose estrogen (20mcg/day or less) could be considered with caution
- c) Progesterone-only strategies are the only hormonal option for her
- d) Neither estrogen nor progesterone are safe given her auras



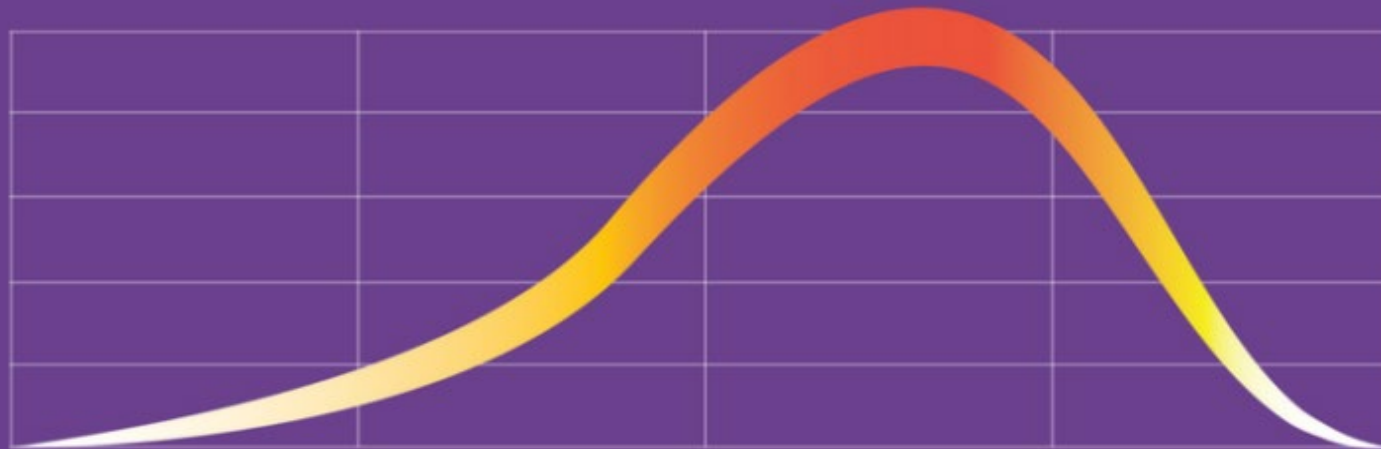
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TIMELINE OF A MIGRAINE ATTACK



PRODROME

FEW HOURS TO DAYS

IRRITABILITY
DEPRESSION
YAWNING
INCREASED NEED TO URINATE
FOOD CRAVINGS
SENSITIVITY TO LIGHT/SOUND
PROBLEMS IN CONCENTRATING
FATIGUE AND MUSCLE STIFFNESS
DIFFICULTY IN SPEAKING AND READING
NAUSEA
DIFFICULTY IN SLEEPING

AURA

5-60 MIN

VISUAL DISTURBANCES
TEMPORARY LOSS OF SIGHT
NUMBNESS AND TINGLING ON PART OF THE BODY

HEADACHE

4-72 HRS

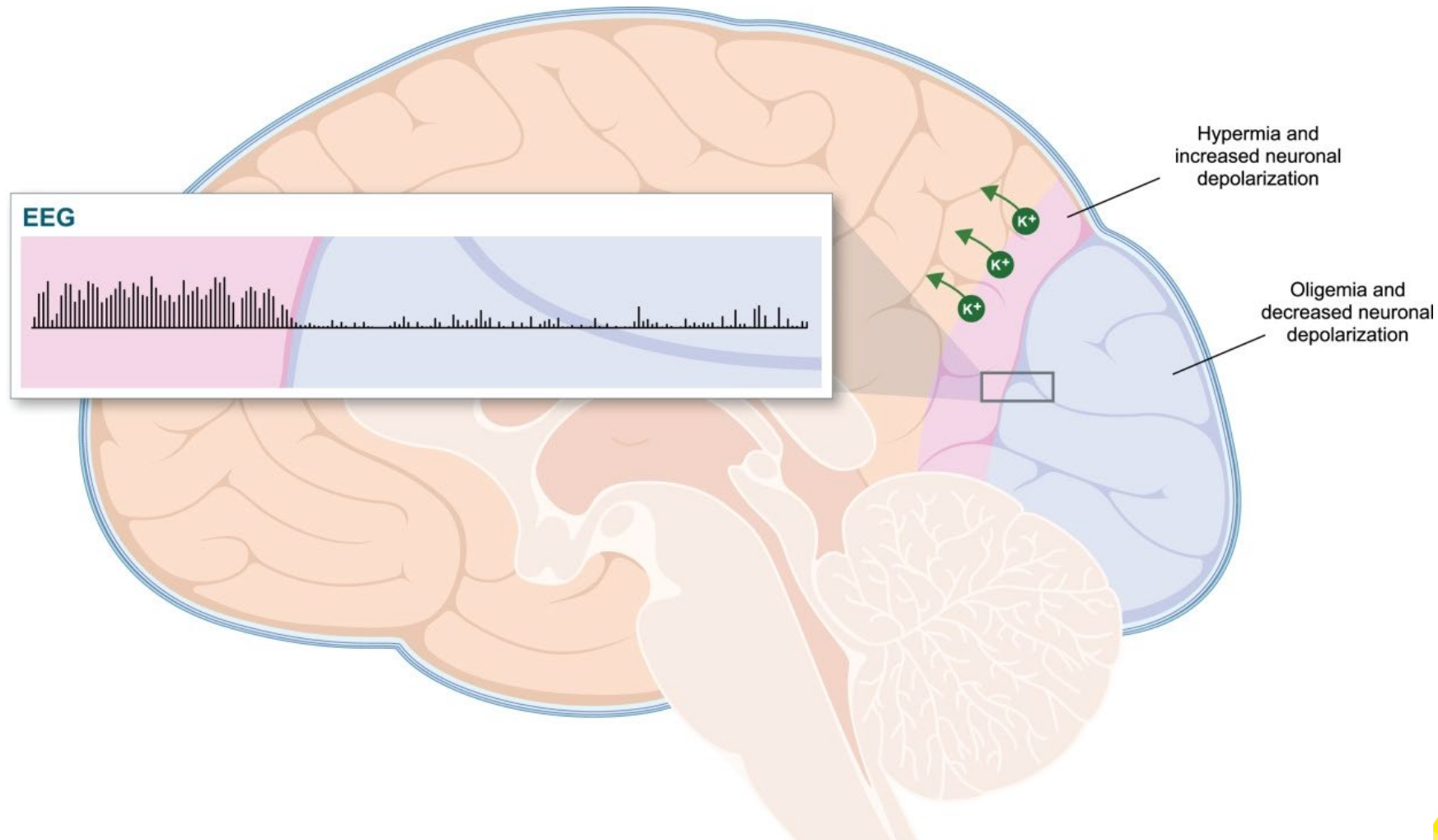
THROBBING
DRILLING
ICEPICK IN THE HEAD
BURNING
NAUSEA
VOMITING
GIDDINESS
INSOMNIA
NASAL CONGESTION
ANXIETY
DEPRESSD MOOD
SENSITIVITY TO LIGHT, SMELL, SOUND
NECK PAIN AND STIFFNESS

POSTDROME

24-48 HRS

INABILITY TO CONCENTRATE
FATIGUE
DEPRESSED MOOD
EUPHORIC MOOD
LACK OF COMPREHENSION

Cortical Spreading Depression and Aura



Migraine Diagnostic Criteria: ICHD-3 - Aura



- Cortical spreading depolarization: excitable leading wave (positive symptoms) followed by depression (negative symptoms)
- Gradual onset and spread typically lasting 5-60 minutes
- Typical: vision, sensory, speech
- NOT typical aura:
- Motor
- Brainstem (diplopia, vertigo, ataxia, decreased level of consciousness)



Aura and Hormones



- Migraine → 2x higher risk of ischemic stroke, 1.5x higher risk of hemorrhagic stroke
- Primarily driven by migraine with aura
- Highest in those under age 45 and smokers
- Older studies suggest that combined hormonal contraceptives (CHCs) → increased stroke risk
- Recent studies: elevated risk with estrogen dose of more than 50 µg/day, likely also elevated at >30 µg/day, unclear at lower doses

Aura and Hormones



- Aura characteristics impact impression of stroke risk
- Stroke risk increases with higher aura frequency (>1/month)
- Prolonged duration (>60 minutes) or more severe symptoms also likely higher risk

Aura and Hormones



- Pregnancy also carries significant health risks (although it is not a disease)
- New lower-estrogen CHCs may be safe in migraine with aura if auras are not frequent or prolonged
- One study with estrogen ring eliminated menstrually-related attacks and actually reduced aura frequency

Aura and Hormones



- Migraine without aura
- CHCs are usually fine
- Consider non-cycling or low-dose pill to minimize estrogen drop
- Monitor for new auras
- Migraine with aura
- Consider progesterone-only options
- If required and no high-risk features, low-dose estrogen with caution (20 µg/day or less preferred but avoid more than 30 µg/day), monitor for change in aura/headache

Hormone Changes to Keep in Mind



- Menarche
- Menstrual periods
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- Hormonal contraceptives
- **Menopause**
- **Hormone replacement**



Case: Reena, 55



Reena is having hot flashes and irregular periods, and reports worsening from previously 2 migraine days per month, to now 14 migraine days per month. **Is this normal??? Is hormone replacement recommended?**

- a) She needs an urgent MRI given the pattern change
- b) She is probably stressed about menopause
- c) Hormone fluctuations of menopause can worsen migraine
- d) Hormone replacement therapy is contraindicated given migraine history

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Menopause and Migraine



- Reena clearly has a strong hormonal influence on her migraine attacks so this is not unexpected
- Migraine brains do not like change i.e. hormone fluctuations of menopause, sleep disruption
- Menopausal transition takes 10 years on average!
- New auras may emerge in perimenopause
- Attack timing can shift, e.g., early morning or wake-up attacks
- If pattern change is significant, consider workup for secondary cause



Menopause and Migraine: Hormone Replacement Therapy (HRT)



- HRT is different than contraceptive estrogen dosing – goal is physiologic replacement
- Even those with aura can often safely use HRT
- Use lowest possible dose, non-cycling, and non-oral route if possible
- If headaches/auras worsen, reduce dose and/or switch to non-oral as this may herald increased stroke risk
- Inherent risks of HRT should always be weighed
- (?increased meningioma risk with medroxyprogesterone acetate, medrogestone, promegestone)

Menopause and Migraine



- Non-hormone options for migraine and vasomotor symptoms
- Gabapentin 300-1200mg qhs 2-3 hours before bed
- Herbal gaba
- Venlafaxine 37.5-150mg daily or duloxetine 30-60mg daily
- Fezolinetant for vasomotor symptoms

Menopause and Migraine: Surgical Menopause?

- Abrupt hormone change often worsens migraine
- Not recommended in general as a migraine treatment
- Migraine may worsen (often) or improve post-hysterectomy



Menopause and Migraine: Will My Headaches Go Away After Menopause?



- Hopefully – depends a bit on your migraine path
- If the brain walks the migraine path more often, the path is easier to find and enlarges each time
- If you start off with a smaller path and let the grass grow over it between attacks, your chances are better



Take-Home Points



- Hormone changes over the lifespan can significantly impact migraine
- Safe and effective treatments can often be found in pregnancy and lactation
- Better migraine control in perimenopause □ better change of improving post-menopause



THANK YOU

