A. Migraine epidemiology:
1. Global Burden of Disease Survey 2010: Third most prevalent disorder and seventh highest cause of disability
2. National Health Interview Survey 2003: Migraine prevalence in the US was 13.2% of overall population (8.6% of males, 17.5% of females).
3. Prevalence by age is bimodal. Peaks seen in late teens to early 20s and then again around 50 years of age
4. Tends to run in families

B. International Headache Society: International Classification of Headache Disorders 3rd Edition 2013: Disorders affecting the visual system:
1. Migraine Headache (1.0)
   a. Migraine with typical aura (1.2.1.1)
   b. Migraine with typical aura without headache (1.2.1.2)
   c. Retinal migraine (1.2.4)
2. Painful cranial neuropathies and other facial pains (13.0)
   a. Recurrent painful ophthalmoplegic neuropathy (13.9)

C. Migraine with typical aura (1.2.1.1):
1. At least two attacks fulfilling the following criteria:
   a. Aura consisting of visual, sensory, and/or speech/language symptoms, each fully reversible, but no motor, brainstem, or retinal symptoms
   b. At least two of the following four characteristics: 1) at least one aura symptom spreads gradually over \( \geq 5 \) minutes, and/or two or more symptoms occur in succession, 2) each individual aura symptom lasts 5-60 minutes, 3) at least one aura symptom is unilateral, 4) the aura is accompanied, or followed within 60 minutes, by headache
2. Transient ischemic attack as been excluded

D. Migraine with typical aura without headache (1.2.1.2):
1. Fulfills criteria for 1.2.1.1
2. No headache accompanies or follows the aura within 60 minutes

E. Retinal migraine (1.2.4):
1. At least two attacks fulfilling the following criteria:
   a. Aura consisting of fully reversible monocular positive and/or negative visual phenomena (scintillations, scotoma or blindness) confirmed by examination during an attack or by 1) clinical visual field examination, or 2) the patient’s drawing (made after clear instruction) of a monocular field defect
   b. At least two of the following three characteristics: 1) aura spreads gradually over \( \geq 5 \) minutes, 2) aura symptoms last 5-60 minutes, 3) aura is accompanied, or followed within 60 minutes by headache
2. Other causes of amaurosis fugax have been excluded
3. Transient ischemic attack (embolic) work-up required
4. Controversial proposed mechanisms include depressive spreading event within retinal neural tissues followed by associated retinal vasodilation and constriction.

F. Recurrent painful ophthalmoplegic neuropathy (13.9):
   1. Previously termed ophthalmoplegic migraine
   2. At least two attacks fulfilling criterion B
      a. Unilateral headache accompanied by ipsilateral paresis of one, two or all three ocular motor nerves (CNII, CNIV, CNVI)
      b. Orbital, parasellar or posterior fossa lesions has been excluded by appropriate investigation
   3. Incredibly rare: Affecting 0.7 per million individuals
   4. Typically affects children under age 10, but adult cases have been reported
   5. Most commonly involves CNIII, followed by CNVI, and rarely CNIV
   6. When CNIII is the involved nerve, pupillary fibers are usually affected
   7. Unlike migraine, there can be a delay of days before headache onset and motor paresis can similarly last for days
   8. Diagnosis of exclusion and work-up is extensive including vascular, malignant, infectious, and inflammatory pathologies
   9. Recent MRI evidence shows transient enhancement of the involved cranial nerve as it exits the midbrain suggesting a recurrent demyelinating neuropathy

G. Migraine aura:
   1. Fully reversible focal neurologic symptoms that may precede or coexist with headaches in 25-30% of patients with migraines
   2. Gradual in onset, progression of symptom, and lasting 5 to 30 minutes
   3. Subtypes of migraine aura:
      a. Visual (86%)
      b. Sensory (34%)
      c. Speech and/or language (35%)
      d. Motor (10%)
      e. Brainstem
      f. Retinal

H. Visual aura:
   1. Bilateral
   2. Most common form of migraine aura
   3. Typically start centrally, progressing over a period of 5 to 60 minutes to involve one quadrant of hemifield
   4. Less commonly start peripherally and spread centrally
   5. Typically positive symptoms (scintilations) are followed by negative symptoms (scotoma)
   6. Only 19% of migraine sufferers have visual aura every headache
7. Auras precede headache 57% of the time and occur during 43%
8. 75% headaches occur within 30 minutes of visual aura
9. 59% of visual aura last between one and 30 minutes
10. Classic fortification spectra (jagged-edged scintillating scotoma) occur in 20%, with other visual symptoms including small bright dots, flashes of light, and blind spots

I. Pathophysiology of migraine aura:
1. Migraine is a complex neurologic disorder that likely starts centrally giving rise to prodromal symptoms followed by aura, and headache
2. Prodromal symptoms are consistent with involvement of hypothalamus (fatigue, irritability), cortex (abnormal light or smell sensitivity), brainstem, and limbic system
3. Auras are a consequence of a wave of altered brain activity that migrates over the cerebral cortex
4. Characterized by “Cortical Spreading Depression:” slowing propagating wave of excitation followed by inhibition of cortical neurons
5. Headache occurs with activation of sensory neurons in the meningeal trigemino-vascular system (neurons of the trigeminal nerve that innervate cerebral blood vessels)
6. Transient increase in cerebral blood flow followed by a decrease in response to bimodal metabolic demand

J. Differentiating migraine aura from serious pathologies (including cerebral ischemia):
1. Migraines should present in typical populations with defining clinical characteristics
2. Neurologic symptoms should be episodic and fully reversible, lasting less than 60 minutes
3. Unless there is a well defined history of migraine with typical aura (associated with headache), migraine with typical aura without headache should only be made after other causes have been fully ruled out
4. Aura should be slowly spreading and have migratory pattern of symptoms that cross cerebrovascular boundaries
5. Aura should have a bimodal progression from positive to negative symptoms
6. Although sided, visual auras are bilateral
7. The more atypical the patient demographics and aura symptomatology, the greater the concern of non-migraine origin necessitating further work-up

K. Migraine treatments:
1. Medications for acute migraine:
   a. Acetaminophen and non-steroidal anti-inflammatories
   b. Triptans and triptan-NSAID combinations
   c. Vasoconstrictors
d. Opiates
e. Trigger identification and avoidance

2. Medications for chronic migraine (15 days/month and > 3 months):
   a. OnabotulinumtoxinA (Injected into specified areas of the head/neck
   b. Topiramate
   c. Medications used in the treatment of acute migraine
   e. Trigger identification and avoidance

L. Citations: