HEADACHES, MOTOR DISORDERS, AND AMYOTROPHIES

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Scott Spradlin, D.O. FACP, FACOI

I have no relevant financial or nonfinancial relationships in the products or services described, reviewed, evaluated or compared in this presentation.
Headaches, Motor Disorders, Amyotrophies

- General Classification of Headaches
  - Migraine
  - Tension
  - Cluster
  - Coital
  - Post-Traumatic
  - Temporal Arteritis
  - Pseudotumor Cerebri
  - Thalamic
Migraines

- Unilateral, intermittent, throbbing
- Lasts 4 hours-3 days
- Light sensitive/sound sensitive
- Associated with prodrome
- Aura- scintillating scotomas
- Triggers
- Acephalic- abnormal transient transient dysfunction No pain
Headaches, Motor Disorders, Amyotrophies

- Treatment
  - Acute
    - Serotonin agonists (Triptans)
    - NSAIDS
    - Ergotamine
    - Dopamine antagonists
    - Narcotics- rarely recommended
    - DHE IV- severe
Headaches, Motor Disorders, Amyotrophies

**Prophylactic**

- Beta blockers
- Tricyclic Antidepressants
- Divalproex
- Topiramate
Headaches, Motor Disorders, Amyotrophies

**Cluster Headaches**

Occur daily for weeks then stop
Ice pick like
Associated with REM or early AM
“Worst Pain” known
Pain peaks in 5-10 min then throbs 2 hours
Ipsilateral Horner’s syndrome
Male
Drinkers and Smokers
Tall and THIN and Hazel eye color
Headaches, Motor Disorders, Amyotrophies

**Treatment**

5-HT1 Receptor agonists
Triptans/Ergot Alkaloids
Oxygen 8-10 L/min
Lidocaine intranasal drops
Corticosteroids
Prophylactic= Calcium Channel Blockers
Headaches, Motor Disorders, Amyotrophies

- **Tension**
  - Chronic muscle contraction
  - Can have vascular component
  - Daily
  - Bilateral
  - Tight band feeling
  - Non throbbing
Headaches, Motor Disorders, Amyotrophies

Treatment

NSAIDS
Muscle Relaxants
Tricyclics
Beta Blockers
Headaches, Motor Disorders, Amyotrophies

**Other Headaches:**

**Coital**
- Benign
  - TX: Propanolol / Indomethacin

**Post-Traumatic**
- Vascular
  - TX: same as migraine

**Temporal Arteritis**
- >55 yr old
- Sudden onset
- Temporal artery tenderness
- Elevated ESR
  - Tx: Biopsy/Steroids

**Pseudotumor Cerebri**
- Obese premenopausal women
- Diplopia/headache visual field loss papilledema
- CSF=>250 mm H2O
  - Tx: Diuretic/Steroids

**Thalamic**
- Severe/debilitating after infarct usually has hemianesthesia
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**Motor Disorders:**
- Parkinson’s Disease
- Progressive Supranuclear Palsy
- Huntington’s Chorea
- Essential Tremors
- Tardive Dyskinesia
- Neuroleptic Malignant Syndrome
- Tic Douloureux
- Giles de la Tourette
- Torticollis
- Meige Syndrome
- Creutzfeldt-Jakob disease
Headaches, Motor Disorders, Amyotrophies

Parkinsons Disease

Clinical Diagnosis
Decrease dopamine producing cells in the substantia nigra

Signs/Symptoms:
  Resting Tremor
  Rigidity
  Retarded movement
  Loss of postural reflexes
<table>
<thead>
<tr>
<th>Presentation</th>
<th>Parkinsonism</th>
<th>Differential Diagnosis</th>
<th>Distinguishing Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tremor</td>
<td>Asymmetric rest tremor</td>
<td>Essential and other tremors</td>
<td>Symmetric postural and action tremor</td>
</tr>
<tr>
<td>Clumsy or weak limb</td>
<td>Bradykinesia</td>
<td>Carpal tunnel syndrome, radiculopathies, and stroke</td>
<td>Altered reflexes, sensation, and strength</td>
</tr>
<tr>
<td>Stiff or uncomfortable limb</td>
<td>Rigidity</td>
<td>Musculoskeletal syndromes</td>
<td>Pain and limitation of movement</td>
</tr>
<tr>
<td>Gait disorder</td>
<td>Asymmetric slowness, shuffling, reduced arm swing, minimal or no imbalance</td>
<td>Multiple ischemic lesions in the brain, hydrocephalus, and musculoskeletal disorders</td>
<td>Symmetric shuffling, retained arm swing, wide-based gait, prominent imbalance, limited movement at knee and hip</td>
</tr>
</tbody>
</table>
Headaches, Motor Disorders, Amyotrophies

**Treatment**

- **Increase the Dopamine**
  - Decrease the Acetylcholine
  - *Dopaminergic is most successful*
  - Levodopa/carbidopa (Sinemet® or Atamet®)
  - Anticholinergics-Artane
  - Parlodel/Eldepryl/Mirapex/
  - Ropinirole (Requip, Requip XL)
  - Rasagiline (Azilect)
  - Apomorphine (Apokyn)
  - Amantadine
  - Toicapone-COMT
  - Entacapone-COMT

Deep Brain Stimulation
Surgery-Palliodotomy
Table 2. Initial Therapy for Symptoms in Parkinson's Disease.*

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Example</th>
<th>Initial Dose</th>
<th>Final Dose</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First-line dopaminergic agents</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbidopa plus levodopa</td>
<td>Immediate release (Sinemet)</td>
<td>1/2 tablet</td>
<td>1 to 2 tablet</td>
<td>At initiation: anorexia, nausea, vomiting, dizziness, hypotension (a 1:4 ratio of carbidopa:levodopa reduces gastrointestinal symptoms), long-term therapy: motor fluctuations, dyskinesias, confusion, hallucinations</td>
</tr>
<tr>
<td></td>
<td>Controlled release (Sinemet-CR)</td>
<td>1 tablet</td>
<td></td>
<td>Same as for immediate-release preparations</td>
</tr>
<tr>
<td></td>
<td>50 mg carbidopa, 200 mg levodopa</td>
<td>1/2 tablet</td>
<td>1 tablet</td>
<td>Same as with preparations above, plus diarrhea</td>
</tr>
<tr>
<td></td>
<td>12.5 mg carbidopa, 50 mg levodopa, 200 mg entacapone (Stalevo)</td>
<td>1 tablet</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 mg carbidopa, 100 mg levodopa, 200 mg entacapone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Second-line alternatives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Anticholinergic agents</strong></td>
<td>Trihexyphenidyl (Artane)</td>
<td>1 mg</td>
<td>2 mg</td>
<td>Impaired memory, confusion, constipation, blurred vision, urinary retention, xerostomia, and angle-closure glaucoma</td>
</tr>
<tr>
<td></td>
<td>Benztropine (Cogentin)</td>
<td>0.5 mg</td>
<td>1 mg</td>
<td>Same as for trihexyphenidyl</td>
</tr>
<tr>
<td><strong>Selective MAO-B inhibitors</strong></td>
<td>Selegiline (Eldepryl)</td>
<td>5 mg</td>
<td>5 mg</td>
<td>Insomnia, nausea, anorexia, hallucinations, potential for interactions with SSRIs and meperidine</td>
</tr>
<tr>
<td><strong>NMDA antagonist</strong></td>
<td>Amantadine (Symmetrel)</td>
<td>100 mg</td>
<td>100 mg</td>
<td>Dizziness, insomnia, nervousness, livedo reticularis, hallucinations, confusion</td>
</tr>
</tbody>
</table>

* All antiparkinsonian drugs are started at low doses and increased slowly to reduce adverse effects. Likewise, slow withdrawal of these drugs after long-term treatment is prudent to avoid a marked worsening of parkinsonism or even the neuroleptic malignant syndrome (discussed by Keyser and Rodnitzky). MAO-B denotes monoamine oxidase B, SSRI selective serotonin-reuptake inhibitor, and NMDA N-methyl-D-aspartate.
Headaches, Motor Disorders, Amyotrophies

Progressive Supranuclear Palsy

Similar to Parkinsons
Erect Posture
Hyperextension Neck
No tremor
Vertical Ophthalmoplegia—can't look up or down
Over 2 yrs unable to walk
No treatment
Huntingtons Chorea

Inherited
Autosomal Dominant
Hemiballismus
Facial twitching
Rigidity/Dystonia
Lab:
  - H-D Gene
  - Decreased GABA
  - CT/MRI= Bulge of Caudate Nucleus/ enlarged ventricles

Treatment
  - Tetrabenazine
  - Amantadine or Riluzole
Benign Tremor (Essential)

Not to be confused with Normal tremor

7 Hz

Autosomal Dominant

Treatment

Beta Blockers

Primidone
Tardive Dyskinesia

Effect of Long term antipsychotics
Involves Lips, tongue, face, and neck
Can affect limbs

Treatment
   Exchanging the dopamine antagonist antipsychotic
Neuroleptic Malignant Syndrome

Response to antipsychotics
Dopamine Receptor Blockade
Fever - can be as high as 106
Rigidity
Increased CPK
Altered mental status

Treatment:
- Remove drugs
- Supportive therapy
- Dantrolene/Bromocriptine/Amantadine
Tic Douloureux

Hemifacial spasm
Pain
Trigeminal neuralgia
80% have basilar artery affecting the facial n.
Treatment: Carbamazepine/Surgery
Headaches, Motor Disorders, Amyotrophies

Other:

Gilles de la Tourette - Neuroleptics - Risperdal/Geodon
Torticollis - Botulinum toxin
Meige Syndrome:
   Bilateral blepharospasm with lip/mouth involvement
Creutzfeldt-Jakob disease
   Myoclonus with dementia/brain biopsy/no tx
   Sudden onset
Headaches, Motor Disorders, Amyotrophies

Seizures

Excessive abnormal discharges of electrical activity in CNS

Epilepsy is a syndrome of recurrent episodes of seizure activity

Two Types:
- Partial-
- Generalized-
Partial Seizures
Also known as Focal or Local Seizures
Seizure activity occurs in a specific area
Sensory Phenomena
Autonomic manifestations
Psychic manifestations
Headaches, Motor Disorders, Amyotrophies

Generalized Seizures

**Absence:**
- Sudden
- Brief motor activity
- Blank Stare
- Unconsciousness

**Myoclonic:**
- Sudden
- Uncontrollable
- Jerking of single or multiple muscle groups
- Unconsciousness
- Confusion postictally
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Tonic Clonic Seizure - *Grand Mal*

May or May not have an Aura

Sudden loss of consciousness

Tonic Phase

- abrupt increase in muscle tone and contraction

Clonic Phase

- Rhythmic muscular contraction and relaxation
Headaches, Motor Disorders, Amyotrophies

Status Epilepticus
  Continuous seizures

Complex Partial Seizure
  Purposeless repetitive activities
  Evolves to secondary generalized
## Table 1. Principal Types of Seizures.

<table>
<thead>
<tr>
<th>Type of Seizure</th>
<th>Clinical Features</th>
<th>Electroencephalographic Features*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple partial seizures (focal)</td>
<td>Signs and symptoms may be motor, sensory, autonomic, or psychic, depending on the location of the electrical discharge; consciousness is not impaired.</td>
<td>Focal slowing or sharp-wave activity, or both</td>
</tr>
<tr>
<td>Complex partial seizures (temporal lobe or psychomotor)</td>
<td>Seizure may begin with no warning or with motor, sensory, autonomic, or psychic signs or symptoms; consciousness is impaired; automatisms (automatic acts of which the patient has no recollection) may occur; seizure is often followed by a period of confusion.</td>
<td>Focal slowing or sharp-wave activity, or both</td>
</tr>
<tr>
<td>Secondarily generalized partial seizures (tonic–clonic, or grand mal)</td>
<td>Seizures may begin with motor, sensory, autonomic, or psychic signs or symptoms; consciousness is lost, with tonic increase in muscle tone; subsequent rhythmic (clonic) jerks subside slowly; patient is comatose after seizure and recovers slowly; tongue biting or incontinence, or both, may occur</td>
<td>Focal slowing or sharp-wave activity, or both</td>
</tr>
<tr>
<td>Generalized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absence seizures (petit mal)</td>
<td>Seizure begins rapidly, with a brief period of unresponsiveness (average, 10 seconds) and rapid recovery; there may be increased or decreased muscle tone, automatisms, or mild clonic movements. Seizure can be precipitated by hyperventilation; age at first seizure, 3–20 yr</td>
<td>Spike–wave pattern (3 Hz)</td>
</tr>
<tr>
<td>Primarily generalized tonic–clonic seizures (grand mal)</td>
<td>Loss of consciousness occurs without warning or is preceded by myoclonic jerks; clinical features are similar to those of a secondarily generalized partial seizure</td>
<td>Spike–wave pattern (3–5 Hz)</td>
</tr>
</tbody>
</table>

*The electroencephalographic features listed are those observed on routine electroencephalography during which a seizure does not occur.
The Normal Thalamocortical Circuit and EEG Patterns during Wakefulness, Non-Rapid-Eye-Movement (Non-REM) Sleep, and Absence Seizures
Headaches, Motor Disorders, Amyotrophies

MYOPATHIES
  Hereditary/Congenital

  Metabolic

  Inflammatory

  Toxic
Headaches, Motor Disorders, Amyotrophies

Work up for Myopathy

CK with isoenzymes
Electrolytes, calcium, magnesium
Serum myoglobin
Serum creatinine and BUN
Urinalysis:
  Myoglobinuria is indicated by positive urinalysis with few RBCs on microscopic evaluation.
Complete blood count
Erythrocyte sedimentation rate
Thyroid function tests
Liver Functions
EMG
Age appropriate cancer screening
Specific Genetic testing- Cadisil, MELAS, etc
# Differences Between McArdle Disease and CPT Deficiency

<table>
<thead>
<tr>
<th></th>
<th>McArdle Disease (glycogenosis V)</th>
<th>CPT Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic defect</td>
<td>Glycogen storage</td>
<td>Lipid storage</td>
</tr>
<tr>
<td>Exercise</td>
<td>Usually cramps with short strenuous exercise</td>
<td>Usually myalgia and tenderness (without cramps) with prolonged exercise, worse with fasting</td>
</tr>
<tr>
<td>Second-wind phenomenon</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>Recurrent myoglobinuria</td>
<td>Less frequent (50% of patients)</td>
<td>Common</td>
</tr>
<tr>
<td>CK at rest</td>
<td>Increased</td>
<td>Normal</td>
</tr>
<tr>
<td>Ischemic forearm exercise test</td>
<td>Absence of normal increase in lactate level</td>
<td>Normal</td>
</tr>
<tr>
<td>Muscle biopsy</td>
<td>Usually shows glycogen accumulation</td>
<td>May be normal</td>
</tr>
<tr>
<td>Gene location</td>
<td>Band 11q13</td>
<td>Band 1p32 (CPT II)</td>
</tr>
</tbody>
</table>
Headaches, Motor Disorders, Amyotrophies

Duchenne Muscular Dystrophy

X linked
Progressive weakness
Begins at 2 until young adult
Weakness: proximal > distal
Elevated CPK
No treatment
Headaches, Motor Disorders, Amyotrophies

Myotonic Dystrophy
Inherited neuromuscular disorder
Autosomal dominant
Symptoms-
  Weakness
  Sleep apnea
  Cardiac conduction defects
  Mitral valve prolapse
  Testicular atrophy
Headaches, Motor Disorders, Amyotrophies

Mitochondrial

Mitochondrial myopathy (MELAS)
Inherited maternal
Defect of the mitochondria
Lactic acidosis
Muscle weakness/ptosis/neurological
Cardiomyopathy - arrhythmias
Liver/Kidney problems
Stroke before 40
Red ragged fibers on biopsy
Headaches, Motor Disorders, Amyotrophies

Metabolic

Addison disease, particularly when fluid and electrolyte problems are present
Cushing disease
Hypothyroidism (CK may be mildly elevated)
Hyperthyroidism (CK may be normal)
Hyperparathyroidism
Conn Syndrome
**Periodic Paralysis:**
Normokalemic paralysis causes the **most severe and prolonged** attacks.
Patients usually feel well between attacks, but some have myotonia or residual weakness after repeated episodes.
Acute hypokalemic periodic paralysis may be primary (ie, familial) or secondary to excessive renal or GI losses or endocrinopathy.
Intracellular shift of potassium depolarizes the cell membrane rendering it inexcitable and no muscle contraction can occur.
**Familial periodic paralysis** usually occurs in Caucasian males, is autosomal dominant, and may last as long as 36 hours.
Attacks usually **occur at night or in early morning** upon awakening and can be precipitated by a diet high in carbohydrates, rest following exercise, or glucose and insulin given intravenously.
Headaches, Motor Disorders, Amyotrophies

- **Inflammatory**
  - Dermatomyositis / Polymyositis
    - Proximal muscle weakness
    - EMG- myopathic changes consistent with inflammation
    - MRI- shows inflammatory component
  - **Responds to glucocorticoids**
  - Inclusion Body Myositis
    - Does NOT respond to steroids
    - BX shows vacuolar inclusions with eosinophils
Headaches, Motor Disorders, Amyotrophies

**Infections**

**Spirocentre**
- Lyme

**Bacterial**
- Staphylococcal,
- Tuberculosis,
- Clostridium

**Viral**
- HIV,
- Influenza,
- EBV,
- CMV,
- Coxsackie,
- Adenovirus
Headaches, Motor Disorders, Amyotrophies

Toxic

Ingestion of chemicals or pharmaceuticals:
ETOH
Statins/Fenofibrates
Steroids
AZT
Cocaine
Diuretics
Amiodarone
Colchicine
Myasthenia Gravis

Autoimmune- motor end plate disorder

Associated with thymomas

Diplopia and ptosis is common

Symptoms worsen as day progresses

Diagnosis:

- Anti-Acetylcholine receptor antibodies

  Tensilon test (while ptosis present)

Treatment:

- Anti-cholinesterase agents (mestinon)/ thymectomy

  In crisis- Plasma exchange/IVIG
Lambert-Eaton

Associated with Oat cell carcinoma
Autoimmune
Presynaptic peripheral nerves antibodies that causes acetylcholine release to decrease
Proximal muscle weakness
Dry mouth
Hyporeflexia- esp lower extremities
Treatment: Anti-cholinesterase agents