RLS and other Movement Disorders

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Hypnagogic Foot Tremor (HFT)

- Rhythmic movement of the feet or toes
- Occurs at transition between wake and sleep or during light NREM sleep.
- Relatively common and normal finding.
- No predisposing factors.
- Men and women equally affected.
- Most cases reported in persons with RLS or SRBD.
Most are unaware of the presence of HFT.

- PSG – pattern of brief, repeated activation of anterior tibialis in one leg.
- Minimum frequency 0.3 Hz, Maximum 4.0 Hz.
- Typical EMG bursts 300-700 milliseconds.
- Occur in a train of at least 4 movements.
Alternating Leg Muscle Activation

- ALMA consists of brief activation of the anterior tibialis in one leg in alternation with similar activation in the other leg during sleep or arousals from sleep.

- Unknown clinical manifestations.

- Identified in persons with SRBD or PLMs.

- 75% of persons in original series were on Antidepressants.
Alternating Leg Muscle Activation

- Prevalence uncertain.
- Mostly male.
- Ages 12 to 70 (mean 41 years).
- Use of antidepressants may increase risk.
- Minimum frequency of alternating EMG bursts 0.5 Hz, Maximum frequency is 3.0 Hz.
- Usually closely precedes or follows an arousal and gradually diminishes as sleep returns.
Differential Diagnosis for HST/ALMA

- Periodic Limb Movement Disorder
- Painful legs and moving toes.
- Parkinson Disease.
- Neuroleptic-induced akathisia.
- None of these conditions involves regular alternation between sides.
**Sleep Starts (Hypnic Jerks)**

- Sudden, brief, simultaneous contractions of the body or one or more body segments occurring at sleep onset.

- Motor activity often associated with a sensory component – impression of falling, or auditory (banging or crackling noises), or visual (flashing lights or hallucinations).

- Prevalence of 60-70%
Sleep Starts

* Universal component of the sleep onset process.
* Physiological mechanisms uncertain.
* PSG – occur during transitions from wakefulness to sleep
* EMG – brief 75 to 250 millisecond high amplitude potentials.
* Autonomic activation – tachycardia, tachypnea.
* Course is Benign.
Sleep Starts

- Affects all ages and both sexes.
- Frequency and severity can increase with:
  1. excessive caffeine or other stimulants.
  2. prior intense physical work or exercise.
  3. sleep deprivation.
  4. emotional stress.
Excessive Fragmentary Myoclonus

- Largely incidental PSG finding on EMG.
- Characterized by small movements of the corners of mouth, fingers, or toes, or no visible movement at all.
- No known clinical consequence.
- Large limb movements across large joint spaces not characteristic (excludes EFM)
Excessive Fragmentary Myoclonus

- NREM phenomenon
- Resemble the phasic twitches seen in normal REM sleep.
- Isolated, brief (75-150 milliseconds), asymmetrical, asynchronous EMG potentials,
- Often appear at sleep onset and continue thru NREM sleep stages including SWS.
Excessive Fragmentary Myoclonus

- Benign and non-progressive.
- May be sole abnormality in EDS.
- Has been described with: OSA, primary Central Sleep Apnea, sleep related hypoxemic/hypoventilation syndromes, narcolepsy, PLMD, an various causes of insomnia.
- Strong predominance in males.
- No treatment.
Restless Legs Syndrome

* Diagnostic Criteria (A-C must be met)

A. Urge to move the legs, usually
   
   accompanied by or thought to be caused
   
   by uncomfortable and unpleasant
   
   sensations in legs. Symptoms must:
   
   1. begin or worsen during periods of rest
      
      or inactivity.
   
   2. partially or totally relieved by movement.
   
   3. occur exclusively or predominantly in the
      
      evening or night rather than during day.
Restless Legs Syndrome

* Diagnostic Criteria

  B. Above features are not solely accounted for as symptoms of another medical or a behavioral condition.

  C. Symptoms of RLS cause concern, distress, sleep disturbance, or impairment in mental, physical, social, occupational, educational, behavioral, or other important areas of functioning.
Restless Legs Syndrome

- Sensorimotor disorder characterized by a complaint of a strong, nearly irresistible urge to move the legs.
- 21-57% of individuals also describe some arm sensations.
- 50% express the RLS sensations as painful.
RLS - Demographics

* Overall prevalence estimated at 5-10% in European and North America population.
* Prevalence twice as high in females.
* Prevalence increases with age up to 60-70 yrs.
* Pediatric prevalence rates are 2-4% in UK/US.
* Adolescents are more likely to have moderate to severe RLS symptoms than younger kids.
* Boys are affected as often as girls.
RLS – Pathology and Pathophysiology

- Brain iron deficiency.
  - Iron important in brain dopamine production and synaptic density
- CNS dopamine regulation.
- Genetics
  - Association of gene variants BTBD9, MEIS1, MAP2K5/LBXCOR and PTPRD.
RLS – Associated Features

- Sleep onset and maintenance insomnia
- Daytime fatigue.
- Excessive Daytime Sleepiness.
- Epworth Sleepiness Scale usually normal range.
- Increase prevalence of mood and anxiety disorder
- Increase rates of ADHD (25% RLS patients have ADHD and conversely, 12-35% of those with ADHD have RLS).
RLS – Precipitating Factors

- Iron deficiency.
- Medications.
- Pregnancy.
- Chronic renal failure.
- Prolonged immobility
RLS – Exacerbating Factors

- Limited or contradictory evidence for:
  1. sleep deprivation.
  2. peripheral neuropathy.
  3. radiculopathy.
  4. pain.
  5. caffeine.
  6. tobacco.
  7. alcohol.
RLS – Onset and Course

* Onset occurs at all ages.

* Mean age of onset for familial RLS is third or fourth decade (prior onset before 21 in about 1/3 of cases).

* In early onset RLS (before age 45)- SLOW progression in 2/3 of cases; other 1/3 stable over time.

* In late onset RLS – RAPID progression is typical and aggravating factors are common.
RLS - Complications

- Significant impairment of health related quality of life.

- Major disease burden demonstrated to be similar to or worse than that associated with:
  - osteoarthritis
  - CHF
  - depression
  - Parkinson disease
  - stroke
RLS – Other Medical Conditions with greater than chance association

- Narcolepsy
- Migraine
- COPD
- Parkinson disease
- Multiple Sclerosis
- Peripheral Neuropathy
- OSA
- Diabetes Mellitus
- Fibromyalgia
- Rheumatoid Arthritis
- Obesity
- Thyroid disease
- Heart disease
Medications that may precipitate or aggravate RLS and/or PLMS

- Sedating antihistamines.
- Centrally active dopamine receptor antagonists.
- Most antidepressants
- Exception – bupropion with its dopamine promoting activity.
Periodic Limb Movement Disorder

Diagnostic Criteria (A-D must be met)

A. PSG demonstrates PLMS as per AASM criteria.

B. Frequency is > 5/hour in children or > 15/hour in adults.

C. PLMS cause clinically significant sleep disturbance or impairment in mental, physical, social, occupational, educational, behavioral, or other important areas of functioning.

D. PLMS not better explained by another sleep disorder, medical or neurological disorder, or mental disorder.
Periodic Limb Movement Disorder

- Characterized by periodic episodes of repetitive, highly stereotyped limb movements that occur during sleep.
- Occur most frequently in lower extremities.
- Extension of the big toe, partial flexion of ankle, knee and sometimes hip.
- An arousal may precede, coincide or follow... suggesting a central generator may give rise to both the periodic limb movements and related sleep disturbance.
PLMD

- Clinical history of sleep onset problems, sleep maintenance problems, or unrefreshing sleep attributable to PLMS needed for PLMD.
- Newer data do not find significantly elevated ESS scores or MSLT values in PLMS.
- PLMS index should exceed 5/hour in children and 15/hour in adult cases for a DX of PLMD.
Predisposing and Precipitating factors

- Positive family history of RLS confers increase risk for PLMS and PLMD.
- Genetic variants.
- Medications
  - SSRI antidepressants
  - Tricyclic antidepressants
  - Lithium
  - Dopamine receptor antagonists
PLMD – Higher rates

- Mood disorders
- Anxiety
- Attention deficits
- Oppositional behaviors
- Parasomnias
- In children with PLMD – FH of RLS common.
- Sustained clinical response to dopaminergic therapy supportive of diagnosis of PLMD.
Increase rates of PLMS

- Multiple system atrophy
- Dopa-responsive dystonia
- Sleep related eating disorder
- Spinal cord injury
- End stage renal disease
- CHF
- Parkinson disease
- Sickle cell disease
- PTSD
- Asperger syndrome
- Williams syndrome
- Multiple sclerosis

PLMD is a diagnosis of exclusion.
Objective findings in PLMS

- PLMS can appear immediately with onset of stage N1, frequent in stage N2, decrease in frequency in stage N3 and absent during stage REM.

- Anterior tibialis EMG shows repetitive contractions lasting 0.5 to 10 seconds.

- Self reports, bed partner observations or parental reports for children have not been found to have sufficient specificity or sensitivity to replace objective testing for PLMS.
Objective Findings - PLMS

- PLMS may be associated with cortical arousals or awakenings.
- Autonomic arousals – change in heart rate or blood pressure – more frequent than cortical arousals.
- In some cases, periodic arousals may persist even though PLMS have subsided.
- Leg actigraphy has been validated against PSG for measurement of PLMS.
Sleep Related Legs Cramps

- Diagnostic Criteria (A-C must be met)
  A. Painful sensation in the leg or foot associated with sudden, involuntary muscle hardness or tightness.
  B. Painful muscle contraction occur during time in bed.
  C. Pain relieved by forceful stretching of the affected muscles.
Sleep Related Bruxism

- Diagnostic Criteria

A. Presence of regular or frequent tooth grinding occurring during sleep.

B. Presence of one or more of the following:

1. Abnormal tooth wear consistent with above reports of tooth grinding during sleep.

2. Transient morning jaw muscle pain or fatigue; and/or temporal headache; and

or jaw locking upon awakening.