Evaluation of sleep disorders

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Agenda

- Essential elements of history
- Relevant medications
- Choice of further sleep test
Essential Elements of Sleep History

• Onset
  • “I have always been a bad sleeper”
  • “I have been snoring in the last couple years”

• Associated symptoms
  • My typical question: “what else started then?”
  • “I was a bad sleeper in college, when I also had to work evenings as a bar-tender. My life is more regular now, but I still can’t sleep”
  • “I have been snoring since I broke my ankle. On further thought, I’ve also gained weight since that time”

• Associated movements
  • “I have had leg movements…. I am like a fish out of water....”
Pertinent medications to ask for

- Antidepressants – for those with movements associated with sleep, also for insomnia/hypersomnia
- Muscle relaxants
- Antianxiety treatment
- Beta-blockers (sometimes associated with insomnia or nightmares)
Sleep History is Four - Dimensional

- Bedtime (means in bed, lights out)
- Wake-time (means out of bed, active)
- Awakenings
  - number
  - difficulty reinitiating sleep
- Daytime activity
  - Overall activity level (active vs. sedentary)
  - Exercise pattern (quality and time)
  - Habits (smoking, caffeine and alcohol)
- Sleep regularity
Essential Relevant Elements of the Exam

- BMI, BP
- Face, i.e., micro-, retrognathia
- Neck circumference
- Airway
- Extra-pyramidal symptoms (i.e. tremor, bradykinesia, postural reflexes)
Tests Available

- PSG - polysomnogram
- PSG+PAP titration
- HST – home sleep apnea test
- MSLT – multiple sleep latency test
- MWT – maintenance of wakefulness test
- Extended EEG
PSG - polysomnogram

- Gold standard for overnight evaluation
- Screens for a variety of sleep disorders
- Performed in a laboratory
- Continuous video monitoring allows direct observation and in some circumstances – treatment
- Allows a good evaluation of
  - Obstructive sleep apnea
  - Central sleep apnea
  - Periodic limb movements of sleep
  - REM sleep behavior disorder
  - Overall sleep architecture
- Convenient
- Expensive
The image shows a sleep study graph with various metrics recorded over time. The graph includes:

- **Page Scheme**: The graph is labeled with different sections and metrics for analysis.
- **Setups**: Different setups are indicated, including CPAP, SaO2, EtCO2, and pH.
- **Episodes**: Multiple episodes are marked, each with specific times.
- **Sleep Stages**: Stages are differentiated with bar graphs showing transitions between stages.
- **Oxygen Saturation**: Oxygen saturation levels are plotted over time, showing fluctuations.
- **Body Position**: Body position is indicated with different symbols for asleep, lying down, and sitting.

The data appears to be comprehensive, providing detailed insights into sleep patterns, oxygen levels, and body posture throughout the night.
PSG with extended EEG

- Indicated if focal seizures are suspected
- Standard EEG – 10-20 electrodes
- PSG – otherwise as usual
- Video-monitoring: best with high definition, as details (i.e. eye movements, subtle mouth movements) are important to visually evaluate)
MSLT – multiple sleep latency test

- Gold standard for the evaluation of suspected narcolepsy or other hypersomnia of central origin
- Performed after PSG (which confirms adequate sleep and lack of major sleep disorders)
- Five nap opportunities
- Each 20 min
- Measures sleep latency (mean time until first sleep epoque from all 5 naps)
- Presence of SOREM
1. The MSLT consists of five nap opportunities performed at two hour intervals. The initial nap opportunity begins 1.5 to 3 hours after termination of the nocturnal recording. A shorter four-nap test may be performed but this test is not reliable for the diagnosis of narcolepsy unless at least two sleep onset REM periods have occurred.

2. The MSLT must be performed immediately following polysomnography recorded during the individual’s major sleep period. The use of MSLT to support a diagnosis of narcolepsy is suspect if TST on the prior night sleep is less than 6 hours. The test should not be performed after a splitnight sleep study (combination of diagnostic and therapeutic studies in a single night).

3. Sleep logs may be obtained for 1 week prior to the MSLT to assess sleep-wake schedules.

4. Standardization of test conditions is critical for obtaining valid results. Sleep rooms should be dark and quiet during testing. Room temperature should be set based on the patient’s comfort level.
5. Stimulants, stimulant-like medications, and REM suppressing medications should ideally be stopped 2 weeks before MSLT. Use of the patient’s other usual medications (e.g., antihypertensives, insulin, etc.) should be thoughtfully planned by the sleep clinician before MSLT testing so that undesired influences by the stimulating or sedating properties of the medications are minimized. Drug screening may be indicated to ensure that sleepiness on the MSLT is not pharmacologically induced. Drug screening is usually performed on the morning of the MSLT but its timing and the circumstances of the testing may be modified by the clinician. Smoking should be stopped at least 30 minutes prior to each nap opportunity. Vigorous physical activity should be avoided during the day and any stimulating activities by the patient should end at least 15 minutes prior to each nap opportunity. The patient must abstain from any caffeinated beverages and avoid unusual exposures to bright sunlight. A light breakfast is recommended at least 1 hour prior to the first trial, and a light lunch is recommended immediately after the termination of the second noon trial.

6. Sleep technologists who perform MSLTs should be experienced in conducting the test.

7. The conventional recording montage for the MSLT includes central EEG (C3-A2, C4-A1) and occipital (O1-A2, O2-A1) derivations, left and right eye electrooculograms (EOGs), mental/submental electromyogram (EMG), and electrocardiogram (EKG).

8. Prior to each nap opportunity, the patient should be asked if they need to go to the bathroom or need other adjustments for comfort. Standard instructions for bio-calibrations (i.e., patient calibrations) prior to each nap include: (1) lie quietly with your eyes open for 30 seconds, (2) close both eyes for 30 seconds, (3) without moving your head, look to the right, then left, then right, then left, right and then left, (4) blink eyes slowly for 5 times, and (5) clench or grit your teeth tightly together.
9. With each nap opportunity the subject should be instructed as follows: “Please lie quietly, assume a comfortable position, keep your eyes closed and try to fall asleep.” The same instructions should be given prior to every test. Immediately after these instructions are given, bedroom lights are turned off, signaling the start of the test. Between naps, the patient should be out of bed and prevented from sleeping. This generally requires continuous observation by a laboratory staff member.

10. Sleep onset for the clinical MSLT is determined by the time from lights out to the first epoch of any stage of sleep, including stage 1 sleep. Sleep onset is defined as the first epoch of greater than 15 sec of cumulative sleep in a 30-sec epoch. The absence of sleep on a nap opportunity is recorded as a sleep latency of 20 minutes. This latency is included in the calculation of mean sleep latency (MSL). In order to assess for the occurrence of REM sleep, in the clinical MSLT the test continues for 15 minutes from after the first epoch of sleep. The duration of 15 minutes is determined by “clock time”, and is not determined by a sleep time of 15 minutes. REM latency is taken as the time of the first epoch of sleep to the beginning of the first epoch of REM sleep regardless of the intervening stages of sleep or wakefulness.

11. A nap session is terminated after 20 minutes if sleep does not occur.

12. The MSLT report should include the start and end times of each nap or nap opportunity, latency from lights out to the first epoch of sleep, mean sleep latency (arithmetic mean of all naps or nap opportunities), and number of sleep-onset REM periods (defined as greater than 15 sec of REM sleep in a 30-sec epoch).
MWT – Maintenance of wakefulness test

- Useful to objectively confirm ability to sustain wakefulness
- Typical use:
  - To evaluate if a worker in alertness sensitive profession can safely return to regular work
  - To evaluate the effectiveness of treatment for hypersomnia
1. The 4-trial MWT 40-minute protocol is recommended. The MWT consists of four trials performed at two hour intervals, with the first trial beginning about 1.5 to 3 hours after the patient’s usual wake-up time. This usually equates to a first trial starting at 0900 or 1000 hours.

2. Performance of a PSG prior to MWT should be decided by the clinician based on clinical circumstances.

3. Based on the Rand/UCLA Appropriateness Method, no consensus was reached regarding the use of sleep logs prior to the MWT; there are instances, based on clinical judgment, when they may be indicated.

4. The room should be maximally insulated from external light. The light source should be positioned slightly behind the subject’s head such that it is just out of his/her field of vision, and should deliver an illuminance of 0.10-0.13 lux at the corneal level (a 7.5 W night light can be used, placed 1 foot off the floor and 3 feet laterally removed from the subject’s head). Room temperature should be set based on the patient’s comfort level. The subject should be seated in bed, with the back and head supported by a bedrest (bolster pillow) such that the neck is not uncomfortably flexed or extended.
5. The use of tobacco, caffeine and other medications by the patient before and during MWT should be addressed and decided upon by the sleep clinician before MWT. Drug screening may be indicated to ensure that sleepiness/wakefulness on the MWT is not influenced by substances other than medically prescribed drugs. Drug screening is usually performed on the morning of the MWT but its timing and the circumstances of the testing may be modified by the clinician. A light breakfast is recommended at least 1 hour prior to the first trial, and a light lunch is recommended immediately after the termination of the secondnoon trial.

6. Sleep technologists who perform the MWT should be experienced in conducting the test.

7. The conventional recording montage for the MWT includes central EEG (C3-A2, C4-A1) and occipital (O1-A2, O2-A1) derivations, left and right eye electrooculograms (EOGs), mental/submental electromyogram (EMG), and electrocardiogram (EKG).

8. Prior to each trial, the patient should be asked if they need to go to the bathroom or need other adjustments for comfort. Standard instructions for bio-calibrations (i.e., patient calibrations) prior to each trial include: (1) sit quietly with your eyes open for 30 seconds, (2) close both eyes for 30 seconds, (3) without moving your head, look to the right, then left, then right, then left, right and then left, (4) blink eyes slowly for 5 times, and (5) clench or grit your teeth tightly together.
9. Instructions to the patient consist of the following: “Please sit still and remain awake for as long as possible. Look directly ahead of you, and do not look directly at the light.” Patients are not allowed to use extraordinary measures to stay awake such as slapping the face or singing.

10. Sleep onset is defined as the first epoch of greater than 15 sec of cumulative sleep in a 30-sec epoch.

11. Trials are ended after 40 minutes if no sleep occurs, or after unequivocal sleep, defined as three consecutive epochs of stage 1 sleep, or one epoch of any other stage of sleep.

12. The following data should be recorded: start and stop times for each trial, sleep latency, total sleep time, stages of sleep achieved for each trial, and the mean sleep latency (the arithmetic mean of the four trials).
Home Sleep Test

- Three channels minimum
- No measure of sleep available
- Adequate for objective confirmation of obstructive sleep apnea
- Negative test does not rule out obstructive sleep apnea
- Cannot evaluate PLMS, RBD or other movement disorders or the possibility of nocturnal seizures