Ordering a Sleep Apnoea Test and the Basics of Interpretation

Sonam Solanki

As discussed in Chapter 1 identifying patients with symptom suggestive of sleep apnoea are key. Neck circumference increased, snoring, witnessed apnoeas, excessive daytime sleepiness, morning headache etc should all raise clinical suspicion of Sleep Apnoea. Once such a patient is identified, the objective way to evaluate it is to do a Polysomnography/ Sleep study. Electrodes are attached over night to a patient to record respiratory movements, nasal flow, oxygen saturation, electrocardiogram, EEG etc. There are various levels of sleep study done depending on the number of parameters to be checked and the pretest probability of sleep apnoea. Level I study is done in a hospital set up with sleep lab. Level II - IV study can be done at home.

Table 2. Screening and Diagnosis of Sleep Apnoea

Diagnosis Sleep-Study Options	Details	Sensitivity	Specificity	Comparison
Level I: complete polysomnography	Occurs in a laboratory with a technician present	NA	NA	Gold standard
Level II: complete polysomnography	Occurs outside of thelaboratory with no technician present	NA	NA	Gold standard
Level III: portable polygraphy	Procedure records airflow,respiratory effort, and oxygen saturation, but not sleep stages	79% and 97%	60% and 90%	Polysomnography
Level IV: overnight oximetry	Procedure records oxygen saturation with or without airflow	93%	5%[30,38]	Polygraphy
Questionnaire	eg. Epworth Sleepiness Scale[52]	32%[b] and 54%[c]	54%[b] and 65%[c30,38]	Polysomnography

[a]Specificity for this measure is across 2 different Apnoea Hypopnoea Index cutoffs.
[b]In patients with atrial fibrillation
[c]In the general population

Ideal test to do is Level I/II, but level III is done in a resource limited setting with high pretest probability of obstructive sleep apnoea and no major comorbidities. The main difference in the studies is whether it is attended by a sleep technician or not and on the number of channels recorded like EEG, ECG, nasal flow, oxygen saturation, respiratory movements etc. The results are then either manually or electronically analysed for specified definitions of respiratory events.

Titration Study - Once it is established by a polysomnogram that patient is suffering from sleep apnoea, titration study is needed. This is essentially the same parameters being studied with additional Continuous positive pressure (CPAP) or Bi level positive pressure (BiPAP) machine being attached. This is done on a second night and again

Clinical Associate, Department Of Chest Medicine, Bombay Hospital. 12 New Marine Lines, Mumbai - 400 020.

can be done either in hospital/ at home or attended/unattended. In some cases, split night study is done where 50% time sleep recording is done and if the technician establishes that patient has sleep apnoea, titration study is done for the remaining 50% of the time.

Special Instruction for sleep studies

1. Reassure that the electrodes are not painful attachments.
2. Can take all routine food and medications as usual.
3. Make sure the room is quite and ideal for sleeping even if it's a home sleep study. The longer you record, you will get clearer picture and patterns.
4. Plan to sleep by 10.30 pm for home sleep study when the technicians come so make sure the meals that evening are done and avoid extra liquid intake in the evening.
5. If you need to wake up to use the bathroom in the middle of the night, then you can disconnect the attachments and take the break.
6. A good recording is when at least 6-8 hours of sleep is recorded.

Interpretation of Sleep Study

1. Look at the recording time - number of hours recorded.
2. Sleep efficiency is another important parameter that refers to percentage of total time in bed spent in sleep.
3. Sleep latency is the time in minutes from 'lights out' that marks the starting of total recording time to the first epoch scored as sleep.
4. REM sleep - normal sleep contains approximately 25% of sleep time in REM. REM sleep is associated with more frequent and longer duration apnoeas, hypopnoeas, and severe hypoxaemia.
5. Sleep events - most commonly Apnoea Hypoapnoea Index (AHI) is recorded which is represented by the number of apnoea and hypopnoea events per hour of sleep.
6. Desaturation - minutes in the night when oxygen saturation went below 90%.
7. Titration - Once it is established that patient has sleep apnoea, titration study is ordered and the pressure required to bring the AHI < 5 is noted.

Definitions of Respiratory Events for Diagnostic Polysomnography

Apnoea: An event lasting ≥10 sec characterised by ≥90% reduction from pre-eent baseline in oronasal thermistor airflow. An apnoea is scored as:

Obstructive, if there is continued or increasing respiratory effort throughout the event
Central, if effort is absent throughout the entire event
Mixed if effort is initially absent, then resumes in the latter part of the event

There is no minimum desaturation or microarousal requirement for scoring of an apnoea.

Hypopnoea: An event lasting ≥10 sec characterised by a ≥30 reduction from pre-event baseline in peak nasal pressure inspiratory airflow that is associated with:

Definition 1A: Either a ≥3% reduction in arterial oxygen saturation (SO_2) pre-event baseline or a microarousal

Definition 1B: A ≥4% reduction in arterial SO_2 from pre-event baseline value

The hypopnoea is scored as obstructive if during the event there is any snoring, inspiratory airflow limitation, or paradoxical thoracoabdominal motion that was not present during pre-event breathing.

The hopopnoea is scored as central if none of the events described above is present.

Respiratory effort-related arousal (RERA): A sequence of breaths lasting ≥10 sec that does not meet criteria for apnoea or hypopnoea, which is characterised by increasing respiratory effort or inspiratory flattening of the nasal pressure flow signal leading to arousal.

Hypoventilation: An increase in PCO_2 to > 55 mm Hg for ≥10 min or PCO_2 increase ≥10 mm Hg above awake supine values to > 50 mm Hg for ≥10 min.

Adapted from Berry RB, Brooks R, Garmaldo CE, et al: The AASM manual for the scoring of sleep and associated events: rules, terminology and technical specifications, version 2.0, Darian, IL, 2013, American Academy of Sleep Medicine.

Severity of Obstructive Sleep Apnoea

AHI < 5 - Normal

AHI 5 - 15 - Mild Sleep Apnoea

AHI 15 - 30 Moderate Sleep Apnoea

AHI > 30 Severe Sleep Apnoea

Based on the OSA severity, co-morbidities, surgically correctible abnormalities, hypercapnia etc Surgical, CPAP, BiPAP management is advised to the patient. Details are described in the coming chapters.

References

1. Neil M Skjodt et al Approach to outpatient management of adult sleep apnea. Canadian family physician Oct 2008, 54 (10) 1408 - 1412;
2. Shrivastava D, Jung S, Saadat M, Sirohi R, Crewson K. How to interpret the results of a sleep study. J Community Hosp Intern Med Perspect. 2014;4(5):24983. Published 2014 Nov 25. doi:10.3402/jchimp.v4.24983
3. "Understanding the Results: Sleep Apnea". med.harvard.edu. Harvard Medical School, Harvard University. Retrieved 5 September 2014
4. Ruehland WR, Rochford PD, O'Donoghue FJ, Pierce RJ, Singh P, Thornton AT (1 February 2009). "The new AASM criteria for scoring hypopneas: impact on the apnea hypopnea index". Sleep. 32 (2): 150-7. PMC 2635578. PMID 19238801.^
5. Lee-Chiong TL, editor. Hoboken, NJ: John Wiley; 2006. Sleep: A comprehensive handbook.
6. Pressman MR. Boston: Butterworth Heinemann; 2002. Primer of polysomnogram interpretation.

A Controlled Trial of Erenumab for Episodic Migraine

We tested erenumab, fully human monoclonal antibody that inhibits the calcitonin gene-related peptide receptor, for the prevention of episodic migraine.

Erenumab administered subcutaneously at a monthly dose of 70 mg or 140 mg significantly reduced migraine frequency, the effects of migraines on daily activities, and the use of acute migraine-specific medication over a period of 6 months. The long-term safety and durability of the effect of erenumab require further study.

Peter J. Goadsby, Uwe Reuter, Yngwe Hallstrom, et al, The NEJM, 2017, Vol 377, 2123

Redefining Hypertension - Assessing the New Blood-Pressure Guidelines

While a blood-pressure treatment target of less than 130/80 mm Hg makes sense for high-risk patients, for everyone else it seems more reasonable to continue defining hypertension as a blood pressure of 140/90 mm Hg or higher.

George Bakris, Matthew Sorrentino, The NEJM, 2018, Vol 378, 497-499