Obstructive Sleep Apnea

- sleep is an active process
- Sleep was divided into 5 stages
- Sleep Stage Nomenclature
  - stage W : Wake (drowsiness)
  - Non REM : N1 N2 N3
  - stage R : REM
- we usually get 4-5 cycles of sleep during a good well sleep (each cycle is 90 minutes)
- Cycle : W - N1 - WN1 alteration - N2 - N3 - N2N3 alteration - long N3 phase (deep sleep) - N2N3 alteration - N2 - REM
- N3 is deep sleep not REM sleep
- dreams happen all through the cycle but tend to happen more in the REM sleep
- a nap (refreshing sleep) should be 30 minutes (because by then we entered N3) or 90 minutes (the whole cycle)
- Parasomnial disorders like sleep walking happen in non rem stages
- asleep children whose parents can change for them are in N3 but if they wake up and cant go back to sleep they were in N2
- Sleep is necessary for survival
  - Metabolic activity of the brain decreases significantly after 24 hours of sustained wakefulness
  - A decrease in immune system function as measured by white blood cell count
  - Impairment of memory and physical performance and reduced ability to carry out mathematical calculations
  - Release of growth hormone in children and young adults takes place during deep sleep (important for growth)
  - Can cause increased heart rate variability : arrhythmias
- Polysymnography PSG
  - we use leads mainly in the center of the brain and im the occipital part
  - other leads
    - therm : air temperature that we breath in and out (normally wavy)
    - MSnore : records snoring (normally flat line)
    - LEOG and REOG : right and left extraoccular ground which detect eye movement
    - THO and ABD : thorax and abdomen movement (normally minimal thoracic movement with moderate abdominal movement)
    - pO2
- Obstructive sleep apnea OSA is a disorder that is characterized by obstructive apneas,

hypopneas, and/or respiratory effort-related arousals caused by repetitive collapse of the upper airway during sleep causing acute disruptions to blood oxygen levels, heart rate, blood pressure, intrathoracic pressure and sleep quality

- causes : obesity / hormonal effects like menopause / alcohol / smoking / tonsilar enlargement / hypothyroidism and acromegaly
- the main muscle affected is the tongue
- more common in men
- sleep apnea cycle : sleep - apnea - hypoxia - sympathetic activation - arousal (either to N1 or W) - ventilation
- Mallampati score : 1-4 levels of oral cavity space and Each unit increase in score has the odds of having OSA by 2.5
- Symptoms
  - depression
  - restless sleep
  - sleepiness (to the point of narcolepsy)
  - dry mouth
  - headache
  - forgetfulness
- Diseases associated with OSA
  - ADHD
  - Alzheimer
  - strokes
  - diabetes
  - heart failure
  - hypertension and CAD and AFib
  - GERD
  - Obesity
- Diagnosis
  - Polysymnography PSG
  - Home sleep test
  - Oximetry
- Polysomnogram PSG findings
  - Nasooral flow : interruption (flat line)
  - THO : increased movement in apnea episode
  - ABD : paradoxical inward movement (inverted waves)
  - pO2 : gradual drop in O2 sat (50%) and the lowest point is AFTER the episode in cases of obstruction and in the middle in central apnea cases

    - ECG : bradycardia
- Scoring respiratory events
    - Apnea : 90% or more reduction in airflow or complete cessation of air flow for 10 seconds (Oxygen desaturation is not a criteria)
    - Obstructive apnea : Apnea with evidence of continued respiratory effort (Chest movement persists)
    - Central apnea : Apnea with absent respiratory effort (No chest movement)
    - Hypopnea : decreased flow more than 30% from baseline for at least 10 seconds with 3% O2 desaturation OR arousal
- Sleep efficiency & latency
    - latency : the time the patient needs to fall asleep
    - efficiency : the time of sleep
    - Normal is 80% efficiency
- Apnea Hypopnea Index AHI
    - AHI = (# apneas + # hypopneas) / sleep hours
    - AHI < 5: normal
    - AHI 5 – 15 :mild
    - AHI 15 –29 :moderate
    - AHI 30 or above : severe
- Respiratory Disturbance Index RDI
    - RDI = (# apneas + # hypopneas + # Respiratory effort related arousal RERAs) / sleep hours
    - RERA : a change in EEG indicating arousal but the patient didnt actually wake up
    - RDI is usually greater or equal to AHI
- Cheyne Stokes Breathing
    - crescendo decrescendo changes in tidal breathing which sandwich central apneas
    - episodes for normal breathing sandwiched between central apneas
- Treatment
    - Weight loss
    - avoid sedatives and alcohol
    - Stop smoking
    - CPAP (continuous positive airway pressure)
    - Surgery
    - Dental appliances
- Obesity hypoventilation syndrome OHS
    - a combination of obesity (body mass index ⩾30) AND daytime hypercapnia (pCO2 ⩾45 mmHg) occurring in the absence of an alternative neuromuscular, mechanical

or metabolic explanation for hypoventilation

- can lead to Pulmonary hypertension
- They usually have HTN or DM
- The prevalence of OHS is similar in men and women
- 90% of patients with OHS have OSA defined by AHI ⩾5