**Sleep Disordered Breathing**

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Primary Snoring (without OSA). 60% men after 40. Commonly precedes OSA and becomes OSA after age 40.

Snoring isn’t benign- positive correlation between snoring and cardiovascular disease and HTN.

Smoking and obesity are major risk factors for snoring and OSA

Upper Airway Resistance Syndrome (UARS)

Definition – AHI <5, 5 or more RERAs per hour and minimum oxygen desaturation level greater than 92%.

* separate entity from OSA
* increased respiratory effort with frequent microarousals
* Hypo or non responsiveness to upper airway collapse in OSA vs. UARS where pts. Have hyperresponsiveness to negative pharyngeal pressure and responded to more quickly, resulting in lack of obstruction. This causes a release of cathcholamines creating a flight or flight response all night.
* Common in normal weight women
* Patients commonly present with a functional somatic syndrome

Upper airway resistance

* Hypothyroidism
* deviated septum
* enlarged nasal turbinates
* hypertrophied tonsils and adenoids
* micrognathia
* retrognathia
* macroglossia
* obesity

Conditions associated with non-restorative sleep

* Somatic syndromes, ie fibromyalgia, Chronic Fatigue Syndrome, headache, irritable bowel syndrome, Burning mouth syndrome, anxiety.
* Growth hormone (responsible for muscle regeneration and homeostasis) is low in this population. It is secreted primarily in Stage 4 NREM sleep. Therefore with disturbance of sleep, there is an increase of muscle pain. Similar problem with serotonin.
* Menopause – decrease in estrogen and progesterone. Estrogen receptors in upper airway musculature result in muscles losing their tone.

Sleep – Pain Link is bi-directional

* Pain creates sleep disturbances
* Sleep disturbances cause or modulate acute and chronic pain

Palma J. Sleep Medicine 2013; epub.

Normal Sleep:

90 minute sleep cycle

REM sleep – Dream or paradoxic sleep, lightest level of sleep

REM less prevalent in early stages of sleep and increases as the night progresses

20-25% of normal sleep

Generally emerges during Stage 2 sleep

Maintained into old age

Rapid eye movement is not always present and this can be restorative sleep

2 phases- REM and non-REM

4 Stages of non-REM sleep

* Stage 1 is transitional (light sleep) and comprises 5%
* Stage 2 is also light sleep and comprises 50%; dreaming may occur but not vivid and aren’t remembered. Can’t be easily aroused.
* Stage 3 and 4 lumped together in Delta Sleep (Slow Wave Sleep) 20%. Restorative sleep. Decreases with age; may be absent by age 60.

Bailey D. Sleep disorders – Overview and relationship to orofacial pain. Dental Clinics of North America 1997;41 (2): 189-209.

OSA –

Definition – complete upper airway obstruction lasting longer than 10 seconds with an associated 4% oxygen desaturation.

OSA first described by 2 groups in Europe in 1965. It was ignored in US until the 1970s.

OSA- 2-6% of population, more in men. Increases in women after menopause.

Sleep Bruxism

* occurs primarily in Stage 2 sleep and REM
* Increases with alcohol consumption
* Any drug that inhibits Delta Sleep increases bruxism ( supports idea to that bruxism is mediated by central nervous system)
* In children, the primary reason for bruxism is related to airway obstruction (allergies, adenotonsillar hypertrophy). They also manifest attention deficit, hyperactivity, enuresis, deficits in school performance.

Bruxism Triad (Rouse, J)

* Sleep disordered breathing
* Reflux disease
* Bruxism

Nasal vs. Mouth Breathing

* 2.5x increase in upper airway resistance during sleep when mouth breathing vs. nasal breathing
* Obstsructive apneas and hypopneas more frequent when mouth breathing

(AHI 43) vs. nasal breathing (AHI 1.5)

- Nasal Strips and mouth taping may be helpful

Fitzpatrick MF, et al. Europ Resp J 2003;22:827

Effect of traditional occlusal splints on OSA

* 10 mild to moderate OSA patients, PSG with and without splint.
* 6 patients had increased AHI/RDI with splint, one was improved

Gagnon Y, et al. Int J Prosthodon 2004;17:447.

CPAP has been shown to decrease and in some cases eliminate nocturnal bruxism, probably by eliminating the need for airway protection that bruxism provides.

Oksenberg A, Arons E. Sleep Med 2002;3:513

Simmons J, Prehn R. APSS Poster presentation 2013.

GERD

- CPAP has been shown to decrease GERD, probably by decreasing intrathoracic pressure and increasing esophageal pressure.

- Reflux is a 24/7 problem so nighttime treatment alone will not cure it.

Yang YX et al. Eur J Gastronenterology Heptal 2013, epub 1-7.

No systemic review has found evidence to indicate that occlusal adjustment leads to a greater degree of TMD resolution than placebo adjustment.

List T, Axelsson S. Management of TMD: Evidence from systemic reviews and meta-analyses. J Oral Rehabilitation 2010; 37(6): 430-451.

Malocclusions that positively correlate with TMD are unilateral crossbite, deep bite, increased overjet, and anterior open bite.

Leite R. et al. Relationship between temporomandibular disorder and orthodontic treatment: A literature review. Dental Press J Orthodontics 2013;18(1): 150-157.

**Childhood Prevention**

2-3% children has OSA (many more including UARS), peak age 2-8 years. Incidence is increase with increase in childhood obesity.

Delays in treatment leads to decline in cognitive function and decreased academic performance

Cardiovascular morbidity has been conclusively reported in children with OSA

Enlarged adenotonisillar tissue plus mouth breathing, bruxing, and/or snoring in children DICTATES further diagnostic tests

Bhattacharjee R. et al. Obesity and obstructive sleep apnea syndrome in children: A tale of inflammatory cascades. Pediatric Pulmonology 2011; 46:313-23.

69 Subjects, 2-12 years old, large tonsils and adenoids, 100% habitual snoring

Intervention: T&A removal

Results: 45.6 % had sleep bruxism pre-op

11.8 % had sleep bruxism post-op

DiFrancesco R. et al. Int J Pedi Otolaryng 2004;68:441.

Effect of RPE on Nasal Complex

* 140 Children – 5-9 years
* Maxillary constriction
* Bilateral posterior crossbite
* Deviaged septum at least 1 mm

Intervention

* 100 had Hyrax expander
* 40 control no treatment

Results at 1 year

* With expander 3.7 mm increase in length of septum and 94% decreas in septum deviation
* Control group no change

Farronato G. et al Minerva Stomotol 2012;61:125-34

Craniofacial Growth Changes in Baby Monkies

* Study group, plugged noses with silicone inserts
* Control group, untreated

Results in study group

* Study group had following growth changes
* Narrow maxillas
* High arched palates
* Elongated and downward rotation of the mandible
* Malocclusion and malposition of the mandible
* After removal of nasal plugs, lip and tongue returned to normal positions, but malocclusion did not correct
* Harvold, et al. AJODO 1981;79(4): 259.

Strong statistical significance between the RDI (arousals) and the presence and severity of bruxism.

Pediatric sleep-related tooth wear can be utilized as a clinical marker for pediatric SDB.

Singh N, et al. Poster 015, AADSM, 2012.

T & A and RPE – What Order?

* 32 children – mean age 6.5 years
* Preop PSG average AHI – 11.8

Group 1 – T & A and then RPE

Group 2 - RPE then T & A

PSG between treatments and at conclusion

Results:

1. Only 1 child was cured with one treatment
2. 29 children cured after both treatments
3. 2 children improved but required further treatment

Guilleminault C, et al. Sleep Breath 2010.

Watchful Waiting – The ENT Way

What is the purpose of watchful waiting

* There is some danger with T & A
* T & A has no negative impact on the immune system

Santos FP, et al. Braz J Otolarygol 2013;7:28

Airway restriction absolutely alters growth

Nunes W, et al. Arch Otolaryngol Head Neck Surgery 2010;136:116