**•OSA:**
**Be Aware… or Beware!**
•2009 NCANA State Meeting
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**•Pretest Your OSA Knowledge**
True or False
Only those with sleep apnea have apneic episodes.
Answer:
False. Even healthy people have episodes of brief apnea during REM sleep.

**•Pretest Your OSA Knowledge**
True or False
Obesity is a ***the*** primary risk factor for OSA.
Answer:
False. *Morbid* Obesity is a strong contributing factor in OSA patients, but age, gender, ethnicity & neck circumference are all very strong factors.

**•Pretest Your OSA Knowledge**
True or False
OSA is more frequently identified in the primary care population than in the surgical population.
Answer:
False. OSA is substantially higher in specific surgical populations than in any other population. However, no epidemiological studies thus far to determine general surgical population prevalence.

**•Pretest Your OSA Knowledge**
True or False
If a patient has a confirmed diagnosis of OSA & has been fitted for nasal CPAP, his anesthetic course will be less risky.
Answer:
False. If a patient is prescribed CPAP, but does not use it routinely, he is at the same risk as one that does not use CPAP at all.

**•Pretest Your OSA Knowledge**
True or False
If an OSA patient is allowed to awake completely from a general anesthetic before extubation, he is considered safe to send home from a "conventional" ambulatory surgery.
Answer:
Depends. If it is an airway surgery, no. If not, maybe. There is evidence to predict the risk of serious complications following airway surgery. There is also evidence describing serious complications following other types of surgery.

**•Objectives**
•Discuss the use of Sleep Studies in OSA diagnosis.
•Identify at least 3 signs/symptoms of OSA.
•Identify at least 3 risk factors associated with OSA.
•Discuss Upper Airway Mechanics: Normal vs OSA.
•Identify the 4 most important questions to ask when screening for OSA.
•Identify at least 3 suggested guidelines for peri-operative care of a known or suspected OSA patient.

**• Sleep Apnea**
•Central Sleep Apnea (CSA)
•Mixed Sleep Apnea (MSA)
**•Obstructive Sleep Apnea (OSA)**

**•Central Sleep Apnea**
Brain signal for breathing is delayed
•Multiple causes
•Seldom snore
•Require specific medications to stimulate breathing
•Rarely seen alone

**Mixed Sleep Apnea**
•OSA + CSA = MSA
•Treatment of snoring will not successfully treat problem
•Chronic OSA leads to MSA
•Obstructive Sleep Apnea

**•OSA History**
Dionysus: a tyrant
Alexander the Great period
4th Century BC
Obesity, hypersomnolence, snoring

**•OSA History**
Charles Dickens
In 1837, he wrote "The Posthumous Papers of the Pickwick Club" where he described an extremely obese boy named "Joe" who could not help falling asleep during the day.
Daytime Somnolence
"Pickwickian"

**•OSA History**
John Hunter & John Cheyne
1st documented in late 18th – early 19th century as respiratory arrhythmias & periodic breathing

**•OSA History**
William Stokes
OSA Relationship to CHF
Early 19th Century
Efforts with John Cheyne
"Cheyne-Stokes Respirations"
Periodic breathing: abnormal pattern of breathing characterized by oscillation of ventilation between apnea & hyperpnea, to compensate for changing serum partial pressures of $O_2$ & $CO_2$.

**•OSA History**
1956 Dr. C.S Burwell, et al.
published a case report titled, "Extreme Obesity Associated With Alveolar Hypoventilation, a *Pickwickian Syndrome*"
119 years after Dickens' novel…..

**•OSA History**
"Pickwickian Hypoventilation Syndrome"
•1973 Christian Guilleminault described & defined
*Sleep Apnea Syndrome*
•Syndrome's prevalence still disputed as late as 1981
(same year CPAP introduced)

**•OSA History**
•Escalated interest in OSA since 1990
•AANA distributed article for CE credits: 2004
•ASA developed guidelines for OSA management: 2006
(36 years after Guilleminault labeled OSA an official syndrome)
•Screening tools actively pursued by many: 2006>>>

Better late than never……..

**•Obstructive Sleep Apnea**
**Nighttime symptoms**
•Frequent arousals
•Non-restorative sleep
•Snoring (loud!)
•Witnessed apnea during sleep *
*Most important nighttime symptom

**•Obstructive Sleep Apnea**
**Daytime Symptoms**
§Difficult to arouse from daytime nap
§Inappropriate falling asleep during day*
i.e. Hypersomnolence

*Most important daytime symptom (+ headaches)
§Irritability
§MVAs

**•Diagnosing Sleep Apnea: OSAS/OSAHS**
|Gold Standard|
Polysomnography (PSG)
Overnight sleep events:
•Apneas (0 airflow > 10 sec)
•Hypopnea (> 50% decrease flow + 4% decrease $O_2$ sat)
•Events can be obstructive, central or mixed
•Respiratory Disturbance Index (RDI) or Apnea Hypopnea Index (AHI) = # of occurrences per hour (includes both periodic breathing & apnea episodes): measurement of severity

**Adult RDI (AHI)**
•0-5 none
•6-20 mild
•21-40moderate
•>40 severe*
**Pediatric RDI (AHI)**
•0 none
•1-5 mild
•6-10 moderate
•>10 severe

**•Causes/Risk Factors**
•Anatomical Characteristics
•Obesity BMI > 35 kg/$m^2$ (though +/- 50% are not)
•Snoring (lengthens soft palate)
•Smoking or exposure to 2nd hand smoke
•Family history of OSA
•Ethnicity
•Gender

**•Causes/Risk Factors**
Today's Sleep-Disordered
•Middle-aged diabetic with systemic hypertension
•Normotensive college students who are insomniacs
•Postmenopausal women with healthy lifestyles
•Stroke & epileptic patients with vascular disease

**•Causes/Risk Factors**
Today's Sleep Disordered
•Overactive adolescents participating in sports until late at night
•Neurological stimulated people with TVs in their bedrooms & bad sleep hygiene

•African Americans and Asians with OSA that is much more severe compared with Caucasians independent of age, sex & BMI

**•Other Causes/Factors**
**• Disorders/Syndromes**
•Hypothyroidism
•Acromegaly
•Amyloidosis
•Vocal cord paralysis
•Post-polio syndrome
•Neuromuscular disorders
•Marfan's Syndrome
•Down Syndrome

**•Associated Conditions ***
•Immune system abnormalities
•Severe GERD
•Hypertension (cardiac/pulmonary)
•CHF/CAD/MI
•Depression
•Diabetes

**•OSA: USA Silent Pandemic**
•16% of general pop ***documented*** (27% male/9% female)
•2-4% of US pop ***documented*** mod-severe OSA: men > women
**•<u>80-90% presumed undiagnosed!!!!</u>**
•Reasons :
•Poor awareness
•Lack of screening
•$$ & time related to sleep studies
•Studies vary: 7-34% OSA findings are based
on medical encounters & sleep lab findings
•Incidence increases with age (up to age 70-80)

**•OSA Research**
Anesthesiology 2006; 105: A988
•1898 consecutive surgical patients screened for OSA over 4 months using a questionnaire.
•24% (458) found to be at high risk for OSA
•23% (455) moderate risk
•Only 88 of the high risk group had prior DX of OSA.
•High risk patients used an ARES Unicorder® at home (portable device tested to be comparable to formal sleep study).
**•Overall results:**
•19% of adult surgical patients had OSA.

•15% of the patients at this institution had undiagnosed OSA, with severity increasing with the supine position.

**•A & P of Upper Airway**
The primary anatomical purpose of the human pharynx is speech, eating or breathing?
Answer:
Speech

**•A & P of Upper Airway**
•Increased **collapsibility** for **speech:** between posterior nasal passages & larynx
•Patency = Resistance
•Compliance = change in airway shape as lumen pressure changes from (+) to (-)

**•Collapsible Tube:**
**Not Quite Poiseuille's Law**

**•Starling Resistor Model**
**•Upper Airway Mechanics**

**•Treatment of OSA**
Weight loss: 10% can make a big difference!

**•Treatment of OSA**
•Nasal/Mask Continuous Positive Airway Pressure (CPAP)
•Oral appliances
•Surgery
•T&A
•Nasal/sinus surgery
•UPPP (uvulopalatopharyngoplasty) - removal of tonsils, adenoids if present, uvula & partial soft palate
•Gastric Bypass Procedure
•Future pharmaceutical treatments?

**•What About OSA & Anesthesia?**

**•Conflicting OSA Research**
Mayo Clinic Proc. 2001; 76:897-905
**•Objective:** to identify & assess impact of postoperative complications in patients with known or unrecognized OSA undergoing hip or knee replacement
•Retrospective, single academic institution, OSA diagnosed within 3 years of patient surgery: 101 OSA patients, 101 control patients
**•Results:**
•Complications in 39% of OSA patients vs. 18% control
•Serious complications occurred in 24% of OSA patients vs. 9% of control
•Significantly longer hospital stays for OSA patients (6.8 vs. 5.1 days)

•**Conflicting OSA Research**
Anesthesia & Analgesia 2003; 96:1328-1335
•**Questioned** whether OSA diagnosis is an independent risk factor for perioperative complications in patients undergoing non-ENT outpatient surgical procedures
•234 PSG-confirmed OSA patients between 1997-2000 in a large academic practice, same # matched controls
•**Results:**
•No significant difference in rate of unplanned hospital admissions (23.9% vs. 18.8%)*
•Nor other adverse events (2.1% vs. 1.3%)
•When admission did occur, generally unrelated to cardiac or respiratory event

•**What Do We Know For Sure?**
•Anesthetic case reports of morbidity & mortality involving OSA patients are rising & there is no clear evidence-based research to determine relationship between OSA & postoperative outcomes.
•Patients diagnosed with moderate to severe OSA are often noncompliant with their use of CPAP or oral appliances.
•UPPP for treatment of OSA is frequently done on an outpatient basis (23 hours or shorter stay).
•OSA patients, especially moderate to severe, are more susceptible to the negative effects of anesthesia, narcotic/sedatives & the supine position.
•OSA patients are more likely to be an airway mgmt issue.
•So…What do we do about it?

•**Be Aware!!**
•It is **VERY** likely that most people with OSA will **NOT** have a diagnosis in their medical record.
•Screen preoperatively for OSA with questions & observations to ascertain ***at-risk*** patients.
•Make yourself familiar with the 2006 ASA Practice Guidelines & all updates thereafter.
•Utilize the STOP-BANG Questionnaire.
•**Plan postoperative course with extreme caution!**

•**Effective Screening for OSA?**
•Epworth Sleepiness Questionnaire (least)
•Berlin Questionnaire (most)
•STOP Questionnaire (poor for severe)
•STOP-BANG Questionnaire ** (best for severe)
•ASA Checklist (none or poor)
•Others

**•Screening for OSA**
STOP Questionnaire
(Yes or No) high risk = 2 or > yes
1.Do you snore loudly? (louder than talking or loud enough to be heard through a closed door)
2.Do you often feel tired, fatigued or sleepy during daytime?
3.Has anyone observed you stop breathing during your sleep?
4.Do you have or are you being treated for high blood pressure?
•Screening for OSA

**STOP-BANG Scoring Model**
Add these to STOP answers: Height (in/cm); weight (lb/kg); Age, Gender, BMI, Collar size of shirt (Sm-XL or in/cm); neck circumference (cm) by staff
•BMI > 35 $kg/m^2$?
•Age > 50 years old?
•Neck circumference > 40 cm?
•Gender male?
•High risk = yes to 3 or >
•Low risk = yes to < 3

**•ASA Practice Guidelines: Preoperative**
•ASSESSMENT OF OSA
oClinical signs & symptoms
oHistory of airway obstruction
oUse of questionnaire
oInterview patient & family
oSomnolence
oUse of questionnaire
oInterview patient & family
•OSA Scoring System
(A) Severity of sleep apnea based on sleep study
(B) Invasiveness of surgery & anesthesia
(C) Requirement for postoperative narcotics

**Estimation of perioperative risk:**
Overall score =
Score of A + the greater score of B or C

**•ASA Practice Guidelines: Preoperative**
Review medical record
**•In the absence of sleep studies, OSA may be <u>presumed</u> considering the following criteria:**
• Increased BMI (for pediatrics: weight or BMI > 95$^{th}$ percentile for age)
•Increased neck circumference
•Snoring (loud!)*
•Congenital airway abnormalities

•Daytime hypersomnolence
•Inability to visualize soft palate
•Adenotonsillar hypertrophy

**•ASA Practice Guidelines: Preoperative**
¨Inpatient versus outpatient
¨Review scoring system results
¨Be aware of facility capabilities
¨Emergency equipment
¨Contract with nearby hospital
¨Overnight stay rooms
¨Airway management
¨Expect a difficult airway scenario
¨Create optimal intubation conditions
¨Consider "awake look"
¨Have all available adjunct equipment readily available.

**•ASA Practice Guidelines: Preoperative**
¨Type of Anesthesia
¨Choose local anesthesia or peripheral nerve blocks for extremity surgery when possible*.
¨Restrict use of benzodiazepines when possible
¨Consider need for NDMRs/Avoid if possible
¨Oxygenation
¨If patient uses CPAP, have it available*.
¨Intra- & post- operative plan
¨Positioning
¨Monitoring
¨Pain control

**•ASA Practice Guidelines: Intraoperative**
•Semi-upright position, especially during extubation & recovery. Lateral or prone preferable to supine*.
•Monitor $ETCO_2$ during moderate–deep sedation.
•General anesthesia with a secured airway is preferable to deep sedation for superficial procedures & all procedures involving upper airway.
•Use sedatives & narcotics sparingly!
•Steroids
•Non-steroidals

**•ASA Practice Guidelines: Postoperative**
•Extubate *only* when **fully awake** after confirmed NDMR reversal (mechanical/manual).
•Consider use of nasal airway before extubation!
•Reconsider giving neostigmine in the presence of full TOF/ST 2° genioglossus activity.

**•**Expect** patient to go back to sleep after extubation & prepare appropriately!

**•ASA Practice Guidelines: Postoperative**
Position
•Semi-upright for extubation
•Semi-upright and/or lateral thereafter
•Minimize post-op supplemental $O_2$
•Pulse oximetry: $O_2$ sat >90% on room air
•$ETCO_2$ monitoring highly recommended**
•Monitor 3 hours longer than non-OSA pt
•Avoid parenteral narcotics whenever possible*
Watch them like a hawk!!!

•Thank You!
•Questions?

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