Obstructive sleep apnea: What an anesthesiologist should know?

Frances Chung
Professor, Dept. of Anesthesiology
Toronto Western Hospital
University Health Network
University of Toronto
Disclosure

- Research support
  - Dept. of Anesthesia, University Health Network, University of Toronto
  - University Health Network Foundation
  - Physicians Services Incorporated Foundation
  - ResMed Foundation

Conflict of Interest

Updated STOP-Bang questionnaire; Property of University Health Network
Pfizer research grant
Outline

- Adverse events of patients with OSA
- How do we identify patients with OSA?
- Perioperative management of OSA pts
- CPAP treatment
Prevalence of OSA

Moderate - Severe OSA (AHI>15)
- Men 11 %
- Women 5 %

Recent study 9-22 %

Peppard PE et al, Am J Epidemiology 2013; 177: 1006-14
Preop Dx and CPAP Rx reduces postop cardiac complications

- Matched cohort analysis of sleep study data and Manitoba health administrative database

Risk of CVS Cx

- UOSA vs. matched control: risk 2.2  P=0.02
- DOSA vs. UOSA: risk 0.34  P=0.009

Preop Dx and CPAP Rx reduces postop cardiac Cx

Mutter TC et al Anesthesiology 2014; 121:707-18
OSA and Postop Delirium

- An association between OSA and postop delirium
  

- Cardiac surgery pts.
  Preop AHI ≥ 19 associated with 6-fold increased risk of postop delirium

  Roggenbach et al. Crit Care 2014 Sept
Death or neurological injury after tonsillectomy in children

- Surveys of SPA + ASA close claims
- 111 cases
- 77% death or neurological injury
- 57% risk of sleep apnea
- 16 children could have been saved by respiratory monitoring in PACU and ward

Cote CJ Anesth Analg 2014; 118: 1276-83
Malignant Hyperthermia Scenario

- Past history of anesthesia
- Family history of anesthesia
- Rule out MH susceptible pt
- Manage accordingly

- Dantrolene if MH happens
Questions?

- Which OSA pt is at risk of periop Cx?
- Which Apnea Hypopnea Index?
- Which degree of O2 desaturation? Is it intermittent hypoxia? Is it cumulated time of desaturation?
- Is it a lack of arousal due to respiratory depression by opioids?
- How great is the role of sleep apnea in respiratory depression due to opioids?
Outline

- Adverse events of patients with OSA
- How do we identify patients with OSA?
- Perioperative management of OSA pts
- CPAP treatment
STOP- Bang

- S  Snoring
- T  Tiredness / sleepiness / fatigue
- O  Observed apnea
- P  BP (>140/90)  Rx or no Rx
- B  BMI >35
- A  Age >50
- N  Neck circumference >40 cm
- G  Gender  male
- 3 / 8 questionnaire positive

Chung et al. Anesthesiology 2008; 108:1-10
Updated STOP- Bang

- Low risk of OSA: 0-2 score
- Intermediate risk of OSA: 3-4 score
- High risk of OSA: 5-8 score
  - STOP ≥2 + BMI >35
  - STOP ≥2 + male
  - STOP ≥2 + neck circumference

www.stopbang.ca
Postoperative Sleep Architecture

Chung F Anesthesiology 2014 et al
Non-OSA

* : p<0.05 vs. Preop night ; †: p<0.05 vs. postop Night 1

Chung F et al, Anesthesiology 2014
Mild-OSA

* : p<0.05 vs. Preop night; †: p<0.05 vs. postop night 1  Chung F et al, Anesthesiology 2014
Moderate-OSA

Apnea Hypopnea Index (AHI)

Perioperative Nights

Preoperative  Night1  Night3  Night5  Night7

* : p<0.05 vs. Preop night; † : p<0.05 vs. postop N 1  Chung F et al, Anesthesiology 2014
Severe-OSA

* : p<0.05 vs. Preop night ; † : p<0.05 vs. postop N1  Chung F et al, Anesthesiology 2014
Apnea Hypopnea Index: no of apnea, hypopnea /h

Periop OSA Severity
- Severe
- Mod
- Mild
- No OSA

Preop | Night1 | Night3 | Night5 | Night7
-------|--------|--------|--------|--------

- No OSA: AHI 2.4, 16.4, 15.3, 11.7, 7.1
- Mod: AHI 22.1, 28.6, 40.2, 26.6, 20.1
- Severe: AHI 51.6, 54.8, 67.9, 65.6, 55.3

AHI
Respiratory arrests occurs on first 24h

- Majority of respiratory depression or arrests occur 1st 24h
- Majority of emergent re-intubation 1st 24h
- OSA pts: 85% re-intubation occur 1st 24h

Ramachandran SK et al. Anesthesiology 2011
Mokhlesi B et al Chest 2013
Lee L ASA newsletter 2013
Apnea Hypopnea Index in OSA patients with GA vs RA

Anesthesia Type: GA SA/Regional

Non-OSA OSA

Chung F et al Anesthesiology 2014
AHI in supine & non-supine position

Chung et al Anesthesiology 2014

Night 3
Night 1
Preop
OSA and anesthesia

- Higher preop AHI, age and 72h opioid dose
- Associated with an increased postop AHI

- Higher preop central apnea index, male sex and GA
- Associated with an increased postop central apnea index

F Chung et al Anesthesiology 2014
Preop Suspicion

- Recognize the problem
  - OSA is common

Anesthesiologists and PACU nurses: Airway specialists
We may be the 1st one to identify pts having OSA
What Effect Does OSA Have on Life Span?

- American life expectancy
  Male – 76.7 yrs  Female – 83.6 yrs

- Mean age of death among people with untreated OSA is 59 years.

- OSA untreated or undiagnosed died 20 yrs earlier

Young T, *Sleep* 2008;31:1071-78
Marshall NS, *Sleep* 2008;31:1079-1085
Marin JM, Lancet 2005; 365: 1046–53
10 yr life expectancy due to smoking vs. pts with non-treated OSA

Perioperative Physician

- We refer pts for Rx of unDx hypertension, DM, angina etc.
- Similarly, we should refer suspected OSA pts.
- Prolong life span by 20 yrs.
Should we screen for OSA in preop clinic and what should we do if +ve?

- What do we do if pts are screened positive?
- When should we refer our patients?
- More research is needed
High Risk
STOP-Bang 5-8

Intermediate Risk
STOP-Bang 3-4

Low risk of OSA
STOP-Bang 0-2

Sleepiness

CAD
Canadian Thoracic Society Guideline for urgent referral of OSA pts

- Critical patients with safety issue
- Pts with high risk of OSA + daytime sleepiness
- Pts with high risk of OSA +
  - Resistant hypertension
  - Nocturnal angina
  - CHF
  - COPD, hypercapnic resp failure

ODI = 10 events/hr is sensitive and specific for moderate and severe OSA.

M Chung et al. Anesth Analg 2012

Oxygen Desaturation Index

Dx OSA

Sensitivity 93%
Specificity 75%
Mean preop over-night SpO2 < 93%
or ODI > 28.5 events/h

Higher risk for postop adverse events

Odds ratio for Cx 2.2

Over-night oximetry: A useful tool to stratify patients for the risk of postop Cx
Outline

- Adverse events of patients with OSA
- How do we identify patients with OSA?
- Perioperative management of OSA pts
- CPAP treatment
American Society of Anesthesiologists

Practice guideline for the periop Mx of pts with OSA

Anesthesiology 2014; 120:268-86
Preoperative Screening

Seet, Chung  Sleep Medi clinic 2013 8: 105-120
Seet, Chung Can J Anesth, 2010; 57: 849-64
What should we do with a preop pt at high risk for sleep apnea?
What should we do if patients with OSA are not compliant with their CPAP?

• Is CPAP effective to reduce postop Cx or shorten LOS?
Malpractice litigation of OSA cases: Westlaw database 1988-2012

- 54 medico-legal cases
- ENT surgeons and anesthesiologists
- Death 48%, permanent deficits 43%, anoxic brain damage 24%
- Intraop Cx 37%
- Inappropriate medications 27%
- Inadequate monitoring 20%

Svider PF et al J Otolaryn Head & Neck Sept 2013
Obstructive sleep apnea pt for ambulatory surgery

- Communication is essential
- Inform surgeons, nurses of risks
- Home prescription: Avoid opioids
- Inform pt and family
- Sleep in recliner
- Cut narcotic pill in half
OSA and Anesthesia

- Perioperative management
American Society of Anesthesiologists

Practice guideline for the periop Mx of pts with OSA

Anesthesiology  2014; 120:268-86
Anesthetic Mx is determined by 4 factors:

- Severity of OSA
- Mx of OSA: CPAP or not
- Surgical procedure: major or minor
- Postop analgesic requirement: opioids or not
Preop Preparation of OSA

- Premed: Avoid
- Aspiration prophylaxis
Sleep Apnea and difficult intubation

- Difficult endotracheal intubation in pts with OSA.
- 22% incidence

JMA Siyam, Anesth Analg 2002; 95:1098-1102
Kim JA, Lee JJ, CJA;2006:53:393-7
Optimal positions for morbidly obese

- Reverse Trendelenburg 30%
- Safe apnea period longest
- Least drop in O2 saturation

Boyce RB. Obesity Surg 13: 4-9, 2003
Isono S. Semin Anesth Periop Med Pain 2007; 26: 83-93
Altermatt FR et al. BJA 2005; 95: 706-9
RA better in OSA pts.

- 40,316 hip and knee arthroplasty pts with obstructive sleep apnea

- RA: Decreased need for mechanical ventilation, ICU, LOS and cost

Patient controlled analgesia

- Patient central apnea
- Patient cardiac arrest
- Please call attorney
Perioperative Management

Seet, Chung  Can J Anesth, 2010; 57: 849-64
Seet, Chung  Sleep Med Clin 2013; 8: 105-120
Continuous monitoring of oxygenation and ventilation should be available for all postop pts.

APSF newsletter  Sept 2011
Postop Mx of OSA

Patient position

- A sitting or lateral position
- Use of a pillow for sniffing position

Isono S  Anesthesiology 2002; 97
Isono S  Anesthesiology 2005;103:489-94
Identification of Patients at Risk for Postoperative Respiratory Complications Using a Preoperative Obstructive Sleep Apnea Screening Tool and Postanesthesia Care Assessment

Bhargavi Gali, M.D.,* Francis X. Whalen, M.D.,* Darrell R. Schroeder, M.S.,† Peter C. Gay, M.D.,‡ David J. Plevak, M.D.§
Suspected OSA

Recurrent PACU Resp Events

Yes

Monitored bed

No

Home or Ward

E Seet & F Chung  Can J Anesth 2010; 5 849-64
Known OSA Pt

PACU > 60 m after Aldrete

- Noncompliant CPAP
- Moderate to severe obstructive sleep apnea
- Significant PACU resp events

Yes

Postop Monitoring

No

Ward or home

Seet & Chung Can J Anesth 2010; 5 849-64
An order-based approach to facilitate postop decision-making for OSA pts

- Vancouver: PACU order-based approach to facilitate postop decision making for OSA pts
- Prompts for diagnostic follow-up and Respirology consult
- Prompts to consider a monitored bed for pts at higher risk

Outline

- Adverse events of patients with OSA
- How do we identify patients with OSA?
- Perioperative management of OSA pts
- CPAP treatment
Effect of CPAP on Resp Parameters of Upper Airway Patency in OSA pts

- CPAP for 1 night
- ↓ resistance of the respiratory system
- Reduce upper airway edema

Pts on home CPAP did not receive CPAP in hospital

- 37% of pts on home CPAP Did not receive CPAP in hospital
- 27% of OSA pts (not on home CPAP) Require CPAP in hospital

Auto-CPAP study

- To test if periop Auto-CPAP Rx prevents postop increase in AHI in pts with newly diagnosed OSA.

- Newly Dx OSA pts receive Auto-CPAP 3 days before OR and 5 days postop vs. Control

Low CPAP adherence in newly Dx OSA pts for elective surgery

- Preop pts referred (STOP-Bang 5 or higher)
- CPAP req’d 65%
- Optimal level 9 cm
- African American, male gender and depression predictors of reduced CPAP adherence

Health benefits of identifying pts with UnDx OSA in preop clinic

- 211 patients
- Pts screened by STOP-Bang + sleep studies + referral to sleep medicine
- 2 yr follow-up study by survey

Undiagnosed OSA

- OSA pts:
- Likely to have better periop monitoring

- The unDx OSA, unrecognized OSA or unRx OSA pts:
- Get into trouble
Malignant Hyperthermia Scenario

- Ask Hx of OSA and screen for UOSA
- Family Hx of OSA
- Rule out suspected OSA pts
- CPAP Rx
5 Principles in the anesthetic Mx of OSA pt

- RA when possible
- Be prepared: Boy Scout’s motto
- GA: tracheal intubation and ventilation
- Postop care: monitoring, early mobilization
- Judicious use of any opioids by any route
OSA pt : 5 tips

- STOP-Bang questionnaire to screen OSA, OHV
- Use Troop pillow for intubation
- RM + PEEP to prevent atelectasis
- Use short acting agents
- Reverse trendelenburg position for extubation
Outline

- Adverse events of patients with OSA
- How do we identify patients with OSA?
- Perioperative management of OSA pts
- CPAP treatment
Anesthesia Pt Safety Foundation Recommendations

- Continuous monitoring of oxygenation and ventilation should be available for all postop pts.

APSF newsletter  Sept 2011