Conundrums in Ambulatory Anesthesia I

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Conflict Of Interests
Research Grants and/or Honoraria

- Pfizer Inc.
- Baxter Pharmaceuticals
- Cadence Pharmaceuticals
- Pacira Pharmaceuticals
- Edward Life Sciences

Objectives

- Describe identification of preoperative risk factors in the obese including sleep apnea
- Illustrate the importance of appropriate selection of adult obese and sleep apnea patients scheduled for ambulatory surgery
- Discuss anesthetic risks including difficult airway in this patient population
- Specify criteria for discharge of these outpatients

Are patients with OSA suitable for ambulatory surgery?
Scientific literature on safety and perioperative management of OSA patients is sparse and of limited quality.

ASA-Scoring System For OSA Patients

A. Severity of OSA (0-3 pts)
B. Invasiveness of surgery/anesthesia (0-3 pts)
C. Requirements for postoperative opioids (0-3 pts)

- Overall score (0-6): A + greater of B or C
  - Not suitable for ambulatory surgery
  - Score ≥ 5 significantly increased risk from OSA

Intra-abdominal and upper airway surgery are not suitable for ambulatory surgery.

ASA Practice Guidelines: Anesthesiology 2006; 104: 1081-93

SAMBA-OSA Systematic Review

- No difference in complications between OSA and non-OSA patients undergoing ambulatory surgery
- Emphasis on preoperative diagnosis
- Emphasis on use of non-opioid analgesics to minimize opioid use
- Emphasis on postoperative care particularly use of CPAP after discharge


OSA Patients NOT Suitable For Ambulatory Surgery

- Patients with OSA without optimized comorbid conditions
- Opioid dose cannot be limited by using non-opioid analgesics and/or regional/local anesth
- Patients’ inability to follow post-discharge instructions including compliance with CPAP


Clinical Diagnosis of OSA: STOP-BANG Questionnaire

- Loud snoring
- Daytime somnolence
- Observed apnea
- Hypertension
- BMI >35 kg/m²
- Age > 50 yrs
- Neck circumference >40cm
- Male
- ≥3 yes = high risk of OSA

**STOP-Bang Score and AHI**


**Predicted Probabilities For AHI and STOP-Bang Score**


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**Should Patients Suspected Of OSA Undergo a Sleep Study?**

- No evidence preop CPAP improves outcome
- Optimal duration of preop CPAP unknown
- Poor compliance with CPAP
- Proceed with a presumed OSA diagnosis
- Sleep study only if severe OSA and significant comorbidities (CHF, pulm HTN, metabolic synd)

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**Preoperative Selection of a OSA Patient For Ambulatory Surgery**


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**Unplanned Admission After Ambulatory Surgery in OSA Patients**

- Preop screening for OSA
- OSA patients observed for 4 h postop
- Discharge home if no episodes of apnea, airway obstruction, and SaO₂<90%
- Patient admitted if unwilling or unable to wear CPAP, airway procedure, inadequate analgesia with increasing and unpredictable use of parenteral opioids


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**Perioperative Complications in OSA Patients**

<table>
<thead>
<tr>
<th></th>
<th>All patients (n=2370)</th>
<th>Severe OSA (n=746)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>43 ± 8</td>
<td>45 ± 8</td>
</tr>
<tr>
<td>ASA Physical Status 1 &amp; 2</td>
<td>65%</td>
<td>41%</td>
</tr>
<tr>
<td>ASA Physical Status 3 &amp; 4</td>
<td>35%</td>
<td>59%</td>
</tr>
<tr>
<td>Transient desaturation SaO₂&lt;93%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Postop stay (phase 1 &amp; 2)</td>
<td>127 ± 31</td>
<td>136 ± 31</td>
</tr>
<tr>
<td>Death</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Respiratory failure/reintubation</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Readmission/Transfer within 30 days</td>
<td>20 (0.88%)</td>
<td>5 (0.5%)</td>
</tr>
</tbody>
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Kurrek et al: Obes Surg 2011

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**Preoperative Selection of a OSA Patient For Ambulatory Surgery**

- Optimized Co-morbid Conditions AND Able to use CPAP after discharge
- Proceed With Ambulatory Surgery

- Not Suitable For Ambulatory Surgery, may benefit from diagnosis and treatment
- Proceed With Ambulatory Surgery

No guidance can be provided for airway surgery

**OSA Does Not Increase Unplanned Admission After Ambulatory Surgery**

<table>
<thead>
<tr>
<th></th>
<th>OSA (n=191)</th>
<th>No OSA (n=204)</th>
</tr>
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<tbody>
<tr>
<td>Duration of postop stay (median, CI) h</td>
<td>7 (5-8)</td>
<td>6 (5-8)</td>
</tr>
<tr>
<td>Unplanned admission (median, CI) %</td>
<td>7 (5.1-8.9)</td>
<td>5.6 (4.1-7.1)</td>
</tr>
</tbody>
</table>

- Severity of OSA not associated with increased unplanned admission


**Sleep Disturbances After Fast-Track Hip and Knee Arthroplasty**

- Patients undergoing fast-track THR & TKR
- Procedure performed under SA and postop analgesia with multimodal non-opioids
- No REM sleep on POD1
- REM returned to preop levels on POD4
- No association between opioid use, pain scores, inflammatory response and sleep disturbance


**Postoperative Sleep Patterns and OSA**

- Surgical Stress, Anxiety, and Pain
- Sleep deprivation and fragmentation (reduce REM sleep)
- Rebound REM sleep (lasts for several days after surgery)
- Airway obstruction and Life threatening apnea
- Location and invasiveness of the surgical procedure
- Degree of pain and need for opioids


**Advice Patient, Family, Caregiver:**

- Patients on Preoperative CPAP
  - Bring CPAP device to the facility, unless one is available at the facility
  - Use CPAP while sleeping, even during the daytime
  - Use CPAP for several days postop


**Advice Patient, Family, Caregiver:**

- Patients With Presumptive Diagnosis of OSA
  - Avoid sleeping in supine position, if possible
  - Limit opioid use, emphasize deleterious effects of opioids
  - Follow-up with their primary physician for possible sleep study

**Summary**

- OSA patients are at high risk of periop complications
- Unrecognized OSA is more likely to cause problems
- Discuss with surgeon and patients/family regarding concerns with opioid use
- OSA patients may be at risk for several days postop
- Patients on CPAP must use it at home
- Admit patient when in doubt

**Results**

- No differences in unanticipated admission rate
  - Obese and non-obese cohorts
  - Studies of bariatric and non-bariatric surgery
- BMI in non-bariatric surgery studies around 30
- BMI in bariatric surgery studies was around 40
  - Rigorous preoperative preparation
  - Super obese (BMI>50) higher risk of complications

**Is there a weight limit for ambulatory surgery?**

• Studies included in the systematic review not included in this review (no duplication)
• 106,119 patients (prospective cohort trials = 62,476 and retrospective trials = 43,643)
• Bariatric surgery population = 39,548, does not include systematic review patients (n=2549)
• Obese had increased respiratory events
  - O₂ desaturation, need for O₂ supplementation
  - Stridor/laryngospasm, airway obstruction

**BMI>50 may increase perioperative risks**

• Determinants of perioperative outcome
  - Comorbid conditions (OSA, hyperventilation syndrome, pulmonary hypertension, resistant systemic hypertension, significant CAD, resistant CHF, h/o DVT or PE, h/o bleeding disorder, chronic renal failure on dialysis)
  - Invasiveness of surgical procedure
  - Surgeons’ experience
  - Facility capability
Difficult Airway Management

Difficult Airway: Facial Trauma

Difficult Airway: Angioedema

Kissing Tonsils

Difficult Airway: Complications

- Despite introduction of supraglottic devices and videolaryngoscopes
- New guidelines from ASA and ESA
- Airway disasters still a major source of brain damage and death

ASA Difficult airway guidelines: Anesthesiology 2013; 118: 251-70

ASA Difficult Airway Algorithm

Anesthesiology 2013; 118: 251-70
Airway Management Algorithm

Difficult Airway Algorithm

Mask Ventilation Prior to NMB
- Unlikely that patients could woken up to restore spontaneous ventilation before significant hypoxia.
- Could ‘safe practice’ be compromising safe practice?

NMB Facilitates Tracheal Intubation
- Analysis of a Danish Anesthesia Database of 103,812 planned tracheal intubations by direct laryngoscopy found that avoiding NMB was associated with difficult tracheal intubation.
- Most patients with difficult MV receive NMB.

Effect of NMB on Mask Ventilation
- Double-blind, placebo-controlled trial (n=90)
- After induction with propofol 2 mg/kg and fentanyl 1 µg/kg
- Randomly received saline or rocuronium
- Mask ventilation performed, graded at 2 min
- Roc significantly improved mask ventilation
  - Greater improvement in patients with difficult mask ventilation (Warters Scale ≥ 3)

UK: Fourth National Audit Project
- “Where facemask or laryngeal mask anaesthesia is complicated by failed ventilation and increasing hypoxia the anaesthetist should consider early administration of further anaesthetic agent and or a muscle relaxant to exclude and treat laryngospasm.”
- “No anaesthetist should allow airway obstruction and hypoxia to develop to the stage where an emergency surgical airway is necessary without having administered a muscle relaxant.”

References:
**Induction of Anesthesia**

- Head up position - 20-30º
  - Tagaio Y et al: Anesthesiology 2010;113:812-8
- "Stacking"
  - Chin higher than chest
- Preinduction CPAP
  - Improves pharyngeal airway patency
  - Isono et al: Anesthesiology 2005;103:489-94
- Preoxygenation
  - End-tidal oxygen >90%

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**Airway Management: Mask Ventilation**

**Preprocedure Preparation**

- Induction of 6A Mask Ventilation
- MOV before muscle relaxants

**Success**

- Optimize head position
- Two hand ventilation
- Oral/nasal airway

**Difficult Tracheal Intubation**

- Optimize position
- Bougie
- Change blades
- Supraglottic Device
- Videolaryngoscope
- Fiberscope

- Limit number of attempts
- Consider return to spont resp
- Consider awakening

- Transtracheal jet ventilation
- Cricothyroidotomy

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**Difficult Airway Management: Common Pitfalls**

- Airway difficulty not recognized
  - Inadequate assessment
  - Overconfident
  - Impulsive decisions
- Risk of aspiration not recognized
- Repeated attempts at intubation

- When in doubt, err on side of caution
  - Choose most conservative option

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**Difficult Mask Ventilation**

- Male gender
- Presence of beard
- Mallampati 3 or 4
- Sleep apnea
- Neck radiation


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**Difficult Direct Laryngoscopy: No Single Factor Predicts**

- Limited mouth opening (<25 cm)
- Inability to protrude mandible
- Mallampati score ≥3
- Thyromental distance <65 cm
- Neck circumference >40cm
- Range of motion of head and neck (cannot touch tip of chin to chest or cannot extend neck)
Awake Tracheal Intubation

- H/o previous difficult intubation
- Mouth opening <25mm
- Severe fixed flexion deformity of cervical spine
  - Neck radiation, ankylosing spondylitis, rheumatoid
- Pharyngeal and/or laryngeal pathology
  - Abscess, hematoma, edema, tissue disruption, tumor

Known or Anticipated Difficult Airway

- Awake tracheal intubation
- Awake look with videolaryngoscope
- GA with spontaneous breathing
  - Inhalation induction
  - Propofol ± remifentanil
  - Dexmedetomidine + ketamine

No Single Factor Predicts Difficult Airway

Videolaryngoscopes:
Difficult Laryngoscopy and Failed Direct Laryngoscopy


Videolaryngoscopes


Summary

- Identify difficult airway
  - Mask ventilation
  - Supraglottic device placement
  - Videolaryngoscope
  - Tracheal intubation
- Identify risk of aspiration
- Determine need for awake intubation
- Determine choice of muscle relaxant
  - Rocuronium vs. succinylcholine
- Prepare for plans B and C
  - Extra help and equipment

Thank You. Questions