Obstructive sleep apnea in high-risk pregnancy: An anesthesia update

Jennifer E. Dominguez, MD, MHS
Assistant Professor of Anesthesiology
Program Director, Obstetric Anesthesiology Fellowship Program
Division of Women's Anesthesia, Department of Anesthesiology
Duke University School of Medicine
Durham, North Carolina

Disclosures

ResMed and Itamar Medical Ltd have loaned home sleep devices for use in our research studies.
Learning objectives

• Discuss the importance of OSA screening for high-risk groups of patients.
• Review the data regarding the adverse outcomes associated with OSA in pregnancy.
• Compare the data regarding prevalence of OSA in pregnancy in higher risk populations to those in lower risk populations.
• Discuss the known risk factors for OSA pregnancy.
• Convey some strategies for optimizing care for these challenging patients.

How do we provide the best care for women with high risk conditions?

- Morbid obesity
- Advanced maternal age
- Pulmonary hypertension
- Cardiac disease
- Chronic hypertension
40 years old; BMI = 73 kg/m²
37 weeks for repeat cesarean due to worsening maternal heart failure.

**Airway exam:** Mallampati class 4, thick neck with limited extension, adequate mouth opening.

**PMH:**
CTHN; severe OSA on BiPAP; Diastolic dysfunction; IDDM; Asthma

**Anesthetic:** Continuous lumbar spinal catheter – 10 mg bupivacaine

Positioned at 45 degrees for surgery due to dyspnea

**Intraoperative BiPAP**

**Total surgical time:** 240 minutes

**Estimated blood loss:** 3000 mL

**Post-operative:** SICU for monitoring and recovery; thoracic PCEA

---

**OSA and obesity:**
Risk factors for anesthesia-related maternal mortality!
After controlling for obesity, women with OSA in pregnancy had increased risk of:

- Cardiomyopathy
- Eclampsia
- Preeclampsia
- Pulmonary embolism
- In-hospital death

![Bar chart showing adjusted OR for various complications](chart1.png)

Obstructive sleep apnea in pregnancy is associated with adverse maternal outcomes: a national cohort

Ghada Bourjeily a,b,c, Valery A. Danilack c,d,e, Margaret H. Bublitz a,b,c, Heather Lipkind f, Janet Muri h, Donna Caldwell h, Iris Tong a,b, Karen Rosene-Montella a

Sleep Med. 2017 October; 38: 50–57.

![Bar chart showing adjusted OR for various maternal outcomes](chart2.png)
## Prevalence of OSA in Pregnancy

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 3600 NuMom2B</td>
<td>N = 182 BMI &gt; 30</td>
<td>N = 114 BMI &gt; 30 or other high risk</td>
<td>N = 108 Mean BMI = 32</td>
<td>N = 248 Mean BMI = 30</td>
<td>N = 80 BMI &gt; 40</td>
<td>N = 100 50 CHTN; 50 normotensive; BMI = 38</td>
<td></td>
</tr>
</tbody>
</table>

### Prevalence

<table>
<thead>
<tr>
<th>Stage</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Early gestation</td>
<td>3%</td>
<td>15%</td>
</tr>
<tr>
<td>Third trimester</td>
<td>8%</td>
<td>--</td>
</tr>
</tbody>
</table>

Facco et al. JCSM 2012, 8(4).  
Lockhart et al. Obstet Gynecol 2015, 126(1).


---

**Cesarean delivery rate is HIGH in this population!**

**Practice guidelines for general surgical patients—Preoperative evaluation and treatment of OSA is optimal.**


## Risk factors for OSA in Pregnancy

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI &gt; 30</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>BMI &gt; 30 or other high risk</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mean BMI = 32</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>BMI &gt; 35</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>BMI &gt; 40</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>NuMom2B</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>CHTN</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

- BMI both groups = 38 kg/m²
- OSA cHTN group 64% vs. 38% controls

### References
- Facco et al. JCSM 2012, 8(4).
- Lockhart et al. Obstetrics & Gyn 2015, 126(1).

### Diagram

- Chronic hypertension
- BMI-matched normotensive controls
- Self-report sleep questionnaires
- One night home sleep test

WP200U™ Type 3 device (Itamar Medical Ltd., Caesarea, Israel)

OSA positive = AHI > 5 events/hour

CHTN group 34.3 (4.4) years vs. normotensive 29.6 (6.1) years, p < 0.001


---

**How to screen?**

- Validated approach still needed
- What’s the best evidence for what is likely to be helpful?
  - AGE
  - BMI
  - Chronic Hypertension
  - +/- Frequent snoring
Barriers to screening?

• Still no data to suggest that treatment can mitigate associated adverse outcomes --> Buy in can be challenging.

• Limitations on the availability and timeliness of sleep medicine referrals and treatment during pregnancy.

• Variable patient cooperation with diagnosis and treatment.

Peripartum management:
Pre-anesthesia consult clinic visit for obstetric patients with known or suspected OSA

– History and medical records
– History of difficult airway or perioperative complications
– OSA screening and possible referral
– Physical exam
– Discussion with patient regarding delivery recommendations
– Encourage to bring CPAP to hospital for delivery admission
III. Peripartum management

- Encourage early epidural
  - Avoid intravenous narcotics
  - Avoid sedatives/hyponotics
  - Decrease need to intubate for emergency CD
- 45-degree HOB elevation
- Home CPAP
- Multi-modal analgesia/opiate sparing post-op pain strategies
- Continuous pulse oximetry
- Consider post-op ICU/step-down depending on your institution for patients with severe OSA

Future directions

- Validated screening approach for OSA in pregnancy
- Prospective studies of the impact of OSA treatment on maternal and fetal outcomes
- Studies to support clinical care pathways re: safe use of opiates for post-operative pain
- Non-opioid based analgesic modalities
- Consensus guideline
SASM Obstetrics Subcommittee

CONSENSUS GUIDELINE IN PROGRESS

Working group:
Ghada Bourjeily
Jennifer Dominguez
Ashraf Habib
Suzie Karan
Ellen Lockhart

Judette Louis
Alice Misckovic
Jacob Nadler
Mahesh Nagappa
Louise O’Brien
Christine Won

Funding Sources:
NIH 5T32GM008600-20
Dream Innovation Grant 2014
Society of Obstetric Anesthesia and Perinatology
Loaned research devices from ResMed and Itamar Medical Ltd.

Duke Division of Women’s Anesthesia
Our study subjects
Clinical research staff
Duke Sleep Research Clinic
My family

Mentors:
Ashraf Habib, M.B.B.Ch., MSc, MHSc, FRCA
Andrew D. Krystal, MD

Collaborators:
Chad Grotegut, MD, MHS

Statistician: Mary Cooter, MS
Extraordinary care through a unique culture of innovation, education, research, and professional growth.