Drug Induced Sleep Endoscopy (DISE)

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Adult Case 1

- 63 y/o retired firefighter/veteran
  - OSA AHI 44.2 / HR ESS 8
  - PTSD
  - Insomnia
  - Failed CPAP for years / claustrophobia
  - DISE for possible Inspire

Question 1

- In adults, compared to routine wake exam, drug induced sedated endoscopy modifies:
  A. assessment of palatal obstruction
  B. surgical decision for a large percentage of patients
  C. surgical decision making for a small percentage of patients
  D. surgical outcomes
Systematic Review

Awake Examination Versus DISE for Surgical Decision Making in Patients With OSA: A Systematic Review

*Laryngoscope, 126:768-774, 2016*

- 393 articles reviewed. 8 studies met criteria (535 pts)
  - Surgical treatment changed after DISE in 50.24% cases
  - Changes related to hypopharyngeal and laryngeal obstruction
  - Changes not associated with improved surgical outcomes
Question 2a

- Palate DISE findings using VOTE are:
  A. V1 concentric O2
  B. V1 AP O2
  C. V2 concentric O2
  D. V2 AP O2
  E. Other
  F. I don’t know what VOTE is

Question 2b

- Lower pharynx DISE findings using VOTE are:
  A. T0 E2
  B. T1 E2
  C. T2 E2
  D. other
Question 3

- The best procedure to treat the hypopharynx in this case:
  A. Lingual tonsillectomy
  B. Partial glossectomy
  C. Genioglossus advancement
  D. Tongue suspension
  E. Supraglottoplasty with epiglottic removal
  F. Hyoid suspension
• Procedure: UPPP, Lateral wall flap (ESP), Extended anterior posterior glossectomy

• Post operatively
  – 2 nights home sleep study with AHI of 1.2 and 2 events/hr
  – Continued insomnia

Airway Evaluation

\[ \text{Airway} (t) = \text{Structure (constant)} + \text{Physiology} (t) \]

• Observed characteristics at any time (t) vary.

• Balance of many forces
  – Muscle tone, airflow, effort, others….

Concept of Sleep Endoscopy

• “Waking behavior confounds upper airway examinations
• Goal
  1. Dynamically reproducing upper airway behavior similar to natural sleep by pharmacologically artificially inducing the patient into a light sleep (More accurate)
Problem: Sleep is complex

- Sleep ≠ not just reversible sedation
- (unresponsive to the environment)
  - Complex amalgam of physiologic processes

“Sleep” Apnea is a Misnomer

- Sleep has only minimal effect on muscle tone
- Sleep allows but does not directly cause apnea

Major loss of muscle tone is Periodic Breathing

- Arousal leads to hyperventilation and ventilatory overshoot.
- Sleep resumption then causes large decrease in respiratory drive
Goal / Methods

- Goal is to reduce muscle tone, identify flow limiting areas, and better understand structure

Need:

- Consistent method and drugs with gradual induction
- Ramsey level V - Non-responsive to verbal stimuli (Bispectral Monitoring)

VOTE Classification

- Velopharynx
- Oropharynx
- Tongue Base
- Epiglottis

Snoring noise locations:
- palate (43%)
- tongue base (7%)
- epiglottis (3%)
- multiple (42%)

Results vary between snorers and OSA
Obstruction in OSA

- Primarily determined by choke point characteristics
  - (Choke point = Palate in 80%)
- Determined by
  - Passive resistance
    - Cross sectional area
    - Length
  - Lateral wall compliance
  - Conduit curvature

Fundamental Model = Tube Law

- Loss of muscle tone decreases airway size
- Collapse is non-uniform

Phenotypes
Case 1 DISE (Phenotypes)

Conclusions Adult DISE

- DISE provides an alternative state to Wake (may not equate to sleep)

- Evaluate airway for:
  - Sites of abnormal resistance
  - Choke point characteristics
  - Lateral wall compliance
  - VOTE likely of minimal benefit
Drug Induced Sleep Endoscopy Children

Cecille Sulman, MD
Best Evidence ENT
2016

DISE in pediatric patients

- Safe, feasible, and valid assessment of the upper airway.
- Good interrater reliability.
- Correlates with both AHI and lowest oxygen saturation on pre-procedural PSG.


Audience response

Do you perform DISE in children?

1. Yes
2. No
Audience response

What anesthetic medications do you prefer anesthesia to use?

1. Propofol
2. Dexmedetomidine
3. Alternative medication
4. No preference
### Cho

**Prospective randomized**

- Did not change respiratory pattern
- + remifentanil > O2 desats and hypventilatation
- Conclusion: Propofol + dexmed showed less respiratory depression and less cough

<table>
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<th>Propofol</th>
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<th>Desmedetomidine</th>
<th>Conclusion</th>
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<tbody>
<tr>
<td>alone</td>
<td>+ remifentanil &gt; O2 desats and hypventilatation</td>
<td>+ remifentanil &gt; O2 desats and hypventilatation</td>
<td>Propofol + dexmed showed less respiratory depression and less cough</td>
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### Kandhil

**Retrospective study**

- N/A
- + sevoflurane > O2 desats
- + ketamine
- < O2 desats
- Stable BP
- Conclusion: Dexmed + ketamine higher rate of successful completion

### Yoon

**Prospective**

- > Respiratory depression
- N/A
- Conclusion: DISE results with propofol correlated with Dexmed. Dexmed recommended

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<tr>
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<td>n=61</td>
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### DISE before T&A

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### DISE Scoring system

- 23 children (mean age, 2.2 years).
- Average AHI 24.8.
- Substantial agreement.
- Higher total obstructive scores associated with lower oxygen saturation nadir (P = .04).
- Multilevel airway obstruction had worse PSG indices compared with children with single-level obstruction (P = .02).
Sleep Endoscopy Rating Scale

- Significant correlation between baseline OSA severity and obstruction in oropharynx and hypopharynx.
- Score ≥6 accurate predictor of severe OSA.
Sleep endoscopy

No apnea  Adenotonsilar hypertrophy

August 6-9, 2016  |  The American Club  |  Kohler, WI

Sleep endoscopy

No apnea  Circumferential collapse

August 6-9, 2016  |  The American Club  |  Kohler, WI

Current state of pediatric DISE

- Multi-institutional survey.
- Low rate of consensus 33%.
- Agreement
  - Workup prior to DISE.
  - Endoscopic protocol.
- Disagreement
  - Anesthetic protocol.
  - Management decisions.

Decision making: DISE?

- Systemic review of use of DISE in OSA.
- 5 studies.
- DISE did not change management in children with tonsils and adenoids.
- DISE should be restricted in those with OSA after T&A.


DISE Outcomes

- Systematic review, 24 articles.
- DISE most common tool used.
- Evidence for treatment is limited and focuses primarily on lingual tonsillectomy and supraglottoplasty.
- Reports regarding appropriate patient selection and outcomes in obese or otherwise healthy children are scant.
- These techniques have not yet been clearly linked to outcomes.


References

3. Davila et al. Sleep obstruction during drug-induced sleep endoscopy correlates with apnea-hypopnea index and oxygen desaturation index. CJAAAMS 2016; 10131753426432111.
Thank you

Questions?