SNORING & OSAHSS SURGERY

International Workshop

Sleep Endoscopy

> 15 min
Proposed GLOSSARY:

- Spontaneous Sleep (SS) vs Drug induced Sedation (DiS)
- Different sedative agents: Midazolam® (M); Propofol® (P)
- Different degrees of sedation (Minimal, Moderate, Deep)

Proposal:
1. SPONTANEOUS SLEEP ENDOSCOPY (SSE)
2. PROPOFOL® induced DEEP SEDATION ENDOSCOPY (PDSE)
3. MIDAZOLAM® induced DEEP SEDATION ENDOSCOPY (MDSE)
Sleep Endoscopy: Why?

Awake Endoscopy - pitfalls and limits:

... the [awake] findings may differ quite dramatically from the sleep-breathing situation...

Pringle & Croft, 1991

... the Mueller maneuver did not discriminate patients groups ...

Woodson & Wooten, 1994

... the information obtained is inaccurate and could lead to inappropriate surgery...

Skatved, 1993
Sleep Endoscopy: How?

IDEAL Sleep Endoscopy

- Natural Sleep (no drug effects!)
- Both REM & non REM sleep phases included
- Not disturbing Endoscope (no arousal!)
- Flexible Endoscope (minimal mechanical bias!)
- High Resolution Endoscope (sensitivity!)
- Digital Endoscope (UAWs sections calculation)
- Easily Reproducible
- Quick & Easy
- Not expensive
**SE: spontaneous vs induced**

<table>
<thead>
<tr>
<th>SPONTANEOUS</th>
<th>INDUCED</th>
</tr>
</thead>
<tbody>
<tr>
<td>✫ Difficult falling asleep (except for cases with EDS)</td>
<td>✫ Easy falling asleep (independently from EDS)</td>
</tr>
<tr>
<td>✫ Possible failure</td>
<td>✫ Probable success</td>
</tr>
<tr>
<td>✫ Low compliance</td>
<td>✫ Shorter duration</td>
</tr>
<tr>
<td>✫ Longer time</td>
<td>✫ Well tolerated</td>
</tr>
<tr>
<td>✫ More expensive</td>
<td>✫ Less expensive</td>
</tr>
<tr>
<td>✫ Physiological</td>
<td>✫ Less physiological</td>
</tr>
<tr>
<td>✫ No Drug impact</td>
<td>✫ Drug impact</td>
</tr>
</tbody>
</table>

Sleeping doctor after a night of spontaneous sleep endoscopy …
Focusing on Drug induced Deep Sedation Endoscopy...

General Overview

Ideal Drug for DiDSE (Maurer, 2006)

- Short half-life
- Antidote available if required
- Suitable for i.v. administration
- Minimal impact on breathing drive & muscle tone
- No anaesthesiologist required
Table 2. Pharmacological Properties of Sedative Agents For Endoscopy[19, 20]

<table>
<thead>
<tr>
<th>Sedation agent</th>
<th>Onset of action (min)</th>
<th>Duration of action</th>
<th>Elimination half-life</th>
<th>Metabolism/excretion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meperidine</td>
<td>5</td>
<td>2–4 h</td>
<td>2–7 h</td>
<td>Hepatic; excreted in urine</td>
</tr>
<tr>
<td>Midazolam</td>
<td>1.0–2.5</td>
<td>2–6 h</td>
<td>1.8–6.4 h</td>
<td>Hepatic and intestinal; excreted in urine</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>≤1.5</td>
<td>1–2 h</td>
<td>2–7 h</td>
<td>Hepatic; excreted in urine</td>
</tr>
<tr>
<td>Propofol</td>
<td>&lt;1</td>
<td>3–10 min</td>
<td>Triphasic: 2.2 min, 20 min, 8 h</td>
<td>Hepatic; excreted in urine</td>
</tr>
</tbody>
</table>

Table 3. Components of a Training Programme For Sedation By Non-Anaesthesiologists

Drug Administration modalities

- **Manual**
- **Mechanical**
- **Target controlled**
PROPOFOL® repeated bolus technique

Target Controlled Infusion (Roblin & Coll., 2001)

- Developed in 1996
- Propofol® based
- Age & weight required
- Pharmacokinetic modeling
- Desired concentration pre defined and adapted
- Calculation of absorption, distribution and excretion rate
- Required infusion rate adapted along the time
- Reproducible sedation narrow window (standardization)
- Sedation closer to spontaneous sleep (?)
DEPTH of SEDATION MONITORING

- Basic Setting
  - Videoendoscopy findings
  - pO2 (anesthesiology)

- Advanced Setting
  - Videoendoscopy findings
  - pO2 (anesthesiology)
  - PSG - EEG
    - pO2
    - EOG
  - BIS

Endo findings
pO2 in anaesthesia monitor

ongoing PSG monitoring & registration
Patient with PSG

PSG Screen
Sleep Endoscopy Findings: Classification Parameters

- Sites & Subsites (Staging)
- Vibration vs Collapse (Mechanics)
- Collapse Degree (Grading)
- Collapse Shaping (Pattern)
NOHL Classification System according to Vicini & Mira, 2007

- **Four Anatomical Levels** are recognised and named as:
  1. Nasopharynx (N)
  2. Oropharynx, Retropalate (O)
  3. Hypopharynx, Retrolingual (H)
  4. Laryngeal Supraglottic (a) & Glottic (b) (L)

\[ (N) (L) (H) (O) \]

\[ N = \text{Nasopharynx} \]
O = Oropharynx

H = Hypopharynx
L = Larynx (a = supraglottic)

L = Larynx (b = glottic)
Pattern Classification

- "I" pattern
- "V" pattern
- "T" pattern
- "O" pattern
- "star" pattern
- "." pattern
- "Ice cream" pattern

Epiglottis - closing book primary secondary
- closing door
- pipeline

Supraglottis - sucking sliding

Glottis - passive active

SLEEP ENDOSCOPY
ENT – FORLI’ SETTING
Operating Room - PROPOFOL® Induced Deep Sedation Endoscopy
adapted from Abdullah & van Hasselt, 2005

- One Day Surgery Setting
- Monitoring: SpO2, ECG, NBP
- Operating Room facilities
  - CPAP available
- Topic Xylocaine®
- Digital Pentax® Video-NPhL-scope (Ø 3.7 mm)
- Awake NPhL-scopy + Mueller
Sleep Endoscopy – Forlì: APPLICATIONS

- DD Snoring-OSAHS vs Stridor
- Surgical Failures (residual obstruction/s & snoring)
- Clinical-Instrumental mismatch
- Severe OSAHS
- Clinical Research (“endo-CPAP”)

Operating Room – PROPOFOL® induced Deep Sedation Endoscopy

PROCEDURE step by step

1. Premedication
2. Patient preparation
3. Patient positioning
4. Local Anaesthesia
5. Sedation
6. Endoscopy
7. Special Maneouvers
8. OR discharge
1. Premedication

- No drug administered

**Avoid mouth dryness!!!**

2. Patient preparation

- i.v. cannula
- pO2 probe
- microphone
- ECG
- (PSG)
- (EEG)
- (BIS)
3. Patient Positioning

- Supine
- No pillow
- Dark room or eye covering
- Quiet room (no noises!)

OR Setting
Ongoing PSG

One works … one listens …
4. Local anaesthesia

- No spraying of local anaesthetic or vasoconstrictive agents
- Anaesthetic gel on the scope tip

5. Endoscopy

- Basic static Awake Endoscopy
- Dynamic Endoscopy (mueller, jaw lift, phonation)
Basic endo setting

Microphone
PROPOFOL® repeated bolus technique

Digital i.v. drug delivering pump
SNORING TARGETING

- Keep the scope tip in nasopharynx
- **Wait for visible vibration and audible snoring**
- Move the scope and inspect all the levels
- **Don’t forget epiglottis and vocal folds**
- Take videos!
- Summarise the findings in a short text including possible treatment options
- Classify according to NOHL system

OSAHS TARGETING

- Keep the scope tip in nasopharynx
- Ignore the initial prolonged “apnoea phase”
- **Wait for repeated respiratory pharyngeal wall collapses**
- **Try to remain between previous PSG pO2 mean value and nadir (endoscopical window)**
- **Keep BIS at 70 - 50 index (deep sedation) (write in final report)**
- Move the scope and inspect all the levels
- Try to stay in the centre of the lumen
- Don’t forget epiglottis and vocal folds
- Take videos
- Summarise the findings in a short text including possible treatment options
- Classify according to NOHL system
STRIDOR TARGETING

- Keep the scope tip in oropharynx
- Wait for visible vibration and audible stridor
- Take videos!
- Summarise the findings in a short text including possible treatment options

6. Special manoeuvres

- Palate stabilisation (endoscope)
- Jaw lift
- Larynx lift
- Lateral position ()
- Tubing (?)