Word Cloud
TOP 3 CHALLENGES

1. 

2. 

3. 
October 23, 2017

35th Anniversary

ADA mandates screening for OSA
Learning Objectives

- Protocols for titrating dental devices
- Starting position
- Advancement rate
- Vertical
- When and how of titration sleep testing
- What to do when your results are suboptimal
POST INSERTION

• Manage S.E.
• Start Adjusting (Titrating)
• Evaluate Effectiveness
  – Subjective
  – Bed partner reports
  – Objective Testing
<table>
<thead>
<tr>
<th>DEFINING SUCCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHI \leq 10 and reduced by $\frac{1}{2}$ and subjective relief of symptoms</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>RDI \leq 15 and reduced by $\frac{1}{2}$ and subjective relief of symptoms</td>
</tr>
</tbody>
</table>
Results – at Final Protrusion

Baseline AHI & BMI vs. Final Therapeutic Position

AHI (events/hr⁻¹) vs. Full Protrusion

BMI (kg/m²) vs. Full Protrusion

Baseline RDI

0% 20% 40% 60% 80% 100%

Body Mass Index

Full Protrusion

Titration Options

- Home Sleep Testing
- In lab PSG
- Matrix Plus
Titration Options

◊ Home Sleep Testing

◊ In lab PSG

◊ Matrix Plus
HOME MONITORS
USED FOR TITRATING OA’S

• WHICH ONE SHOULD YOU USE?
• WHEN DO YOU USE IT?
• HOW OFTEN SHOULD YOU USE IT?
• WHEN DO YOU SEND PATIENT FOR PSG?
START

Forward but comfortable
(about 30-40%)
Sleep Monitors
Classification (AASM 1994)

• Level I: Standard laboratory polysomnography
• Level II: Portable full polysomnography- heart rate rather than ECG acceptable and attendance by trained personnel not always required
• Level III: Modified portable sleep apnea testing, with ventilatory recording (i.e. effort and flow), ECG or heart rate, and oximetry
• Level IV: Continuous single or dual parameter recording
OXIMETRY - Principles

- Two emitters opposite a photo receptor
- Oxygenated Hb absorbs more infrared and de-oxygenated more red light
- The pulsatile nature of arterial blood flow creates a “waveform,” with peaks and troughs as surges occur
- An R:R ratio is calculated based on empirical formulas and calibration curves from healthy subjects and an SpO2 value is generated
- Spo2 has limitations
Pulse Oximetry - limitations

• Motion
• Low perfusion
• Penumbra effect
• Fingernail polish
• Temperature
• Lag
• Skin/nail texture

Clinical Hints:
1. Pay attention to site selection
2. Factor in any perfusion diseases
3. PLM’s may be important
4. Obesity
LEVEL III RECORDERS
High-Resolution Pulse Oximetry: SleepSat Hi-Res Oximeter with SatScreen Reporting
ECTOSENSE,
THE COMPANY BEHIND NIGHTOWL®

We're a medtech startup on a mission to restore the sleep of the one billion people that suffer from a sleep disorder. We leverage the best of micro-electronics, biomedical signal processing and data science to bring medical solutions that are vastly more elegant and effective.
Validation Studies

Embletta

ARES

watch-pat

Remmers.
HOME SLEEP Monitors

- New Medicare Ruling (Feb. 2008)
- Can they be used as a screening tool?
- How do they fit into your dental sleep practice?
Titration Options

◦ Home Sleep Testing

◦ In lab PSG

◦ Matrix Plus
Titration of Oral Appliances During PSG or Home Monitors

• Can only be done with adjustable appliances
• Similarities to CPAP titrations
How far to adjust during titration SS

• Depends on:
  • Symptom relief
  • Disease severity
  • ROM and where they are
TITRATING OA AT SLEEP CENTER

• WHEN YOU DON’T HAVE A HOME MONITOR
• TO CONFIRM YOUR FINDINGS WITH THE HOME MONITOR
• PROTOCOL
  – TECH AWAKENS PT, BUT HAVE PT ADJUST APPLIANCE
  – INSTRUCTIONS TO TECH:
    • IF AHI ≥ 10 OR RDI ≥ 15, ADJUST APPLIANCE 2 FULL TURNS. REPEAT AT 45 MIN INTERVALS UNTIL SUCCESSFUL. CONSIDER TITRATING CPAP AFTER 4 TO 5 HOURS
## HOW SUCCESSFUL ARE MRD’S?

<table>
<thead>
<tr>
<th>Type</th>
<th>Success Rate</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild (5-20)</td>
<td>76%</td>
<td>41/50</td>
</tr>
<tr>
<td>Moderate (20-40)</td>
<td>61%</td>
<td>50/82</td>
</tr>
<tr>
<td>Severe (&gt;40)</td>
<td>40%</td>
<td>27/68</td>
</tr>
</tbody>
</table>

SUCCESS = AHI < 10 AND REDUCED BY ½  
COURTESY JONATHAN PARKER, DDS
LIMITATIONS OF OLDER STUDIES

• Used wide variety of appliances
• Advanced patients arbitrarily
• No Titration protocol

WHAT IF WE PUT ALL PATIENTS ON CPAP AT 6 CM H2O?
HOW MANY WOULD WE TREAT SUCCESSFULLY?
CURRENT RESEARCH

J. Parker, DDS
J. Hodges, PHD

Effect of a Titration PSG on Treatment Success with MAD’s
STUDY PROTOCOL

• 30 Patients with mod to sev OSA
• 25 patients treated with PM Positioner
• 5 patients treated with TAP
• All patients started at 60% of max protrusion
• Patients self titrated until symptoms of OSA decreased significantly or resolved
• Patients evaluated every 4 to 6 weeks
Patient Demographics

- Mean age: 52.6 (SD 11.3)
- Gender: 22 males, 8 females
- Race: 30 Caucasians
Pre Treatment Patient Data

• Mean AHI                      37.8  
  – (range 15 to 110)  
• Mean RDI                       47.5  
  – (range 26 to 110)  
• Mean BMI                       29.3  
• Mean ESS                        10.1  
  – (range 1.5 to 20)  
• 27 Patients had tried CPAP; 1 patient had UPPP; 3 patients no previous treatment
PROTOCOL

• Patient self titrates
• Returns to sleep lab for PSG
• If AHI > 10 or > RDI 15:
  • Adjust appliance 4 full turns
  • Repeat every 30 minutes until success
• Maximum # of turns = x
• Titrate CPAP if appliance not effective within 3 hours
DID SUCCESS RATES IMPROVE WITH APPLIANCE TITRATION?

Success = AHI ≤ 10
Success rate increased 27% (From 63% to 90%) due to titration

Success = RDI ≤ 15
Success rate increased 20% (from 47% to 67%) due to titration
Titration Options

- Home Sleep Testing
- In lab PSG

Matrix Plus
MATRx

A remotely-controlled mandibular protrusion device enabling physicians to:

1. Accurately select which patients will respond to oral appliance therapy and
2. Prescribe the therapeutic protrusive position for each responder
Sleep Theragnostics with MATRx plus
Accurately predict **who** and **how** to treat
What is a Sleep Theragnostic?

- Selects OSA patients who will respond to oral appliance therapy
  - Eliminates appliance failures

- Determines an effective target position for treatment
  - Eliminates guesswork
Patient Workflow

1. Physician Selects Patient for MATRx Study & Tray Fitting
2. Sleep Tech Performs In-Lab MATRx Titration Study
3. Physician Evaluates & Interprets MATRx Study Results
4. Physician Prescribes OAT with Target Protrusive Position
MATRx plus Components

- Tablet
- Recorder
- Mandibular Positioner
- Trays with TD Clip
- Effort Belt
- Nasal Cannula
- Pulse Oximeter
Mandibular Positioner

Remote-controlled Mandibular Positioner

Temporary Dental Trays
Tray Features

OATRx Scale

Incisal Groove
Record the Reference Number
Size and Trim the Trays

2 sizes: Medium and Large
Take the Impressions
Take the Scale Readings
Record the Readings for the Lab

Patient Assessment for a MATRx™ Study
to be signed by a dentist
The MATRx Study Night

- Polysomnogram (PSG) based study using temporary titration trays
- Mandible is protruded by mouse click in the control room, while the patient sleeps
- Mandibular position is titrated within the specified range using 0.2mm steps, in response to respiratory events
- If possible, patient is studied in supine and lateral, REM and NREM
“Just like CPAP titration”
Interpretation of MATRx Data

Criteria needed for predicting success with oral appliance therapy:

- 1 or less apnea or hypopnea in a 5 minute window of REM supine
- REM lateral can be used if REM supine is not observed AND the patient is a confirmed side sleeper
Predictive Accuracy: Efficacious Protrusive Position

Accuracy = 85.4%
Predicting Outcome - by MATRx Results

Predicted Success

Baseline | Therapy

Predicted Failure

Baseline | Therapy

AHI
Sleep Theragnostic Report

**Oral Appliance Study Prediction:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Range Of Motion (mm):</td>
<td>-0.8 to 6.5</td>
</tr>
<tr>
<td>Range of Motion Tested During Study (mm):</td>
<td>-0.9 to 5</td>
</tr>
<tr>
<td>Oral Appliance Outcome Prediction:</td>
<td>Responder</td>
</tr>
<tr>
<td>Suggested Therapeutic Protrusion Target (mm):</td>
<td>3.2</td>
</tr>
<tr>
<td>Suggested Therapeutic Protrusion Target (%):</td>
<td>54.8 %</td>
</tr>
</tbody>
</table>

**Graph:**

- Habitual: -0.8 mm
- Target: 3.2 mm
- Max: 6.5 mm
Effect of VDO

• N = 26  18 M, 8 F
• AHI: 7 – 74
• TAP III
  • Duplicate lower (one at 7 mm VDO, one at 10 mm VDO) SAME protrusion (protrusion not noted)
  • BOTH 7 and 10 mm VDO decreased AHI and snoring but NO significant difference between the two
• GENDER:
  • Males: 10 mm VDO BETTER
  • Females: 10 mm VDO same or worse
VDO Protocol Recommendations

• Keep to minimum
• Increase more with
  • poor nasal patency
  • Larger curve of Spee
  • large tongues
• Titrate out to max position
  • If that didn’t work, back up half way and add 2 mm vertical and start forward again
• Sheets of acrylic (can buy and add same thickness)
Summary

• Wild, wild west out there

• Pick your poison

• Pros and Cons of each

• Staff time / patient time / $$$ / Time to treatment
NEVER GIVE UP