Primary Snoring Evaluation and Treatment

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Disclosures

Apnicure
Minor stock holder – sleep apnea device

Siesta Medical
Minor stock holder – sleep apnea device

Patent Pending 61/624,105
Sinus diagnostics and therapeutics

Overview

• Snoring impact
• Evaluation of snoring
  – History
  – Physical examination
  – Testing
• Treatment of snoring
  – Non-surgical
  – Devices
  – Surgical

Who Snored?

"Bedlam in the Boudoir" J. Dugan 1947

20 out of 32 presidents snored: Washington, both Adams, Van Buren, Fillmore, Peirce, Buchanan, Lincoln, Johnson, Grant, Hayes, Arthur, Cleveland, FDR

FDR snored so loudly, that complaints were filed from nearly every patient on his hospital ward.
How Loud is Loud?

• WHO rating / Schafer Thieme 1996
  
• Calm breathing at 10 cm 25dB
  – Barely audible
• Loud breathing at 1m 40 dB
  – This is the threshold for snoring
• “Acoustic Pollution” 55 dB
• Loudest recorded 87.5 dB
  – As loud as a diesel engine in a Greyhound bus

Measurement of Snoring

• No agreed upon method for measurement
  – Microphone, piezoelectric vibration, nasal pressure oscillations
• Measurement of snoring by sleep technologists listeners demonstrated a kappa of 0.49 (moderate)
• Not clear what characteristic is important
  – Amplitude, frequency, intensity, duration
• Bed partner survey commonly used
  – VAS scale most common, though others are used.

Snoring Etiology

• Starling resistor theory
  – Increased resistance at the nose causes collapse downstream

The Impact of Snoring

• Incidence of habitual snoring
  – Men 35 - 45 %
  – Women 15 - 28%

• Risk factors
  – Increasing age, maleness, obesity, alcohol, sedative use, nasal obstruction

• Effects
  – No excess cardiovascular risk after 10 years

• Vibration
  – Vibration model in rabbits demonstrated endothelial damage from vibration separate from respiratory effects

Knuiman Chest 2006
Tishler JAMA 2003
Marin Lancet 2005
Cho Sleep 2011
Treatment Effects

- **Patient Effects**
  - Reduction in Epworth Sleepiness Scale
  - Influence on stroke

- **Bed Partner Effects**
  - Improved depression score (BDI) Uloza Sleep Breath 2010
  - Improved sleep quality Blumen Eur Respir J 2009
    - % light sleep, arousal index lower

Non-Surgical Approaches

- Position Therapy
- Weight Loss
- Singing?
- Medical Treatment of Nasal Obstruction

Device Approaches

- Mandibular Repositioning Device

Device Approaches

- Essential Oils for snoring Prichard Physio Res 2004
  - Snoring reduction
  - 82% in treatment group
  - 44% in placebo
Snoring Pillows

- Cervical Positioning Kushida Sleep Res Online 1999
- Improved snoring and apnea significantly

Snoring Aids

- Prospective randomized study Michaelson Oto HNS 2004
- Oral spray lubricant, Breathe Rite, Snore no more pillow
- No significant subjective or objective effect

- Patients with and without OSA
Surgical Approaches

- Nasal Procedures
- Palatal Procedures
- Tongue Procedures
  - None indicated for snoring alone

Nasal Procedures

Varying ability to improve snoring –
(you already heard about this…)

Palatal Procedures

- Palatal Stiffening Procedures
  - Injection Snoreplasty
  - Cautery Assisted Palatal Stiffening
  - RF methods – Temp controlled, coblation
  - Pilar Implants

- Reduction Procedures
  - UP3, UPF, LAUP
  - Uvulectomy

Injection Snoreplasty

- Injection of sclerosing agent into soft palate
- Can reinject 6 weeks later in 2 lateral areas
- 2cc of 3% Na tetradecyl sulfate
- 1cc 2% lidocaine then 1cc 99% denatured alcohol
- Snoring “no longer a problem” in 92% of cases

- First described by Strauss Arch Otolary 1943!
Injection Snoreplasty Technique

Cautery Assisted Palatal Stiffening (CAPSO)

- Use of cautery in the office to denude palatal mucosa and create scar
- CAPSO  
  Mair Oto HNS 2000
- Modified CAPSO  
  Pang Oto HNS 2007
  - VAS 8.3 – 3.3 after 3 months
  - 13/13 with improvement
Radiofrequency Ablation

- Temperature Controlled v. Coblation
- Numerous studies with improvement
- Both with moderate effect
- Recurrence in 75% - satisfaction 25%
  - Hultcranz Eur Arch Otolar 2010
- Study of 77 patients s/p RFA with 6 year follow up
  - Bed partner relapse in 92.7 cases
  - VAS pre-op 8.1 post op 3.5 follow up 5.7
  - DeKermadec Eu j oto 2014

Pillar Implants

- Insertion of 3 Dacron foreign bodies creating fibrotic reaction
- Short term effectiveness in many studies
- QOL, snoring, AHI improved
  - Friedman Oto HNS 2006
  - Walker Oto HNS 2007
  - Gillespie Oto HNS 2009

Pillar Implants

- One long term study
  - Rotenberg Lar 2012
- Prospective cohort study
  - No change in BMI, minimal extrusion
- At 1 year, 95% would recommend to a friend
- At 4 years, only 22% would recommend to a friend
Laser Assisted Uvulopalatoplasty (LAUP)

- Serial re-shaping of soft palate – can reduce size of tonsils
- Typically done in office setting
- Serial sessions (1-4) usually at least 6 weeks apart
- Surgeon can “fish mouth” uvula by reducing central bulk
- “French” or “Brittish” method
  – “British” method involves ablation of mucosa of anterior soft palate (similar to injection snoreplasty)
- Application of Kenalog in Orobase decreases pain
  Li Lasers Surg Med 2011

- Can also use CO2, KTP, Argon (electrocautery, etc)

LAUP Stage II

- Revise trenches if needed
- Can add “Brittish” central lesion

LAUP vs. UP3

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<thead>
<tr>
<th></th>
<th>UP3</th>
<th>LAUP</th>
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<tbody>
<tr>
<td>Improvement in Snoring Short term</td>
<td>89%</td>
<td>83%</td>
</tr>
<tr>
<td>Improvement in Snoring Long term</td>
<td>83%</td>
<td>76%</td>
</tr>
<tr>
<td>Snoring abolished</td>
<td>19%</td>
<td>15%</td>
</tr>
<tr>
<td>Snoring a lot better</td>
<td>58%</td>
<td>28%</td>
</tr>
<tr>
<td>No longer separate</td>
<td>81%</td>
<td>66%</td>
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Conclusions

• Snoring is a prevalent condition that affects quality of life, social interaction, and possibly health
• Behavioral, medical, and surgical interventions can improve snoring with varying success
• More work needs to be done to define the physiological and health effects to put snoring into perspective with respect to treatment in the health care system