Pediatric Turbinate Hypertrophy

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Introduction: Turbinate Hypertrophy

- Chronic rhinitis leading to turbinate hypertrophy common in both children and adults
  - 20 million people in U.S
  - $2 billion annually
- Infectious or non-infectious
- Allergic or non-allergic
Turbinate hypertrophy: Children

• Smaller intranasal anatomy

• Obstruction due to turbinate hypertrophy plays larger role in pediatric patients relative to adults
Turbinate Anatomy

Figure 1

- Superior turbinate
- Middle turbinate
- Inferior turbinate
- Periosteum
- Turbinate bone
- Tissue to be resected
Introduction

• Children with adenotonsillar obstruction
  – Adenoidectomy or Adenotonsillectomy alleviates obstruction in presence of enlarged turbinates

• Surgical intervention to reduce turbinate hypertrophy *may* be additional option
Medical Management

- Antihistamines
- Decongestants
- Topical nasal steroids/nasal saline/sinus rinses
- Antibiotics if sinusitis
- Immunotherapy if allergic
Surgical Options

- Cold-steel turbinectomy/turbinoplasty
- Lateralization/outfracture of inferior turbinate
- Diathermy (electrocautery)
- Laser
- Cryosurgery
- Powered Microdebrider
- Radiofrequency Ablation
- Coblation
What Is Coblation?

• Bipolar configuration
• RF current through conductive solution
  – 100-300 V, 100-500 kHz
• Plasma field by RF current
  – In NaCl, orange glow
• Not heat-driven
• Molecular dissociation
• Minimal thermal penetration
  – Cell death (<125 μm)
Coblation

- Low frequency
  - Decreased tissue penetration
  - Minimal collateral tissue damage
  - Surface temperatures 40° to 70° C
- Shorter current path
  - Control of energy delivery
- Volumetric tissue removal

Electrocautery

- Monopolar spark between electrode and tissue
- Localized tissue heating
  - 450° to 600° C
- Tissue desiccation and vaporization
Coblation® Turbinate Wand

- Needle-tip wand with contact markers
- Coblation foot pedal control
- Saline gel application for each turbinate entry
- Varying durations/contacts/entries
Coblation Turbinate Reduction

- Coblation shrinks submucosal tissue
  - Preserves mucosal and glandular architecture
  - Immediate reduction in nasal obstruction, with greater reduction over time
  - Thermal lesion remains after tissue vaporization
  - Soft tissue attenuation/contracture progresses
Coblation Turbinate Reduction

- Operating room or in-office procedure
  - Topical/Local anesthetic
  - <25% require post-operative narcotic analgesic

- Fast, minimally invasive procedure
  - 20-30 seconds per side
Coblation Turbinate Reduction: Experience in Adults

- Fast
- In-office
- Restores normal breathing immediately
- Improvement progresses over time
- Minimal side effects
Coblation Turbinate Reduction: Experience in Adults

- 50% reduction in nasal blockage at 1 week, 3, 6, and 12 months
  - Easy to perform in OR or office
  - Minimal pain; low incidence of post-op crusting
  - Each lesion created in 10 seconds
  - Minimal damage to surrounding tissue


Clinical Effectiveness of Coblation Inferior Turbinate Reduction

OBJECTIVE

• Determine safety and clinical efficacy of Coblation inferior turbinate reduction

DESIGN

• 26 patients with inferior turbinate hypertrophy treated in-office with Coblation

Clinical Effectiveness of Coblation Inferior Turbinate Reduction


<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline</th>
<th>Δ at 3 months</th>
<th>Δ at 6 months</th>
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<tbody>
<tr>
<td><strong>RSI domains</strong></td>
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<tr>
<td>Facial</td>
<td>30.4</td>
<td>−11.2</td>
<td>−17.2*</td>
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<tr>
<td>Nasal</td>
<td>40.3</td>
<td>−10.5*</td>
<td>−20.1*</td>
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<tr>
<td>Oropharyngeal</td>
<td>22.5</td>
<td>−4.3</td>
<td>−12.2*</td>
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<tr>
<td>Systemic</td>
<td>22.5</td>
<td>−7.3*</td>
<td>−12.6*</td>
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<tr>
<td>Overall</td>
<td>28.5</td>
<td>−8.7*</td>
<td>−15.8*</td>
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<tr>
<td><strong>Nasal questionnaire</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Nasal obstruction</td>
<td>3.4</td>
<td>−1.1*</td>
<td>−1.5*</td>
</tr>
<tr>
<td>Time obstructed</td>
<td>3.5</td>
<td>−1.1*</td>
<td>−1.2*</td>
</tr>
<tr>
<td>Nasal stuffiness</td>
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<td>−0.6</td>
<td>−0.8*</td>
</tr>
<tr>
<td>Mucus production</td>
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<td>−0.2</td>
<td>−0.3</td>
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<tr>
<td>Postnasal discharge</td>
<td>2.3</td>
<td>−0.4</td>
<td>−0.5</td>
</tr>
<tr>
<td>Snoring</td>
<td>2.8</td>
<td>−0.4</td>
<td>−0.5</td>
</tr>
<tr>
<td>Overall nasal symptoms</td>
<td>3.5</td>
<td>−1.1*</td>
<td>−1.2*</td>
</tr>
</tbody>
</table>
CONCLUSIONS

- Inferior turbinate reduction by Coblation is effective for inferior turbinate hypertrophy
- Clinical benefit persists for at least 6 months

Coblation vs. Microdebrider

- 60 patients randomized/not blinded
- 30 coblation/30 microdebrider
- 3, 6, 12 month follow-up
- Improvement at all time points in both groups
  - Nasal obstruction
  - Postnasal drip
Coblation vs. Microdebrider

- Symptoms of nasal obstruction and nasal cavity better in microdebrider group at 12 months
- HOWEVER, only one coblation needle pass, unknown contact duration anteriorly

Radiofrequency vs. Submucous resection

- 75 patients
- 25 submucous resection/25 radiofrequency/25 controls (medical management)
- Followed 1 week, 1 month, 3 months
- Both techniques equally effective in short-term follow period
  - Nasal obstructive symptoms, rhinomamometry
Radiofrequency vs. submucous resection: RF benefits

- Local anesthesia
- Preserves nasal epithelium
- No increased secretions or crusting
- No nasal packing
- Sooner return to work/activities; minimal pain; in-office
  - May outweigh increased cost of RF wand

Radiofrequency vs. placebo

- 32 adult patients
- In-office/local anesthesia
- RF probe with or without energy delivery
- Results:
  - Treatment group improved over placebo group at 8 wks/ 6mo follow-up
    - Frequency/severity of nasal obstruction
    - Ability to breathe through nose

Radiofrequency vs. Placebo

- RF group at 2 years follow-up
- Same improvement in symptoms
  - Frequency/severity of nasal obstruction
  - Ability to breathe through nose
- Statistically significant at 8 weeks and 2 years follow-up (p<0.05) compared with pre-op with sustained benefit.

Pediatric Patient Selection

- Children with nasal obstruction alone
  - History of allergic/non-allergic rhinitis with non-response or non-compliance to medical therapy
- Children with turbinate hypertrophy secondary to other problems
  - Turbinate reduction in conjunction with other procedures such as sinus surgery or T&A
- Pediatric OSA?
- Previous/concurrent adenoidectomy?
Pediatric Patient Selection

- Typically treat children >6 years that have failed trial of medical therapy
  - Most children <3 years not yet truly diagnosed with allergies
  - Young children have other sources of airway obstruction such as adenoid hypertrophy
Pre- op Evaluation

- History/physical
- Nasal endoscopy
- Acoustic rhinometry
- Sinus CT Scan to rule out concomitant anatomic abnormalities/sinus disease/polyps
- Prior medical management: poor outcome/compliance
Pediatric Coblation Turbinate Reduction: Surgical Technique

- 0-degree endoscope
- Turbinate injection with 1% lidocaine or saline
  - 2-3 cc per side
- Turbinate wand channeling
- Topical cottonoids with oxymetazoline
Coblation Pediatric Turbinate Reduction Technique

• Create two anterior lesions within the bulk of the turbinate
  – One superior, one inferior

• 10 seconds per lesion

• Coblation setting of 6
Inferior Turbinate Channeling

• Before each insertion, apply saline gel or other conductive media to ensure formation of plasma field

• Activate controller foot pedal as advance wand tip into the inferior turbinate (power setting 4-6 coblate based on user preference)
Inferior turbinate channeling

- Stop insertion at appropriate visualization marker and continue to hold coblation pedal for 10 seconds to create lesion
  - First marker for anterior turbinate
  - Last marker for posterior turbinate
- Withdraw inactivated wand to additional markers and repeat ablation
- When last ablation complete, remove inactivated wand
- Repeat steps to create additional channels
Post-op Evaluation

- Follow-up at 3-6 weeks, 6 months, 12 months
- Physical exam/symptom improvement/reduction in medical therapy
- Acoustic rhinometry
- Allergy follow-up as needed
Adult vs. Pediatric Techniques

- Similar settings (4-6 coblate)
- Similar duration of contact (10 seconds)
- Consider fewer passes/fewer contact points in children
- No data on pediatric outcomes
Surgical Reduction of Inferior Turbinates with Coblation in Children: Multi-center Trial

- Prospective/Controlled Study (CHSD/MEEI/UCLA)

- Assess nasal obstructive symptom reduction in children following Coblation turbinate reduction (12 month follow-up)
Pediatric turbinate reduction: CHSD/MEEI/UCLA

- Pediatric turbinate reduction patients
- Selection criteria
  - Allergic/Non-allergic rhinitis
  - Prior medical therapy failure
  - Nasal endoscopy/photos
  - Acoustic rhinometry
  - CT Scan
  - Absence of adenotonsillar hypertrophy
- Surgical intervention
- Follow-up at 4 weeks, 6 months, 12 months
Pediatric turbinate reduction: CHSD/MEEI/UCLA

• **Medical management**
  - Topical nasal steroids, oral antihistamines, immunotherapy, environmental controls where possible

• **Surgical intervention**
  - Coblation turbinate reduction (without concomitant procedure)

• **Follow-up examination**, endoscopic photos, questionnaire, acoustic rhinometry
Pediatric turbinate reduction: CHSD/MEEI/UCLA

- Clinical outcomes assessment
  - Does coblation turbinate reduction improve nasal obstruction in children with allergic and non-allergic rhinitis?
  - Does coblation turbinate reduction obviate need for medical therapy?
  - Are the benefits long-lasting?
Coblation Turbinate Reduction

- **Stand-alone procedure**
  - Normal tonsils/adenoids
  - Poor response to medical therapy

- **Combined procedure**
  - T&A with significant turbinate hypertrophy
  - Endoscopic sinus surgery
Coblation Use

• When is it indicated to combine T&A or Adenoidectomy with turbinate reduction?
  – Allergic patients with ATH
  – Severe turbinate hypertrophy with ATH
  – Severe OSA
  – One anesthetic– get it all done!
Coblation Use

• Indications to perform separately
  – Turbinates alone—non-invasive, minimal recovery, small tonsils/adenoids
  – Especially if surgeon does not coblate tonsils/adenoids

• T&A, Adenoid alone—younger child, small turbinates
Otolaryngologist Objections

- **Cost**
  - Minimal morbidity and long-term benefits outweigh wand cost
Otolaryngologist Objections

- Reluctance to change technique
  - Submucosal reduction
  - Ease of performance
  - Patient satisfaction
  - Surgeon satisfaction
  - Ancillary staff satisfaction
Otolaryngologist Objections

• Reluctance to perform in children
  – Safety/efficacy/minimize medical therapy
  – Just as OSD under-recognized, Turbinate hypertrophy under-recognized
Conclusions

• Nasal obstruction due to turbinate hypertrophy is common in adults and children
• Coblation turbinate reduction is safe, effective, and long-lasting in adults
• Clinical experience is promising in children
• Prospective data is forthcoming
Studies


