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

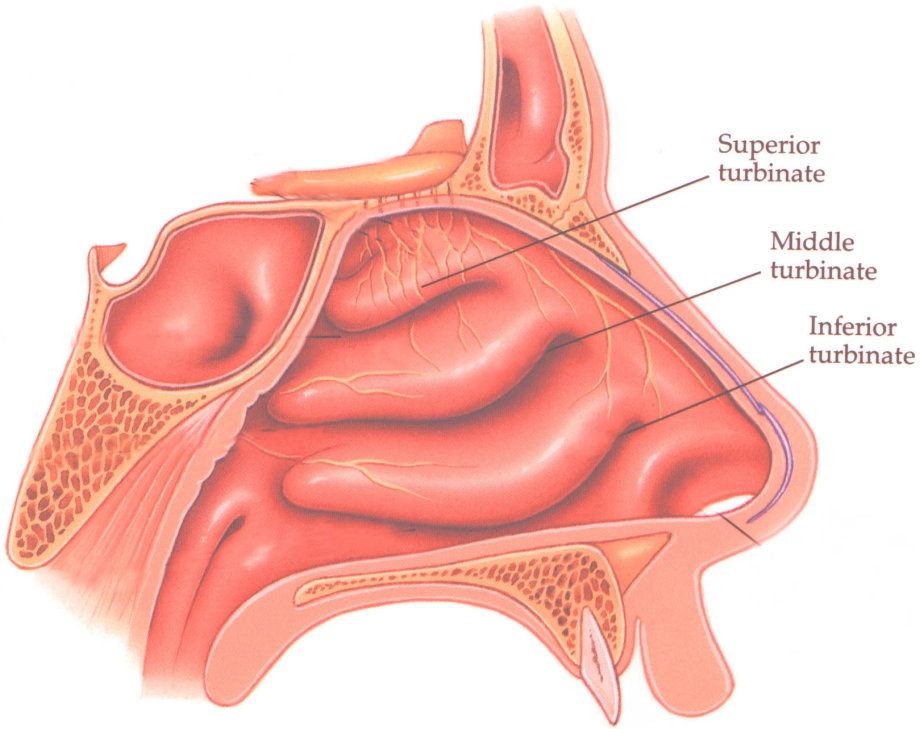
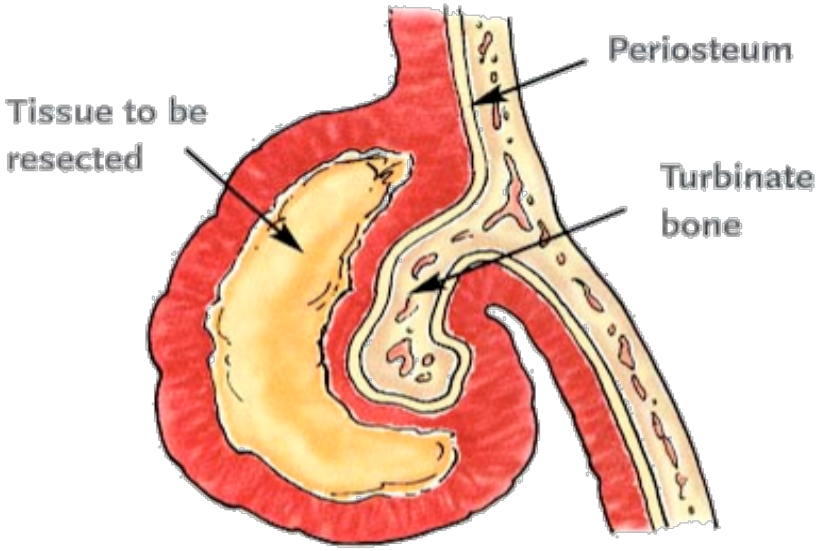


Figure 1



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

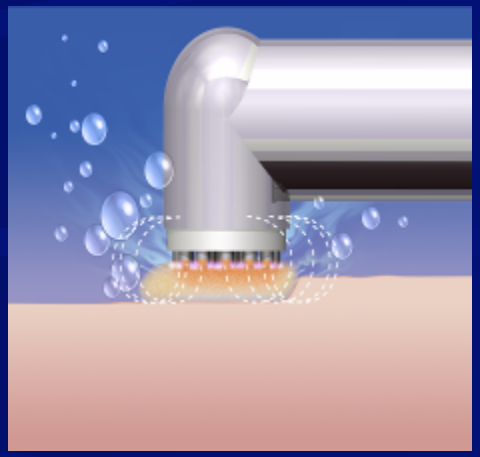
- Cold-steel turbinectomy/turbinoplasty
- Lateralization/outfracture of inferior turbinate
- Diathermy (electrocautery)
- Laser
- Cryosurgery
- Powered Microdebrider
- Radiofrequency Ablation
- Coblation

What Is Coblation?

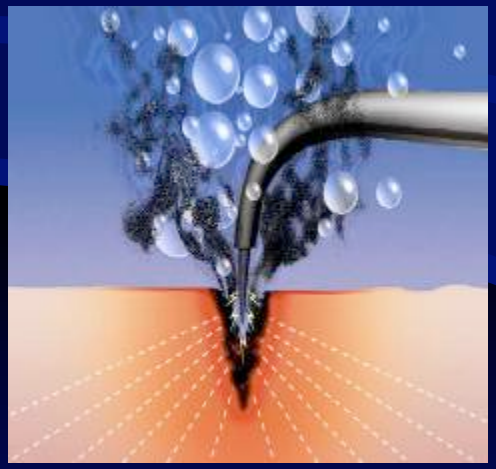
- Bipolar configuration
- RF current through conductive solution
  - 100-300 V, 100-500 kHz
- Plasma field by RF current
  - In NaCl, orange glow
- Not heat-driven
- Molecular dissociation
- Minimal thermal penetration
  - Cell death (<125 μm)

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

Bäck LJ, Hytönen ML, Malmberg HO, Ylikoski JS. Laryngoscope. 2002;112:1806–1812.

Bhattacharyya N, Kepnes LJ. Otolaryngol Head Neck Surg. 2003;129:365–371

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

Bhattacharyya N, Kepnes LJ. Otolaryngol Head Neck Surg. 2003;129:365-371.

Clinical Effectiveness of Coblation Inferior Turbinate Reduction

Bhattacharyya N, Kepnes LJ. Otolaryngol Head Neck Surg. 2003;129:365-371.

Variable	Baseline	Δ at 3 months	Δ at 6 months
RSI domains			
Facial	30.4	–11.2	**–17.2***
Nasal	40.3	**–10.5***	**–20.1***
Oropharyngeal	22.5	–4.3	**–12.2***
Systemic	22.5	**–7.3***	**–12.6***
Overall	28.5	**–8.7***	**–15.8***
Nasal questionnaire			
Nasal obstruction	3.4	**–1.1***	**–1.5***
Time obstructed	3.5	**–1.1***	**–1.2***
Nasal stuffiness	3.0	–0.6	**–0.8***
Mucus production	2.1	–0.2	–0.3
Postnasal discharge	2.3	-0.4	–0.5
Snoring	2.8	–0.4	–0.5
Overall nasal symptoms	3.5	**–1.1***	**–1.2***

Clinical Effectiveness of Coblation Inferior Turbinate Reduction

CONCLUSIONS

- Inferior turbinate reduction by Coblation is effective for inferior turbinate hypertrophy

- Clinical benefit persists for at least 6 months

Bhattacharyya N, Kepnes LJ. Otolaryngol Head Neck Surg. 2003;129:365-371.

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

Lee JY, Lee JD. Laryngoscope 116:729-734, 2006.

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

Cavaliere M, Mottola G, Iemma M. Otolaryngol Head Neck Surg 133(6): 972-978, 2005.

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

Nease CJ, Krempl GA. Otolaryngol Head Neck Surg 2004; 130:291-299.

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.

Porter MW, Hales NW, Nease CJ, Krempl GA. Laryngoscope 116:554-557, 2006.

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

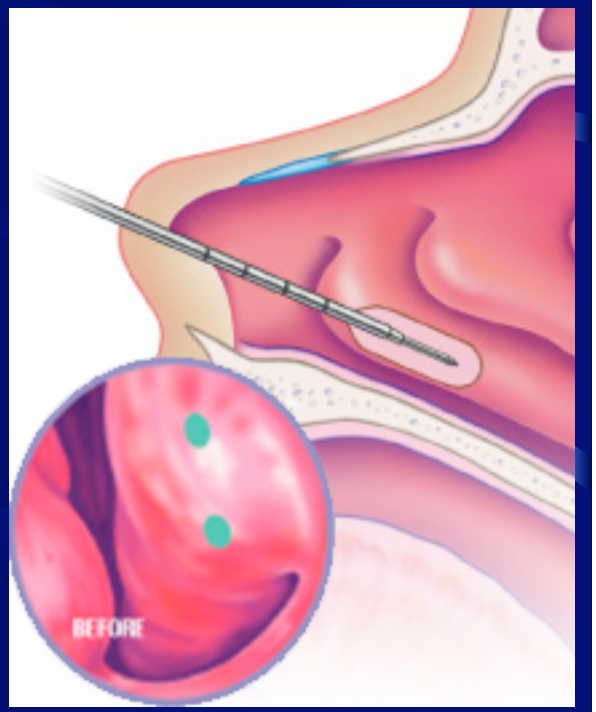
- History/physical
- Nasal endoscopy
- Acoustic rhinometry
- Sinus CT Scan to rule out concomitant anatomic abnormalities/sinus disease/polyps
- Prior medical management: poor outcome/ compliance

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

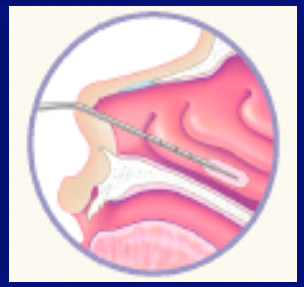
Coblation Pediatric Turbinate Reduction Technique

- Create two anterior lesions within the bulk of the turbinate
  - One superior, one inferior
- 10 seconds per lesion
- Coblation setting of 6

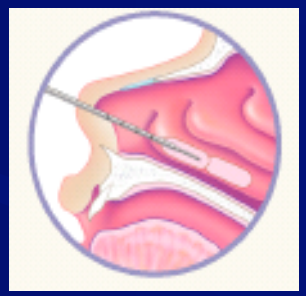


Inferior Turbinate Channeling

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

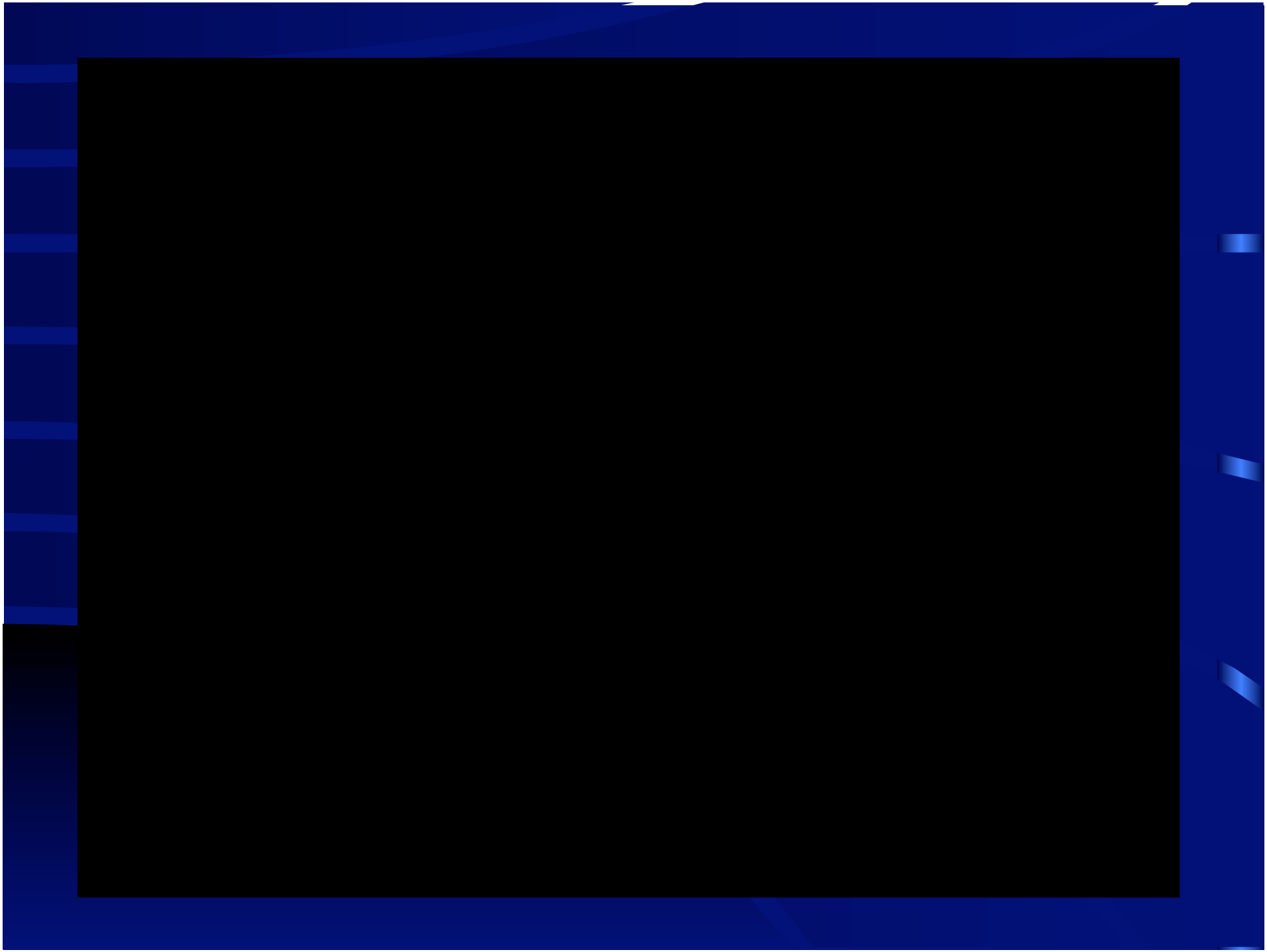


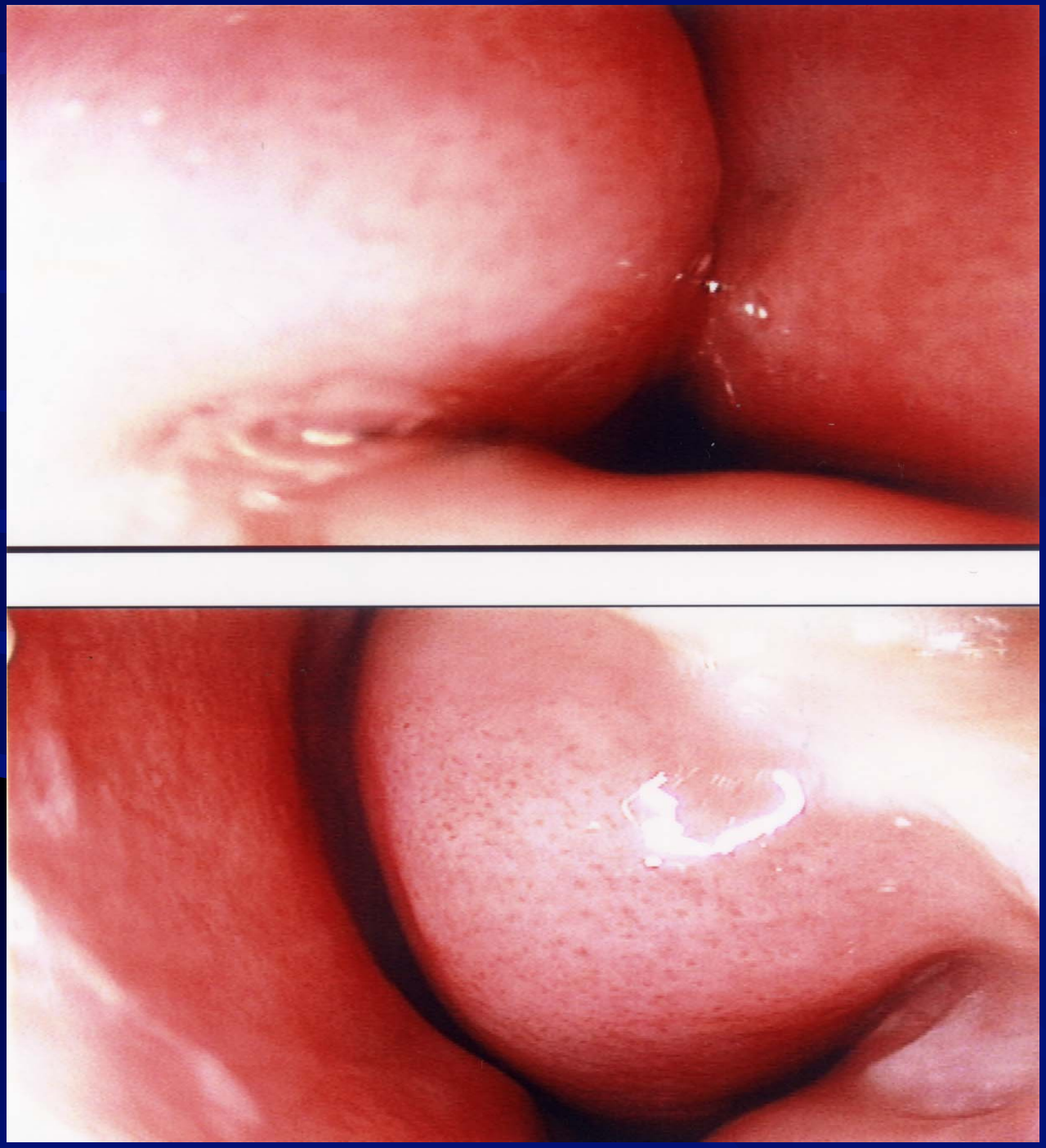
- Activate controller foot pedal as advance wand tip into the inferior turbinate (power setting 4-6 coblate based on user preference)

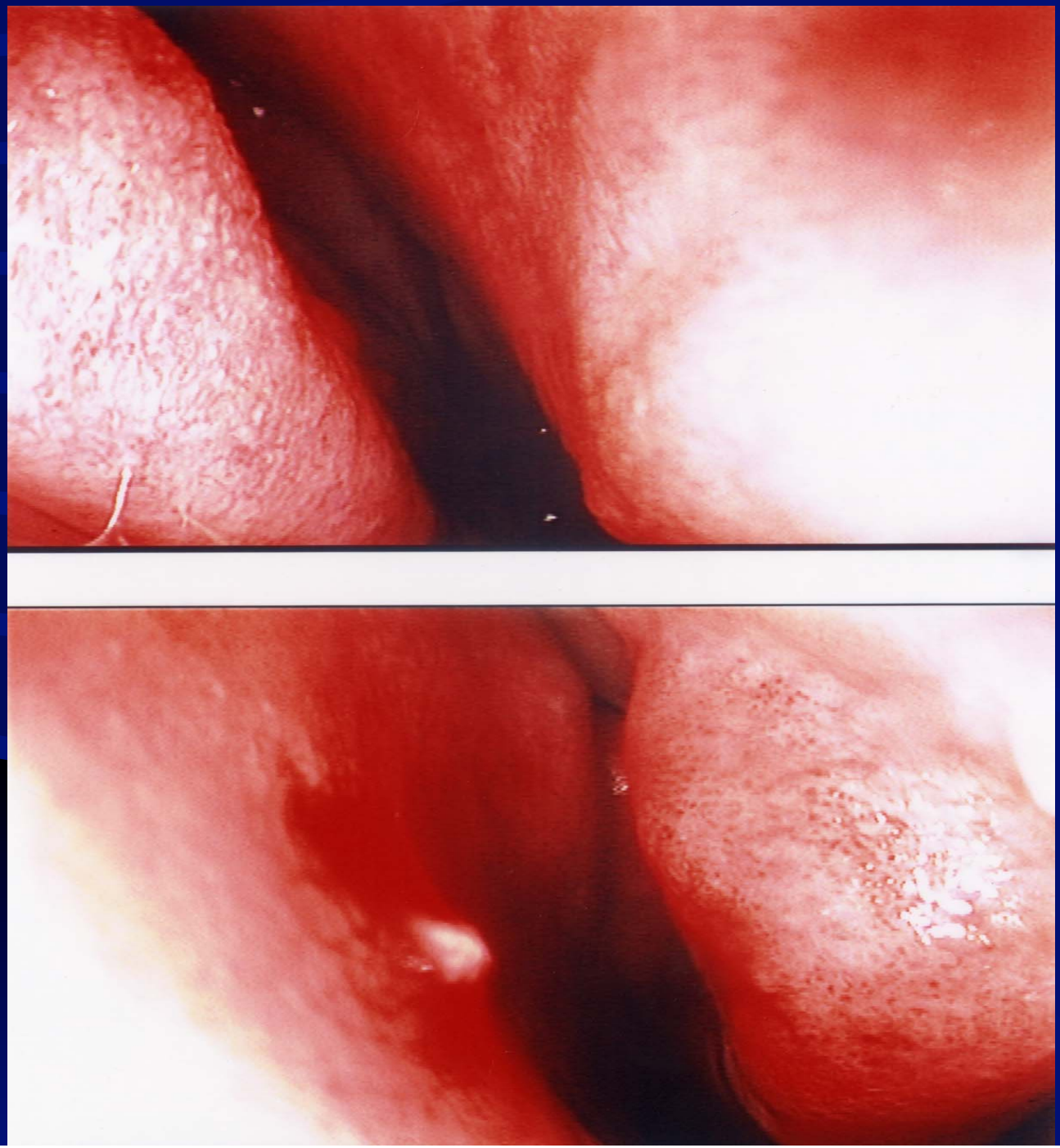


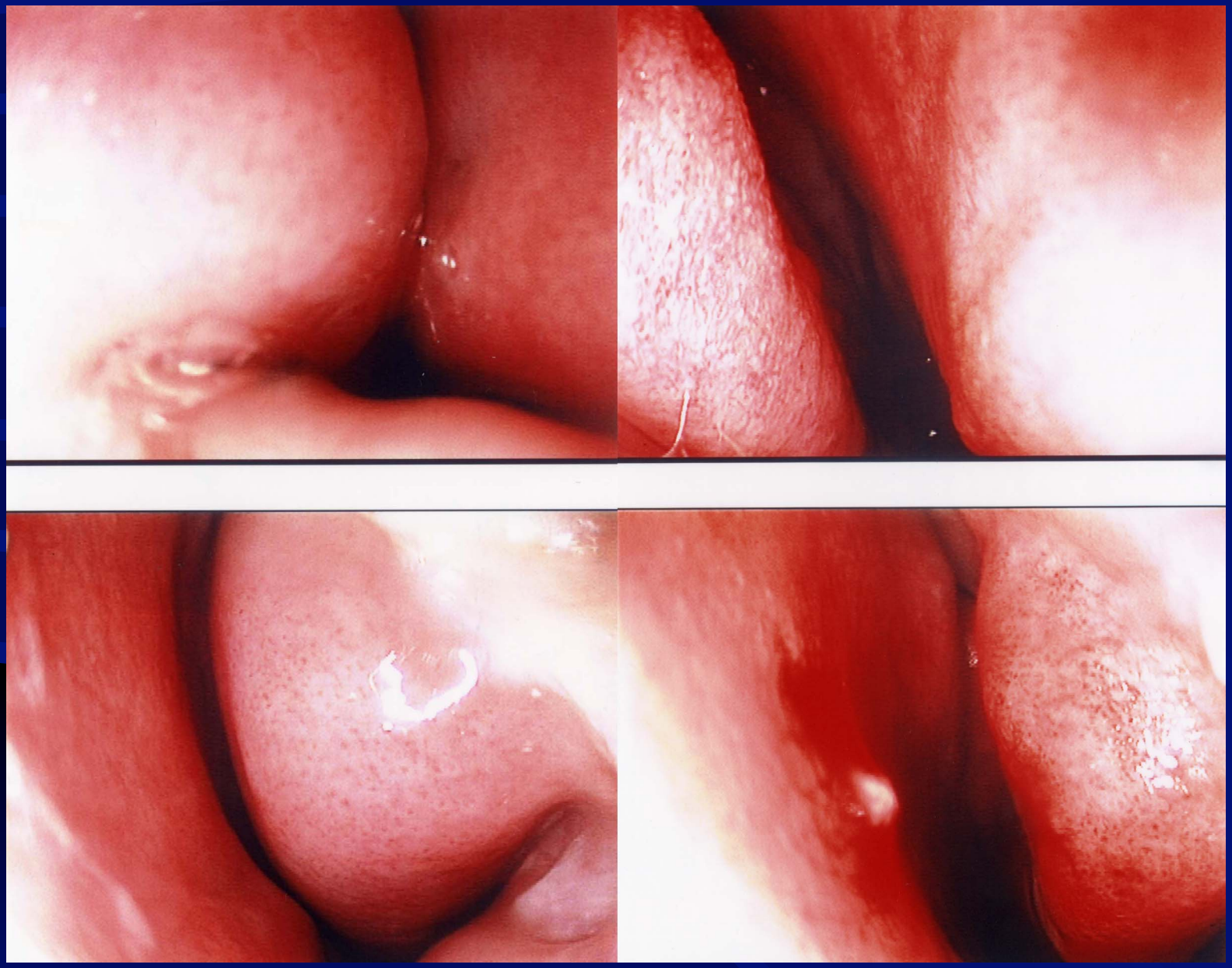
Inferior turbinate channeling

- 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

1. Pang YT, Willatt DJ. Laser reduction of inferior turbinates in children. Singapore Med J 1995; 36(5):514-516.
2. Weider DJ, Sulzner SE. Inferior turbinate reduction surgery in children. Ear Nose Throat J 1998; 77(4):304-2, 314.
3. Hol MK, Huizing EH. Treatment of inferior turbinate pathology: a review and critical evaluation of the different techniques. Rhinology 2000; 38(4):157-166.
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5. Bäck LJ, Hytonen ML, Malmberg HO et al. Submucosal bipolar radiofrequency thermal ablation of inferior turbinates: a long-term follow-up with subjective and objective assessment. Laryngoscope 2002; 112(10):1806-1812.
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7. Bhattacharyya N, Kepnes LJ. Clinical effectiveness of coblation inferior turbinate reduction. Otolaryngol Head Neck Surg 2003; 129(4):365-371.
8. Chang CW, Ries WR. Surgical treatment of the inferior turbinate: new techniques. Curr Opin Otolaryngol Head Neck Surg 2004; 12(1):53-57.
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