

Pediatric Intracapsular vs Extracapsular Tonsillectomy: Current Status and Future Trends



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Disclosures

➤ None

Objectives

- Review intracapsular tonsillectomy techniques
- Compare outcomes of intracapsular vs extracapsular tonsillectomy
- Discuss intracapsular tonsillectomy in special populations

Tonsillectomy

- One of the most common pediatric surgeries done in the United States
- 300,000-500,000 tonsillectomies/year, < 15yo
- Indications
 - Sleep disordered breathing
 - Obstructive sleep apnea
 - Recurrent tonsillitis
- Common Complications
 - Primary vs secondary bleeding
 - Readmission for pain control, dehydration

AAO-HNS Guidelines

- Offer tonsillectomy:
 - Recurrent infections (Paradise Criteria)
 - Recurrent infections – antibiotic allergies, PFAPA, > 1 PTA
 - Sleep disordered breathing and tonsillar hypertrophy
 - Documented OSA
- Indications for PSG
 - <2 yo, obese, Down syndrome, craniofacial abnormalities, neuromuscular disorders, sickle cell disease, mucopolysaccharidoses
- Education
 - SDB/OSA may persist after tonsillectomy
- NO perioperative antibiotics
- YES single intraoperative dose of steroids
- Overnight stay - < 3yo, severe OSA (AHI >10 or SpO2 nadir < 80%)
- Pain control
 - Acetaminophen and ibuprofen or both
 - NO codeine younger than 12 yo
- Follow up and document bleeding/personal bleed rate

AAO-HNS Guidelines

Although the development group recognizes that partial intracapsular tonsillectomy (also known as tonsillotomy or intracapsular tonsillectomy) is frequently performed, we decided not to include it in this guideline because the evidence base is found predominantly in children undergoing complete tonsillectomy. Therefore, the group decided not to compare tonsillectomy and partial tonsillectomy outcomes; a separate commentary is being prepared to address this topic.¹¹

- Effectiveness in treatment of OSA and recurrent tonsillitis
- Objective and QOL outcomes
- Long-term outcomes - **Regrowth**

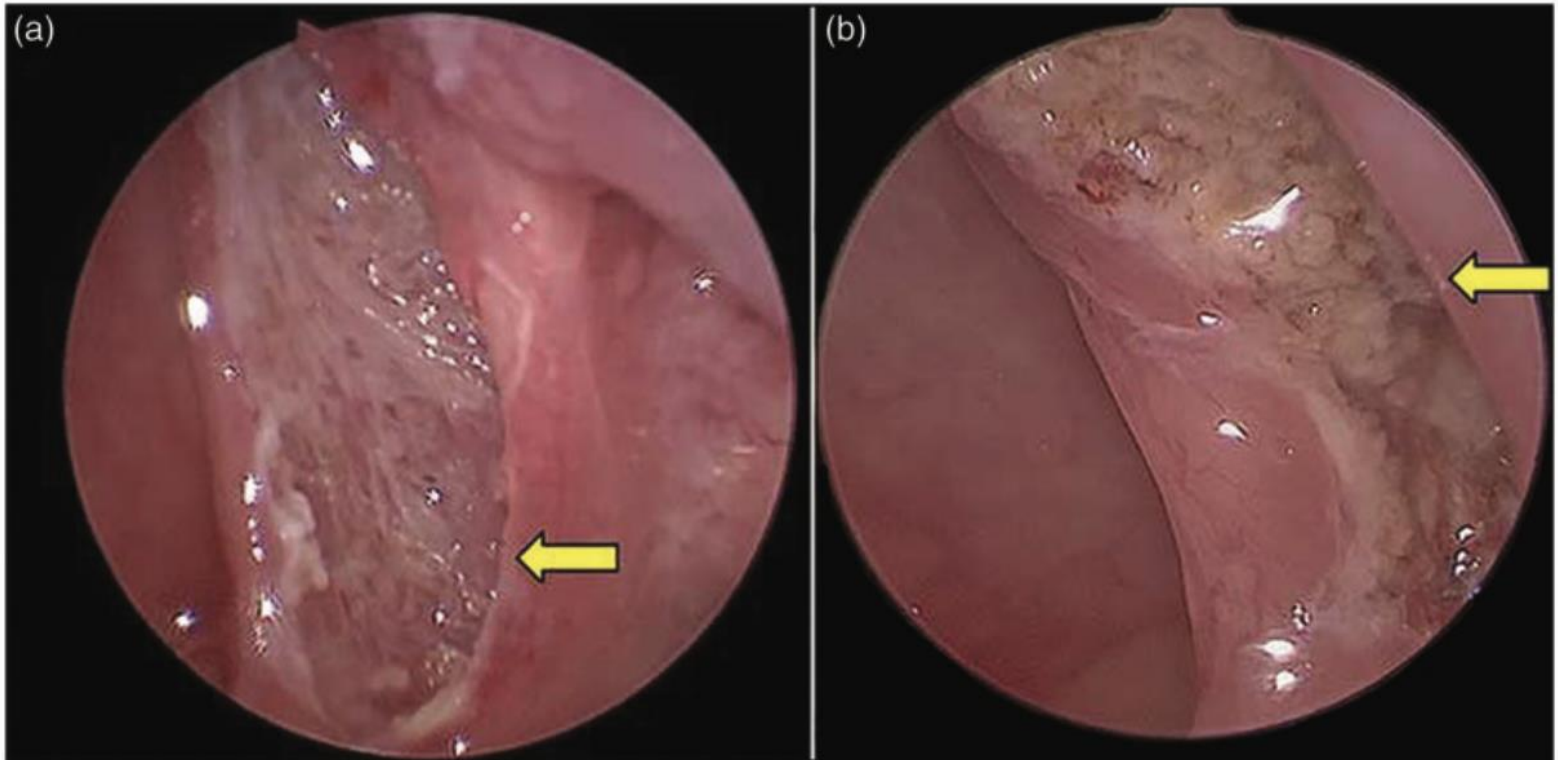
Mitchell et al. Clinical Practice Guideline: Tonsillectomy in Children (Update). *Otolaryngol Head & Neck Surg.* 2019;160(1S) S1-S42.

Parikh SR, et al. Why is there no statement regarding partial intracapsular tonsillectomy (tonsillotomy) in the new guidelines? *Otolaryngol Head & Neck Surg* 2019;160(2) 213-214.

Hot Topic

- Extracapsular (traditional)
 - Popularized early 1900's
- Intracapsular
 - AKA – tonsillotomy, subtotal tonsillectomy, partial tonsillectomy
 - First described 1910
 - More widely accepted 2002/2003
 - Removes tonsillar tissue while leaving tonsil capsule undisturbed
 - Capsule is biologic dressing – prevents exposure, injury, inflammation and infection of the pharyngeal musculature

Koltai PJ et al. Intracapsular tonsillar reduction (partial tonsillectomy): reviving a historical procedure for obstructive sleep disordered breathing in children. *Otolaryngol Head Neck Surg* 2003;129:532-538.



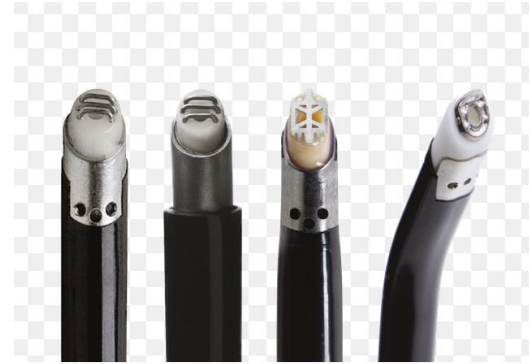
Revival of intracapsular tonsillectomy

- Koltai et al. 2003
- Retrospective study 1998 – 2002, Cleveland Clinic
- 243 children partial tonsillectomy; 107 total tonsil
 - Caregiver choice pre-op
- Equally effective in relief of sleep symptoms?
 - No significant difference in post op QOL (93% and 95% with marked improvement in symptoms)
- Less pain, more rapid recovery
 - On all days of recovery, less global pain
 - Less days of analgesic, less days to normal activity/diet
- - Higher blood loss intra-op (microdebrider)

Koltai PJ et al. Intracapsular tonsillar reduction (partial tonsillectomy): reviving a historical procedure for obstructive sleep disordered breathing in children. *Otolaryngol Head Neck Surg* 2003;129:532-538.

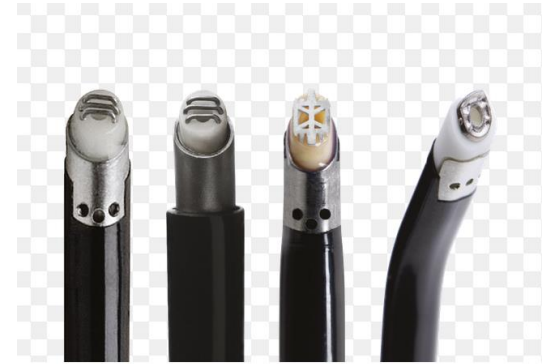
Techniques

- **Coblator**
- **Microdebrider**
- **Bipolar scissors**
- **Harmonic**
- **Cold steel**
- **Laser**



Techniques

- **Coblator/Plasma ablation**
- Sedgwick et al, 2022
- Significantly lower pain
 - Lower pain scores at earlier time points, lower absolute pain scores
 - Faster time to pain free
 - Less time on analgesia
- Faster return to normal
 - 2.8 days faster with intracap
 - Faster return to diet
- Effective! - similar sleep questionnaire scores post op
- Lower risk of post tonsillectomy bleed (total risk)
 - But no sig difference in return to OR rate
- Studies included: 0 – 2.9% regrowth rate (1- 4 years)



Techniques

➤ Microdebrider



Table 2. Prospective studies

References	Study design	Number of patients	Activity MT vs. ET	Pain MT vs. ET	Diet MT vs. ET	Operative time	Blood loss MT vs. ET
Derkay et al. [23]	Prospective, randomized, single-blinded	300	Median days to normal activity: 2.5 vs. 4 (p < 0.01)	Median days to last dose: 4 vs. 6.5 (p < 0.0001)	Median days to normal diet: 3.0 vs. 3.5 (NS)	10 vs. 8 min (p < 0.0001)	Greater than 25 ml: 15 vs. 4% (p < 0.01)
Sobol et al. [21]	Prospective, randomized, single-blinded	74	Mean days to normal activity: 2.4 vs. 3.8 (NS)	Mean days to last dose: 6.9 vs. 8.2 (NS)	Mean days to normal diet: 4.4 vs. 2.7 (p = 0.4)	20.9 vs. 16.9 min (p < 0.001)	45 vs. 30 ml (p = 0.1)
Lister et al. [22]	Prospective, randomized, double-blinded, paired control	25		Difference in mean pain scores days 1–9: 0.4–0.92 (p < 0.001 to 0.009)			

MT = Microdebrider intracapsular tonsillectomy; ET = electrocautery tonsillectomy; NS = not significant (p > 0.5).

- - Increased intraoperative blood loss (not clinically significant)
- - cost of debrider

Techniques

- **Bipolar electrocautery scissors**
 - Isaacson 2004
 - Scissors introduced in 1997
 - Remove approx. 90% of tonsil tissue, avoiding capsule
- **Harmonic scalpel**
 - Used for total tonsillectomy
 - Reported for intracap but no literature found
- **Laser**
 - Unkel et al (Germany) 2005 - 109 children
 - Decreased snoring/sleep symptoms. Improved swallowing
 - Post op pain for 1.5 days
 - No post op bleeding
 - 5 (4.5%) required tonsillectomy at 11-21 months post op

Intracapsular vs Extracapsular

- Walton et al – 2012 – Review of 16 RCTs
- PO Pain
 - Significantly faster resolution of pain (mean of 5 IT vs 7.6 ET days)
 - 10 studies found fewer doses of analgesic given
- PO hemorrhage
 - No difference in primary bleeding
 - Sig difference in secondary bleeding (0.7% IT, 2% ET)
- PO infection
 - No difference (short follow up, small number of patients)

Intracapsular vs Extracapsular

- Zhang et al. 2017 - Systematic review of 32 studies
- Effectiveness
 - No sig difference in QOL or satisfaction
 - Marked improvement in PSG for both
- PO pain and nausea
 - Back to normal activity and diet earlier in IT (~3 days)
- PO hemorrhage
 - Significantly lower hemorrhage rate in IT (secondary)
 - Odds reduced by 79%
- Recurrence
 - Symptoms - 3.99% IT, 3.21% ET
 - Reoperation for IT 0 - 8.3%, between 18mo and 10y

Intracapsular vs Extracapsular

- Sathe et al. 2017 - Systematic review of 16 RCTs
- Effectiveness
 - Both groups improved from baseline
 - No difference in QOL
- PO pain
 - Faster return to normal diet
- Regrowth
 - 2 studies combined – 2.4% required tonsillectomy
- *No firm conclusions

Intracapsular vs Extracapsular

- Lao et al. 2024 – 32 studies
- Effectiveness
 - No significant difference in QOL
- PO Pain
 - Shortened return to normal diet by 2.43 days in IT
 - Reduction in days needing analgesics
- PO Hemorrhage
 - Significantly lower risk of secondary bleeding
- Infection
 - Significant increase in infection within 1 year in IT (9%)
- Regrowth
 - Significant increase in regrowth in IT (10.8%)
 - Significant increase in reoperation rates (5.1%)

Regrowth

- Sagheer et al
- 12,145 intracapsular tonsillectomy, 13 surgeons, 15 years
- Revision rate 1.39%
 - Significantly younger than control (mean of 5yo vs 7.5yo)
 - <2yo are 18.4 times more likely to undergo revision
 - 2-4yo are 6.5 times more likely
 - No difference in ethnicity, sex, race
 - Higher risk of revision if indication is recurrent tonsillitis OR 2.7
 - Highest risk if SDB/OSA + recurrent tonsillitis OR 8.4
 - Hx of GERD

Special Populations

➤ Trisomy 21



- 62 IT, 224 ET
- IT more likely to be discharged <24 hours, less likely for readmission
- Less likely to need narcotics or steroids
- Less post op phone calls
- Bleed rate 1.6% IT, 2.7% ET (not sig)

Intracapsular Versus Total Tonsillectomy in Patients with Trisomy 21

Alisa Timashpolsky, MD ; Ashna Aggarwal, BS; Ryan Ruiz, MD, MS ; Conor Devine, MD

Case Report

Management of Periodic Fever, Aphthous Stomatitis, Pharyngitis, Adenitis with Intracapsular Tonsillectomy

Uche C. Ezeh, MS ; Philip J. Kahn, MD; Max M. April, MD 

➤ PFAPA

- 2 patients
- No fever recurrence at 14 and 18 mo follow up

Special Populations

Coblation® intracapsular tonsillectomy in children with recurrent tonsillitis:
Initial experience



Kiran Varadharajan^{a,*}, Nadine Caton^b, Jack Faulkner^c, Sameer Khemani^d

➤ Recurrent tonsillitis

- 80 patients
- 13 mo follow up
- Significantly improved infective score
 - Tonsillar volume reduction
 - Removal of foci of bacterial or viral colonization

Current Status and Future Trends

➤ Current Status

- Survey sent to ASPO members – 227 (42%) responded
- 20% perform IT for SDB or OSA
 - 55% microdebrider, 36% coblator
- No significant difference between technique and practice setting, ped fellowship training or time in practice
- Most common reason for not IT → concern for regrowth
 - Future infection, malignancy risk, experience performing revision

Current Status and Future Trends

➤ Future Trends

- Evidence based research has shown effectiveness in reducing symptoms and improved postoperative morbidity
- Risk of revision tonsillectomy likely less than risk of post op bleed (consider QOL/trauma)
- 20% is the 'Tipping Point'

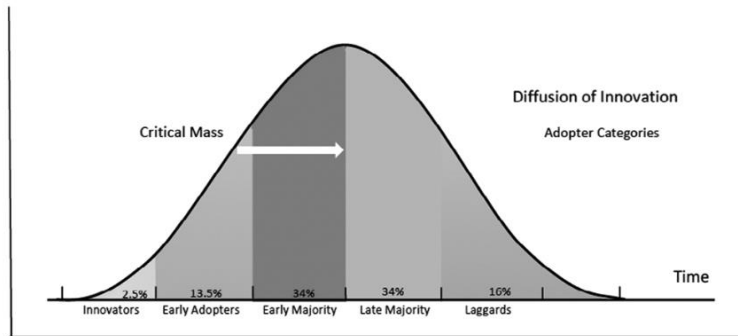


Fig. 2. Rogers adopter category curve [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

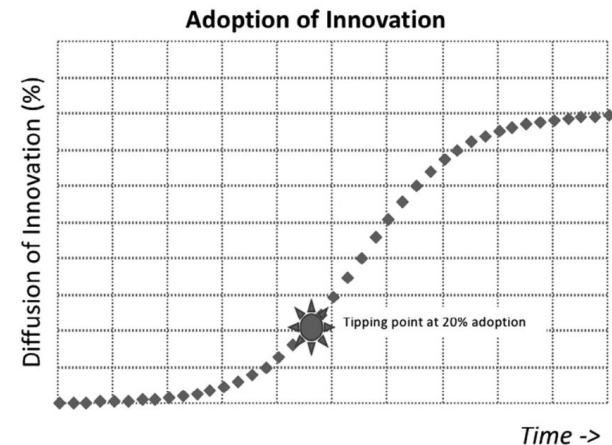


Fig. 3. Rogers' diffusion of innovation curve and Gladwell's tipping point [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

Conclusions

- Intracapsular tonsillectomy
 - Less post operative pain
 - Faster return to normal activity and diet
 - Lower post tonsillectomy hemorrhage rate
 - Possible but low regrowth rate
- Effective in SDB and OSA
- Literature supports IT for recurrent tonsillitis but continue to research
- Several techniques/instruments to consider

Thank you!



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RUSH Aerodigestive Clinic
RUMC, 7 Kellogg
1st and 3rd Thursday AM

RUSH Craniofacial Clinic
RUMC, POB 425
3rd Tuesday AM

Special Populations

➤ Developmental delay

Extracapsular versus intracapsular tonsillectomy: Outcomes in children with a focus on developmental delay

Shraddha S. Mukerji^{a,b,*}, Smruti Rath^c, Wynne Q. Zhang^c, Huirong Zhu^d, Grace S. Anand^{a,b}, John K. Jones^{a,b}, Daniel C. Chelius^{a,b}, Mary F. Musso^{a,b}, Joshua R. Bedwell^{a,b}

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- 320 children with Trisomy 21, Autism Spectrum Disorder, other genetic syndrome, global developmental delay
- 72 IT, 248 TT
 - IT less likely to need narcotics or steroids post op
 - IT with shorter LOS
 - IT less likely with post tonsil bleed (0.45% v 5.7%) in overall group, but no significant different in DD group (1.4% vs 4.8%)
 - Revision tonsillectomy needed in 1.1% of IT
 - Comparable rates of OSA symptom resolution

Other considerations

- **NSAIDS in intracapsular tonsillectomy**
 - 449 patients
 - No sig difference between ketorolac vs opioid
 - Bleeding
 - Readmission for pain with or without dehydration
 - NSAID group had increased rate of bleeding needing OR for control

Cost effectiveness

- Consider need for 2nd operation with tonsillar regrowth
- % of rebleed and takeback to OR

Table 3. Model Cost Values.

Condition/Endpoint	Estimated Total Cost, \$ ^{15,16}	Range Used for Sensitivity Analysis, \$
Initial surgery (ICT or ECT)	2892	2000-3500
Postoperative		
Tonsil bleed	2706	2200-3200
Dehydration (requiring IV hydration)	326	200-400
Completion tonsillectomy	3072	2500-3500
Recovery (per day)	155	100-300

Abbreviations: ECT, extracapsular tonsillectomy; ICT, intracapsular tonsillectomy; IV, intravenous.