Pediatric Tonsillectomy Strategies: From Extracapsular to Intracapsular Tonsillectomy

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Guidelines Executive Summary | Free Access

Clinical Practice Guideline: Tonsillectomy in Children (Update)—Executive Summary

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- **Common pediatric surgical procedure**
- **2nd most common** pediatric ambulatory surgery in the U.S.
- **~280,000** ambulatory tonsillectomies performed annually in children under 15 years old

Common indications for pediatric tonsillectomy:

Obstructive Sleep Apnea (OSA): Approximately 60–80%

Recurrent Tonsillitis: Approximately 20–40%

Frequency Criteria:

- ≥ **7** episodes in **1 year**
- ≥ **5** episodes/year over **2 years**
- ≥ **3** episodes/year over **3 years**

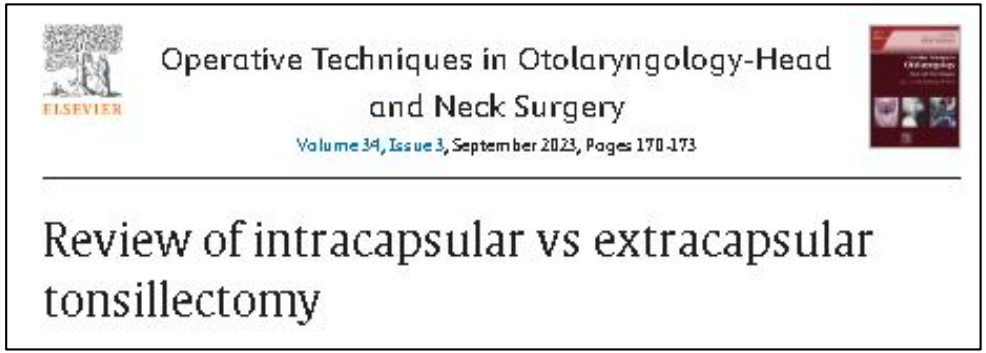
Clinical Documentation:

Sore throat episode plus at least **one** of:

- Fever > **38.3°C (101°F)**
- Cervical adenopathy
- Tonsillar exudate
- Positive **Group A β-hemolytic Streptococcus** test

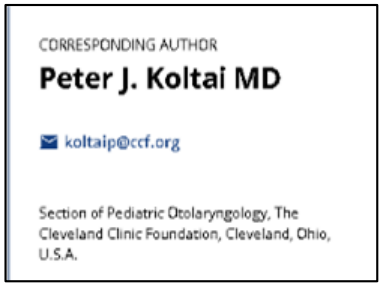
Recurrent Peritonsillar Abscess: Less than 5%

Surgical Technique: Extracapsular Tonsillectomy (ECT)



- Also known as **total tonsillectomy**
- Dissection between **pharyngeal muscles** and **tonsillar capsule**
- Results in **complete removal** of all tonsillar tissue

Surgical Technique: Intracapsular Tonsillectomy (ICT)



Tonsillotomy, **Partial Tonsillectomy**, **Subtotal Tonsillectomy**

- Reintroduced by Koltai et al. (2003)

Concept:

- Removes tonsillar tissue while **preserving the capsule**
- Capsule acts as a **biological dressing**
- Minimizes injury to **pharyngeal muscles**

Benefit:

- Reduces postoperative morbidity (pain, bleeding, recovery time)

Surgical Technique: Intracapsular Tonsillectomy with Microdebrider

Tonsillar resection:

- Begin on **left side**, microdebrider set at **1500 rpm (oscillating)**.
- Direction: **inferior → superior**, **medial → lateral**.
- Use Hurd elevator to retract anterior pillar and medialize tonsil for deeper tissue removal.
- Leave a thin rim of lymphoid tissue over capsule.

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https://www.youtube.com/watch?v=iJrxwrIsI64

Clinical Outcome Comparison

Intracapsular Tonsillectomy (ICT, n=150) vs. Standard Tonsillectomy (n=162)

Postoperative Pain:

- Significantly **less** in ICT group

Intraoperative Blood Loss:

- **No significant difference** between groups

Immediate Postoperative Bleeding:

- **None** in either group

Delayed Hemorrhage (Readmission):

- ICT: **1 case**
- Standard: **6 cases**

Readmission for Dehydration:

- ICT: **1 case**
- Standard: **5 cases**

Operative Techniques in Otolaryngology-Head and Neck Surgery
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Review of intracapsular vs extracapsular tonsillectomy

- Coblation Device
- Radiofrequency Ablation
- Suction Bovie
- Carbon Dioxide (CO_2) Laser

Surgical Technique: Intracapsular Tonsillectomy with Coblation

Coblation Device Settings

Ablation: Start at 7, increase to 8 if needed
Coagulation: Start at 3, increase for stronger bipolar effect
Approaching capsule: Decrease to 5 to reduce capsule injury

Instrument Use: Hurd Retractor

Begin by gently medializing tonsil tissue (press lateral anterior pillar)
After partial removal of superior pole, retract anterior pillar laterally to expose deeper tissue

Tissue Removal Direction, Preserve the tonsillar capsule

Medial → Lateral

Hemostasis

Achieved with bipolar cautery on capsule surface
Comparable effectiveness to extracapsular technique (ECT)

https://www.youtube.com/watch?v=juDrPKM1Iq8

Comparison of Extracapsular and Intracapsular Techniques

Global Trends in Tonsillectomy Techniques

Intracapsular tonsillectomy adoption is **increasing worldwide**

- Majority of European otolaryngologists prefer intracapsular technique
- Pediatric ENT surgeons perform both extracapsular and intracapsular approaches

Technique selection depends on:

- Clinical indications
- Surgeon preference

Postoperative Outcome: Pain and Analgesic Use

Review > Arch Otolaryngol Head Neck Surg. 2012 Mar;138(3):243-9.
doi: 10.1001/archoto.2012.16.

Systematic review of randomized controlled trials comparing intracapsular tonsillectomy with total tonsillectomy in a pediatric population

ICT vs. ECT (RFA Studies)

- **Mean pain duration:**
  - ICT: 4.9 days vs. ECT : 8.6 days
- **Analgesic use duration:**
  - ICT: 4.6 days vs. ECT : 7.7 days

Meta-analysis of 4 RCTs using Coblation

- **Mean pain duration:**
  - ICT: 5.5 days vs. ECT : 8.32 days
- **Analgesic use duration:**
  - ICT: 5.1 days vs. ECT : 8.4 days
- **Statistically significant reductions**

Postoperative Outcome: Pain and Analgesic Use

Randomized Controlled Trial > Acta Otolaryngol. 2011 Jul;131(7):750-6.
doi: 10.3109/00016489.2011.553244. Epub 2011 Apr 26.

Comparison of radiofrequency ablation, laser and coblator techniques in reduction of tonsil size

Laser vs **RFA** vs **Coblation**

Coblation group:

- Lowest analgesic use
- Fastest recovery to normal diet and daily activities

Laser group:

- Reported the highest pain intensity

Postoperative Recovery: Return to Normal Diet

Review > Arch Otolaryngol Head Neck Surg. 2012 Mar;138(3):243-9.
doi: 10.1001/archoto.2012.16.

Systematic review of randomized controlled trials comparing intracapsular tonsillectomy with total tonsillectomy in a pediatric population

Meta-analysis of 4 RCTs using Coblation

- Average days to resume normal diet:
  - ICT group: 4.6 days
  - TT group: 6.9 days
- No statistically significant difference

Postoperative Outcome: Return to Normal Activity

Review > Arch Otolaryngol Head Neck Surg. 2012 Mar;138(3):243-9.
doi: 10.1001/archoto.2012.16.

Systematic review of randomized controlled trials comparing intracapsular tonsillectomy with total tonsillectomy in a pediatric population

Multiple studies: **ICT group** resumed **normal activities earlier** than the **ECT**

ICT vs. ECT **Meta-analysis**:

- **ICT group:** 4.8 days
- **ECT group:** 7.3 days

Not statistically significant

Postoperative secondary bleeding

Review > Arch Otolaryngol Head Neck Surg. 2012 Mar;138(3):243-9.
doi: 10.1001/archoto.2012.16.

Systematic review of randomized controlled trials comparing intracapsular tonsillectomy with total tonsillectomy in a pediatric population

Meta-analysis of 4 RCTs using Coblation

- ICT group (n = 159): 1 case of secondary bleeding (0.63%)
- TT group (n = 161): 3 cases (1.86%)

Statistically significant difference in favor of ICT

Postoperative Bleeding

Observational Study > Clin Otolaryngol. 2022 May;47(3):471-477. doi: 10.1111/coa.13929. Epub 2022 Mar 22.

Coblation intracapsular tonsillectomy: A cohort study of NHS practice in England using Hospital Episode Statistics

Coblation ICT (National Data) UK Large-Scale Cohort Study

- Re-admission for bleeding within 28 days: 1.2%
- Surgical intervention for tonsillar bed bleeding: 0.2%

Comparison: National Prospective Tonsillectomy Audit (NPTA, UK)

- Overall bleeding rate (mainly extracapsular techniques): 4.6%

Postoperative Bleeding

Review > Sci Rep. 2022 Dec 7;12(1):21134. doi: 10.1038/s41598-022-25768-0.

A retrospective observational cohort study evaluating the postoperative outcomes of intracapsular coblation tonsillectomy in children

Secondary hemorrhage rate:

- ICT group: 0.7% (2 cases)
- ECT group: 8.7% (4 cases)

- Significantly lower bleeding rate in ICT group

Follow-up:

- Median follow-up duration: 395 days

Postoperative Bleeding

> Int J Pediatr Otorhinolaryngol. 2020 Jan:128:109703. doi: 10.1016/j.ijporl.2019.109703. Epub 2019 Oct 4.

Intra-capsular complete tonsillectomy, a modification of surgical technique to eliminate delayed post-operative bleeding

Single-Center Data Collection (1 Year):

- Total: 783 pediatric tonsillectomy cases
- Performed by 3 surgeons using Coblation ICT

- **Zero patients** experienced **postoperative hemorrhage** requiring **reoperation**

Age-Related Differences in Hemorrhage Rates

National Prospective Tonsillectomy Audit (NPTA), UK

Hemorrhage rates vary across age groups:

- Children **<5 years**: **1.9%**
- Children **5–15 years**: **3.0%**

Overall pediatric hemorrhage rate is **lower** than that of adults (**4.9%**)

28-Day Readmission Rates After ICT

Coblation ICT in England

- Overall 28-day readmission rate: **6%**
- Reasons for readmission:
  - Hemorrhage: **1.2%**
  - Infection: **0.7%**
  - Pain: **0.3%**

Postoperative Outcome: Revision operation

A large cohort study from England reported the following **revision surgery rates** after ICT:

- **0.3%** at 1 year
- **1.1%** at 2 years
- **2.2%** at 5 years

A retrospective study of **345 children** who underwent ICT

- Median follow-up: 395 days
- No cases of tonsillar regrowth causing airway obstruction
- No patients required revision tonsil surgery

Postoperative Outcome: Revision operation

> Eur Arch Otorhinolaryngol. 2016 Oct;273(10):3263-8. doi: 10.1007/s00405-015-3871-7. Epub 2016 Jan 4.

Risk of reoperation after tonsillotomy versus tonsillectomy: a population-based cohort study

Retrospective Cohort Study: Swedish National Patient Register

Objective

To compare the risk of revision surgery in children with tonsil-related upper airway obstruction who underwent:

- Tonsillotomy (ICT) – also known as intracapsular or partial tonsillectomy
- Tonsillectomy (ECT) – also known as total tonsillectomy

Study Design & Population

Retrospective cohort based on Sweden's National Patient Register

Children aged 1–12 years

Underwent TE or TT between 2007–2012

Primary surgical indication: upper airway obstruction

Exclusion Criteria

- Revision surgeries performed within 30 days after the initial procedure were excluded

Study Overview

- Total patients: 27,535
  - Intracapsular Tonsillectomy (ICT): 11,741
  - Extracapsular Tonsillectomy (ECT): 15,794
- Total follow-up time: 76,054 person-years

Revision operation Incidence

- 684 patients (2.5%) underwent revision tonsil surgery
- Reoperation rate:
  - ICT group: 3.9% (609 patients)
  - ECT group: 0.6% (75 patients)

Risk Comparison

- ICT group had **7x higher revision operation risk**
  - Adjusted HR (controlling for sex, age, and index year): **7.16 (95% CI: 5.52–9.13)**
  - **Younger age at the time of initial surgery** is a significant risk factor for **reoperation** in both groups.

Common Indications for Inpatient Tonsillectomy

- **Age under 3 years (75.8%)**

Young children may require closer postoperative monitoring due to age-related physiological factors.

- **Presence of medical comorbidities (71.2%)**

Children with underlying health conditions are at higher risk of surgical complications and are usually observed in the hospital.

Common Indications for Inpatient Tonsillectomy

- **Severe obstructive sleep apnea (59.1%)**

Indicates significant preoperative airway issues; postoperative respiratory monitoring is often necessary.

- **Distance from medical facility**

Greater travel distance may influence clinical decision-making regarding postoperative discharge planning.

AAO-HNS 2019 Clinical Practice Guideline on Tonsillectomy

- Due to limited long-term data on **partial intracapsular tonsillectomy (ICT)**, the expert panel **did not include a statement comparing ICT and total tonsillectomy (ECT)** in the guideline.

- **ECT remains the standard surgical approach** in the guideline.

Take home message

Criteria	Tonsillectomy (ECT)	Tonsillotomy (ICT)
Surgical approach	Complete removal of tonsils including capsule	Partial removal, preserving capsule
Postoperative Pain	Higher intensity, lasting ~7–8 days	Lower intensity, lasting ~4–5 days
Bleeding Risk	Higher (~3–5%)	Lower (~0.7–1.2%)
Recovery Time	Slower (~6–7 days to normal diet/activity)	Faster (~4 days to normal diet/activity)
Risk of Tonsillar Regrowth	Negligible	Possible (~2.2% at 5 years)
Reoperation Rates	Very low	Relatively higher, yet overall low
Main Indications	Recurrent infections (e.g., tonsillitis, abscess)	Obstructive sleep apnea (OSA), bleeding disorders
Physician Preference Trends	Traditionally preferred worldwide	Increasing preference, especially in Europe

Thank you