



FEATURE ARTICLES

Tonsillectomy

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Tonsillectomy is one of the most common surgeries performed in the United States of America. There is currently no consensus on which of the several techniques available is optimal. This article describes the various extracapsular (total tonsillectomy) and intracapsular (subtotal tonsillectomy) techniques that are currently available.

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Tonsillectomy with or without adenoidectomy is one of the most common surgeries performed in the United States of America, with more than 300,000 tonsillectomies performed annually.¹ The most common indication for tonsillectomy is a sleep-related breathing disorder (obstructive sleep apnea), followed by recurrent tonsillitis. Other possible indications for tonsillectomy include peritonsillar abscess unresponsive to medical treatment, persistent foul taste or breath caused by chronic tonsillitis not responsive to medical therapy, unilateral tonsil hypertrophy presumed neoplastic, and hypertrophy causing dental malocclusion or adversely affecting orofacial growth documented by an orthodontist.²

Preoperative evaluation

History alone is the most common method for diagnosing obstructive sleep apnea.³ When the diagnosis is at all in question, the child is younger than 2 years, or there is concern about the severity of the sleep apnea, a polysomnogram should be recommended.⁴ In the otherwise normal child, once the recommendation for surgery has been made, there is usually little other preoperative evaluation necessary. The American Academy of Otolaryngology 2000

Clinical Indicators Compendium lists under tests for tonsillectomy "Coagulation and bleeding workup if abnormality suspected by history or genetic information unavailable."² However, many otolaryngologists recommend that their patients obtain some or all of the following tests before surgery: complete blood count, platelet level, prothrombin time, partial thromboplastin time, and bleeding time.^{1,3} Other surgeons recommend obtaining a pertinent personal and family history of bleeding, with a laboratory evaluation only if the bleeding history is positive.^{5,6}

Preoperative electrocardiogram and chest x-ray are not necessary unless there is a history of heart disease.⁷ Other preoperative evaluation needs to be decided based on the medical conditions of each individual patient. For example, a child with von Willebrand disease should have the input of a hematologist regarding the use of desmopressin to minimize the risk of bleeding during the intraoperative and postoperative periods. Flexion and extension x-rays of the cervical spine should be considered for patients with trisomy 21 syndrome because they have an increased risk of subluxation of the cervical spine.

Surgical procedure

The anesthesia induction and positioning of the patient is similar for most patients undergoing tonsillectomy, regardless of which technique is used to remove the tonsils. The patient is placed in the supine position and orally intubated. The endotracheal tube is taped to the patient's

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chin in the midline. Alternatively, some practitioners prefer to use a laryngeal mask airway.^{8,9} The bed is turned 90°-180° so that the surgeon can sit or stand at the head of the bed. The patient is positioned at the edge of the bed, and a small shoulder roll is placed. Either a Crowe-Davis, McIvor, or Dingman mouth gag is inserted and expanded to keep the mouth open for the duration of the procedure. The tonsils are then removed using 1 of the techniques described later.

Tonsillectomy techniques can be divided into 2 general categories: extracapsular (total tonsillectomy, subcapsular) and intracapsular (partial tonsillectomy). Intracapsular is also termed “subtotal,” and this procedure is listed as tonsillotomy in some publications. In an extracapsular tonsillectomy, dissection is performed lateral to the tonsil in the plane between the tonsillar capsule and the pharyngeal musculature, and the tonsil is generally removed as a single unit. In contrast, an intracapsular tonsillectomy involves removal of the tonsil in piecemeal fashion, from medial to lateral, with care taken to preserve the capsule. The most common extracapsular techniques use a monopolar electrocautery, bipolar cautery (or bipolar scissors), “cold” knife (sharp dissection), or harmonic scalpel. Intracapsular techniques may use the microdebrider, bipolar radiofrequency ablation (which can also be used to remove the entire tonsil), and carbon dioxide laser. Either extracapsular or intracapsular tonsillectomy can be performed for the pediatric patient with obstructive sleep apnea, but only extracapsular techniques should be used for patients undergoing tonsillectomy as a result of tonsillitis or peritonsillar abscess. In addition, tonsils can be ablated using a laser or monopolar radiofrequency (somnoplasty) in a cooperative adult in a clinic setting. The tonsil ablation procedures will not be discussed in detail in this article.

Monopolar/bipolar electrocautery

The most common technique used for removing tonsils in the United States today is monopolar electrocautery, also called a “hot” tonsillectomy.³ The superior pole of the tonsil is grasped with a curved or straight Allis clamp and retracted medially to identify the lateral edge of the tonsil submucosally. Using an electrocautery setting of approximately 20 W (if using a standard electrocautery tip) or 6 W (if using a microdissection needle), the anterior tonsillar pillar is incised, and the entire palatine tonsil with the capsule is dissected from surrounding tissue. Typically, dissection is performed from superior to inferior (Figure 1). Hemostasis is obtained using packing, a suction cautery, or absorbable ties. A standard electrocautery tip or a microdissection needle can be used for the dissection. Alternatively, bipolar forceps or bipolar scissors can be used to remove the tonsils.

“Cold” knife

Another technique frequently used to remove completely the tonsils is the “cold” or sharp dissection technique. In this technique, the tonsil and capsule are dissected from sur-

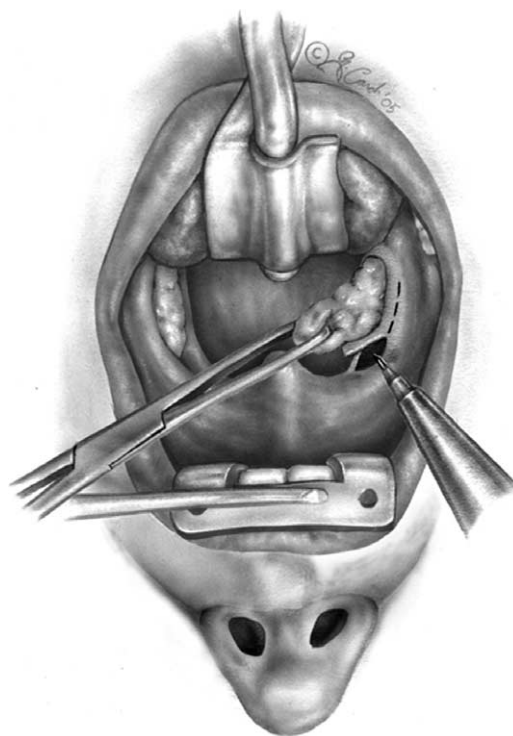


Figure 1 Electrocautery tonsillectomy. Dissection is performed from superior to inferior in the plane between the tonsil and the underlying musculature. The entire tonsil with capsule is removed.

rounding tissue using scissors and/or knife, and the inferior pole is amputated with a snare (Figure 2). Historically, a tonsillotome, or other guillotine-type device, was used to perform a total or partial “cold” tonsillectomy.¹⁰ Like the electrocautery technique, hemostasis is obtained using packs, suction cautery, or absorbable ties.

Harmonic scalpel

The harmonic scalpel can be used to perform an extracapsular tonsillectomy (Ethicon Endo-Surgery Inc, Cincinnati, OH). This medical device uses ultrasonic energy to vibrate its blade at 55,000 cycles per second. The vibration transfers energy to the tissue, providing simultaneous cutting and coagulation, so, typically, no additional instruments are needed for hemostasis.

Bipolar radiofrequency ablation (aka coblation, low-temperature plasma excision, ionized field ablation)

Bipolar radiofrequency ablation can be used to perform an extracapsular or intracapsular tonsillectomy, however, it is most commonly used to perform a partial tonsillectomy (Figure 3). The equipment includes a radiofrequency generator, foot control, saline irrigation regulator, and the coblation wand (PlasmaCare Corp, Sunnyvale, CA). During a bipolar radiofrequency ablation tonsillectomy, conductive saline solution is converted into an ionized plasma layer, resulting in molecular dissociation with minimal thermal energy transfer. Hemostasis can usually be performed with the coblation wand alone.

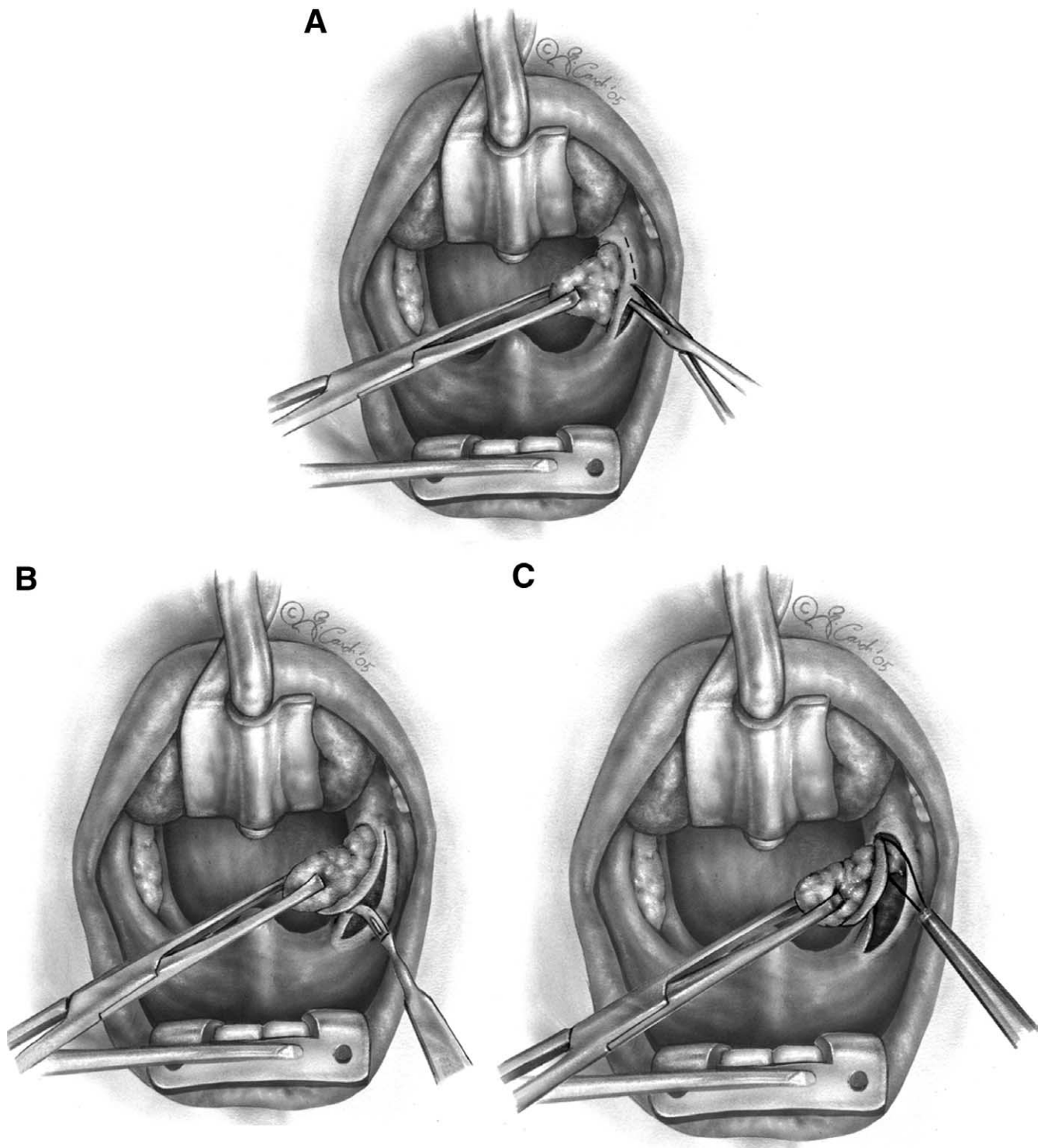


Figure 2 “Cold” knife tonsillectomy. (A) Scissors are used to identify the plane between the tonsil and underlying musculature. The anterior tonsillar pillar is incised at the superior edge of the tonsil. (B) Within the exposed plane, the tonsil is separated from the surrounding tissue using a Fisher knife. (C) The inferior pole is amputated with a snare.

Microdebrider tonsillectomy

Another method of intracapsular tonsillectomy uses the microdebrider. The microdebrider is a powered rotary shaving device with continuous suction, made up of a tube, connected to a hand piece, which, in turn, is connected to a motor with foot control and a suction device. A partial tonsillectomy is completed with the removal of approximately 90% to 95% of the tonsil, while preserving the tonsillar capsule.

Advantages and disadvantages of aforementioned techniques

There is great debate about the relative merits of the various tonsillectomy techniques, and many studies have been published, with many more ongoing that compare the techniques. The existing literature consistently reports that the intracapsular (partial) techniques result in less postoperative pain, however, the degree of lessened pain continues to be much debated.¹¹⁻¹⁸ In addition, there

is a small risk of tonsil regrowth and the necessity for an additional procedure with the intracapsular techniques. Of the extracapsular techniques, “cold” tonsillectomy results in less postoperative pain compared with an electrocautery or “hot” tonsillectomy, however, the latter procedure is typically faster and has less intraoperative blood loss.¹⁹⁻²¹ Although not extensively researched thus far, a total tonsillectomy with the coblation unit may have slight advantages over electrocautery tonsillectomy.²² The studies on outcomes of surgeries completed with the harmonic scalpel do not show any definitive advantage to the scalpel.²³⁻²⁷ It is not clear which technique, if there is one, results in the lowest rate of postoperative hemorrhage.²⁸⁻³⁰ The data available to date suggest that there is not a difference in the bleeding rates between extracapsular and intracapsular tonsillectomy.³⁰ The equipment involved with various techniques varies in price (Table 1), although the largest cost factor in any tonsillectomy is the operating time.

Complications

The primary complication with all tonsillectomy techniques is postoperative bleeding. The risk of postoperative bleeding is generally in the range of 4%, with a wide range of reported values.²⁸⁻³² The variation in the reported incidence is most likely related to the definition of “bleeding” and the data collection systems used in various studies. The incidence of bleeding has increased with the age of the patient.^{31,32}

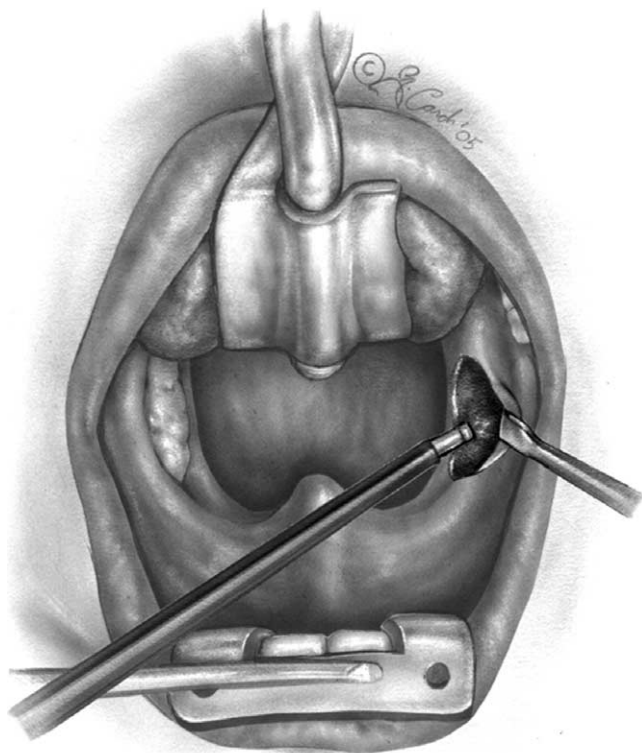


Figure 3 Low-temperature plasma excision intracapsular tonsillectomy. The tonsil is displaced medially and the dissection performed medial to lateral.

Table 1 Cost of tonsillectomy equipment*

Equipment	Cost
Electrosurgical pencil	\$2.93 each
Snare wire	\$1.71 for 2 wires
Suction cautery	\$7.60
Powered T&A set	\$111.40
Coblator T&A set	\$180.00
Harmonic scalpel T&A set	\$237.00

*These numbers are an average of the cost to the hospital at Lucile Packard Children's Hospital at Stanford (Palo Alto, CA) and The Children's Hospital of Denver (Denver, CO). The cost to the patient would be considerably higher.

Postoperative care

A majority of children can safely be discharged home on the same day of surgery, regardless of the surgical technique used.^{3,33} Children younger than 2 years or who live far from a hospital should be kept overnight for observation. Pain medication should be recommended, and most physicians prescribe either acetaminophen or acetaminophen with codeine postoperatively.³⁴ Some physicians recommend a soft diet postoperatively, others recommend “diet as tolerated.”³ Studies have not shown any difference in recovery between children who have a restricted versus those who have non-restricted diets postoperatively.^{35,36}

Long-term follow-up

Typically, the patient will be seen in the office in 1 month of the tonsillectomy to confirm adequate healing, although it is also acceptable to follow-up with a phone call only.^{3,37}

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