Tonsillectomy: Review and Update

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History and current practice: Tonsillectomy practiced in Hindu medicine as early as 1000 BC; in ensuing centuries, many procedures and techniques described by ancient Romans; snare tonsillectomy first performed in 200 AD; in 500 AD, Aetius started debate over tonsillotomy vs tonsillectomy, indicating partial removal favorable to avoid severe hemorrhage; in Middle Ages, tonsillectomy fell into disfavor, and use of ligature recommended; 1897, Ballenger suggested tonsillectomy not good procedure because it did not completely remove symptoms; tonsillectomy became more feasible after advent of modern anesthesia; in 1925, Portman recommended partial removal of tonsils when obstruction or sleep apnea primary problem, and complete removal for disease or infection; partial tonsillectomy abandoned until 1990s when Koltai brought tonsillectomy back to attention of surgeons

Effect of contemporary health care systems: In current system of health care, tonsillectomy and indications for tonsillectomy reflect individual practice and experience of otolaryngologists; cost-effectiveness of procedure depends on practice and experience of surgeon; surgeons may choose to lead current debate, or allow insurance carriers and actuaries to dictate surgical practices; consolidation of hospital systems ongoing; hospitals purchasing practices of physicians and other systems for delivery of care; hospital systems and administrators may dictate policy based on economic interests of hospital, rather than quality of care

Effect of Affordable Care Act (ACA): Offers new incentives for hospitals and physicians to partner and earn bonuses for delivering efficient, high-quality care; bundled payments for inpatient care shared by hospitals and physicians create incentive for health care institutions to hire physicians

Physician perspective: Physicians also motivated to seek shelter in hospital systems because of difficulties of private practice, eg, long hours, at-risk streams of revenue, government pressure to adopt expensive tools such as electronic medical records

Implications for tonsillectomy: Some insurance companies and hospital systems now offer bundled payment for tonsillectomy; readmission for dehydration and bleeding considered part of original cost

Guidelines: American Academy of Otolaryngology (AAO) advocates watchful waiting for recurrent infections of throat; document recurrent throat infections rather than relying on parental history; may consider tonsillectomy for recurrent infection with modifying factors such as intolerance of antibiotics, syndrome of periodic fever, aphthous stomatitis, pharyngitis, and adenitis (PFAPA), or history of complications related to tonsillitis such as peritonsillar abscess; tonsillectomy recommended for children with sleep-disordered breathing (SDB) or abnormal polysomnography; in patients with sleep disorders, physician should conduct postoperative office consultation to assess outcomes, but need not repeat sleep study for all children; use intraoperative steroids to control postoperative nausea and vomiting; no literature supports peroperative or postoperative antibiotics; guidelines suggest postoperative pain control; physicians should monitor their own annual rates of post-tonsillectomy hemorrhage

Audit conducted in United Kingdom: British health system conducted nationwide audit of every surgeon performing tonsillectomy and assessed association between postoperative bleeding and surgical technique; participating physicians then provided with results of study; physicians asked to modify their practices as necessary; tonsillectomy using cautery (monopolar diathermy forceps) associated with highest rate of bleeding; rate of bleeding fell after guidance; some surgeons changed their techniques; cold steel tonsillectomy with packs and ties associated with lowest rate of bleeding; for tonsillectomies performed by coblation or radiofrequency procedures, bleeding rates intermediate between those for cautery and cold steel

Other national guidelines: Italian and Scottish professional societies have done similar investigations and also offer guidelines; Italian guideline recommends antibiotics; Scottish guideline recommends acupuncture over medication for postoperative nausea and vomiting; Italian guideline states cold steel dissection preferred technique; German guideline recommends tonsillectomy in younger children with sleep apnea and enlarged tonsils because procedure less expensive and carries lower risk than tonsillectomy; however, little evidence supports this position

Preoperative consultation: Function of tonsils to produce secretory IgA that provides barrier immunity; however, in presence of chronic infection, tonsils stop secreting IgA and barrier immunity lost; adults who have undergone tonsillectomy have lower rate of cancer of tonsils than age-matched controls; removal of tonsils does not interfere with function

Epidemiology: Tonsillectomy second most common surgical procedure performed in United States, with >500,000 cases performed annually; outpatient tonsillectomy now standard; most common indication for tonsillectomy SDB

Indications for tonsillectomy: Include SDB; in many cases, diagnosis of SDB based on parental observation; when selecting children for surgery, consider comorbid conditions such as growth retardation, poor performance in school, enuresis, 5. Perform palatoplasty in patients with velopharyngeal insufficiency following adenoidectomy.

Educational Objectives

The goals of this program are to improve diagnosis and treatment of patients requiring tonsillectomy and adenoidectomy. After hearing and assimilating this program, the clinician will be better able to:

1. List indications for tonsillectomy.
2. Rank surgical approaches to tonsillectomy based on risk for hemorrhage.
3. Manage postoperative pain in patients undergoing tonsillectomy.
4. Select appropriate patients for adenoidectomy and provide proper counseling and adjunctive therapy.

Faculty Disclosure

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behavioral problems, and attention deficit-hyperactivity disorder; rarely, may perform sleep study to clarify diagnosis

**AAO guidelines**: recurrent infection listed as indication for surgery in AAO guidelines, but not all otolaryngologists agree with this position; guidelines specify that surgery indicated if 7 infections in last year, 5 infections per year for last 2 yr, or 3 infections per year for last 3 yr, with documentation; another indication for tonsillectomy pediatric autoimmune neuropsychiatric disorders associated with streptococcal infections which may produce tic; other indications tonsillar abscess and intolerance to antibiotics; however, several publications suggest tonsillectomy ineffective for treating streptococcal pharyngitis, except for transient 1- to 2-yr benefit conferred by tonsillectomy

**Alternative procedures**: adenoidectomy actually only adenoidotomy; lingual tonsillectomy actually only lingual tonsillotomy; pain and possibly bleeding less after tonsillectomy; regrowth possible, so consider long-term risk of leaving part of tonsils in place; tonsillectomy possibly inferior to tonsillectomy for sleep apnea; for patients with low tone or cerebral palsy, tonsillectomy may increase firmness of pharyngeal wall, so that pharynx less collapsible and less obstructive; study of tonsillectomy vs tonsillectomy needed

**Surgical techniques**: cold steel most frequently used technique in United States; snare technique still used; electrocautery heats pharyngeal tissues and may cause more postoperative thermal injury and pain than other procedures; other choices harmonic scalpel, coblator, and radiofrequency ablation; ablation effective and produces less heating of tissue than cautery; ablation also used for tonsillectomy, however, wands expensive; thermal welding new technique similar to bipolar forceps; for adults, may remove tonsils in office using laser-assisted serial tonsillectomy procedure; microdebrider expensive and difficult to use in patients with chronic tonsillitis and scarred-down tonsils, but useful for hypertrophic tonsils

**Pain medication**: Food and Drug Administration strongly recommends against use of codeine for children after tonsillectomy; use of ibuprofen after tonsillectomy increasingly common and does not increase postoperative bleeding

**Complications**: rate of morbidity due to bleeding after tonsillectomy 1% to 6%; mortality rate 1 in 15,000, which corresponds to 30 deaths per year from tonsillectomy in United States; number of deaths highlights need to select patients carefully and plan all aspects of surgical procedure and postoperative care

**Surgical tips**: to preserve as much mucosa as possible, inject mucosa with ropivacaine to lift mucosa off tonsil; during removal, push backward against muscle and preserved mucosa and attempt to stay on capsule of tonsil; dissect with coagulation forceps, then follow with bipolar and Bovie; with this technique, most mucosa left intact and defect small; closing tonsillar pillars associated with more pain and does not appreciably decrease bleeding because most of sutures tear out

**Choice of procedures**: for children with sleep apnea or chronic infection, perform tonsillectomy; for adults with chronic infection, consider tonsillectomy to allow faster recovery; to perform tonsillectomy, instead of beginning from outside and dissecting tonsil, move pillar out of way, then use coagulation device with ablate function on highest setting to “melt” tonsil; feel tonsil frequently with finger to distinguish it from underlying musculature; technique removes most of tonsil and allows adults to return to work earlier

### Velopharyngeal Insufficiency After Adenoidectomy

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**Epidemiology**: postoperative velopharyngeal insufficiency (VPI) occurs after 1 in 1500 adenoidectomies; in most cases, condition temporary; VPI sometimes associated with occult submucous cleft palate due to lack of musculus uvulae or longitudinal orientation of levators, but presence of cleft not always obvious; look carefully for occult cleft by pulling up uvula to look for musculus uvulae; look for bifid uvula or zona pellucida

**Patient selection**: if abnormal findings present, do partial adenoidectomy; children with 22q11 deletion at risk for VPI; children with Down syndrome probably not at greater risk for VPI; 1 in 80 children have bifid uvula; if bifid uvula isolated finding, may do complete adenoidectomy; however, syndrome associated with bifid uvula and hypertelorism characterized by death at mean of 26 yr of age due to aneurysms; look for hypertelorism in children with bifid uvula; if present, refer for genetic consultation; preoperative assessment of function difficult due to presence of enlarged adenoids; unacceptable to perform endoscopy on all patients undergoing adenoidectomy; short palate not concerning because function may not correlate with visual assessment of palate; patients with neuromuscular issues at greater risk for VPI, but may still consider complete adenoidectomy after discussion with family

**Speech and language issues**: adenoidectomy often performed due to disease of middle ear; such children may have delayed development of speech and language skills; although often difficult to obtain useful speech sample, obtain if possible to assess hypernasal or denasal speech that can mask potential for hypernasality

**Informed consent**: during informed consent process, quote observed rate of 1 in 1500 for postadenoidectomy VPI, but inform family if child has greater than average risk; consider partial superior adenoidectomy if appropriate

**Management**: initial management observation; if patient does not appropriately articulate phonemes, consider speech therapy; 3-yr-old with normal articulation not likely to benefit from speech therapy; but consider aggressive articulation therapy for younger children in whom speech still developing; severe nasal regurgitation associated with abnormal speech and problems with palatal motion; consider endoscopy at 3 mo; if child shows progress in speech such as decreasing hypernasality, may continue observation until 6 mo; consider other factors when deciding when to intervene; for example, if child enjoys participating in singing performances, may wish to intervene earlier, but do not perform surgery before 3 mo; if speech therapy successful, continue therapy; use comprehensive evaluation to guide management; consider perception, because child and family may not perceive hypernasality as problem; may also do speech videofluoroscopy; work as team with speech pathologist; nasometry to assess velars and bilabials not useful in patients without appropriate articulation

**Palatoplasty**: for patients with undetected, submucous cleft palate and bifid uvula, zona pellucida, or notched hard palate, do palatoplasty; these children benefit from Furlow procedure, which reorients muscles so that levators horizontal and lengthens and thickens palate

**Furlow procedure**: performed using double, opposing Z-plasty; right-handed surgeon should raise left hemipalate for posteriorly based myomucosal flap; anteriorly based flaps mucosal; blood supply to muscles posterior; make first Z rounded at end to improve blood supply to tip of flap; incise just in front of shelf of hard palate to allow more room for placement of stitches; for submucous cleft, try to maintain tissue in midline at nasal layer; incise through muscle and elevate; do not disturb underlying thin, pale, bluish nasal layer; elevate tissues as far as hamulus; treat bleeding with bipolar cautery; reapproximate uvula; bifid uvula does not alter speech but may affect parental satisfaction; at nasal mucosal layer, make back cuts for anteriorly based mucosal and posteriorly based myomucosal flaps; suture together using 3 stitches per limb; to minimize tension on flaps, do not sew tip to tip when beginning closure
Augmentation: many materials used, including Dermofat, Proplast, collagen, costal cartilage, and injected hydroxyapatite; another technique uses rolled, acellular dermis; retract palate upward with uvular retractor or red rubber catheters; make vertical incisions in nasopharynx as close to hard palate as possible; use right angle clamp to create tunnel for rolled sheet of thick acellular dermis; place multiple polyglactin (Vicryl) sutures through mucosa, leaving 1 suture longer to facilitate placement of dermis into pocket; place multiple stitches through mucosa and acellular dermis; include underlying fascial plane in sutures to create scarring and prevent inferior drift

Outcomes after dermal augmentation: postoperatively, 81% of children had nasal closure during appropriately articulated phonemes; one-third of children developed completely normal speech, but this group could enunciate p and b preoperatively; technique with dermis useful only for gaps ≤5 mm; for larger gaps, perform pharyngeal flap or sphincter pharyngoplasty; most postadenoidectomy VPI associated with small gaps

Conclusions: prevention better than correction; if preoperative evaluation before adenoectomy suggests possibility of VPI, reasonable to do superior adenoectomy, leaving inferior rim of tissue; document discussion of VPI with family; assess patients in consultation with speech therapist; consider smaller operations for smaller gaps; dextranomer microspheres in hyaluronic acid (Deflux) not approved for palatoplasty, but has long history of urologic use and previously used successfully in palatal operations

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1. The American Academy of Otolaryngology (AAO) advocates _______ as initial treatment for a patient with occasional recurrent infections of the throat.
   (A) Tonsillotomy  (C) Tonsillectomy
   (B) Tonsillectomy and adenoidectomy  (D) Watchful waiting

2. AAO guidelines state that physicians performing tonsillectomy should monitor their annual rates of:
   (A) Death  (B) Pain  (C) Hemorrhage  (D) Regrowth of tonsils

3. In a study on tonsillectomy conducted by the British health system, which technique was associated with the lowest rate of bleeding?
   (A) Cold steel  (C) Snare
   (B) Monopolar diathermy  (D) Coblation

4. The most common indication for tonsillectomy in the United States is:
   (A) Chronic infection  (C) Intolerance to antibiotics
   (B) Tonsillar abscess  (D) Sleep-disordered breathing (SDB)

5. Tonsillotomy is sometimes performed instead of tonsillectomy in order to reduce postoperative:
   (A) Pain  (B) Sleep apnea  (C) Death

6. Which treatment for post-tonsillectomy pain in children is preferred by the Food and Drug Administration?
   (A) Acupuncture  (B) Ibuprofen  (C) Codeine  (D) None of the above

7. Which of the following is not definitively associated with velopharyngeal insufficiency (VPI)?
   (A) Submucous occult cleft  (C) Down syndrome
   (B) 22q11 deletion  (D) Bifid uvula and hypertelorism

8. The initial treatment for every child with VPI after adenoidectomy is:
   (A) Speech therapy  (B) Endoscopy  (C) Palatoplasty  (D) Observation

9. In a child with VPI after adenoidectomy who has a velopharyngeal gap >5 mm, the preferred surgical approach is _______ rather than _______.
   (A) Insertion of rolled dermis; sphincter pharyngoplasty
   (B) Sphincter pharyngoplasty; insertion of rolled dermis

10. When preoperative evaluation of a child reveals high risk for VPI after adenoidectomy, the surgeon should:
    (A) Perform a superior adenoidectomy
    (B) Perform a standard adenoidectomy, but quote a 1 in 1500 risk for VPI to the parents
    (C) Perform a standard adenoidectomy, but refer the patient to speech therapy
    (D) Use Deflux to close the velopharyngeal gap