Adenotonsillectomy in Children: Indications and Contraindications

KEVIN T. KAVANAGH, MD, and NEAL S. BECKFORD, MD, Memphis, Tenn

ABSTRACT: Adenoidectomy and tonsillectomy are the most common major operations done on children. The indications for tonsillectomy in certain clinical situations are constantly being debated in the literature and among professionals. We studied the efficacy (or lack of it) of adenotonsillectomy for chronic tonsillitis (recurrent throat infections), oral nasal obstruction, peritonsillar abscess, elimination of a bacterial carrier state, biopsy, and prevention of tongue thrusting with resultant anterior open bite. Adenoidectomy has been advocated in the literature for the treatment of nasal obstruction, sinusitis, and chronic serous otitis media. Complications of tonsillectomy and adenoidectomy include hemorrhage, anesthetic death, infection, nasopharyngeal stenosis, patulous eustachian tube, and hypernasality. Children at risk for hypernasality are those with mental retardation, cerebral palsy, neuromuscular disorders, and submucous cleft of the soft palate. Because of the severity of the complications that can be encountered in any child, medical and conservative therapy should be attempted before operation is done. Proper antibiotic therapy will often control chronic serous otitis, sinusitis, and chronic, recurrent tonsillitis. Bacterial synergy is important to consider when selecting antibiotic therapy, since, B-lactamase production may protect pathogens commonly considered susceptible to standard antibiotic therapy.

ADENOTONSILLECTOMY is the most commonly performed major surgery in childhood, though its incidence has dropped in the United States from a high of 959,773 (4.7/1,000 persons) in 1972 to 616,076 in 1977 and 496,000 in 1983. This decrease is associated with a growing awareness in the medical community of the appropriate indications for this procedure. The practice of removing tonsils just because they are enlarged or because it is being done in a sibling is antiquated and is mentioned only to be condemned. In addition, the increasingly litigious nature of our society makes it prudent to be able to justify unequivocally any recommended therapy.

Recognizing that a blanket policy of performing both tonsillectomy and adenoidectomy on all children requiring either one or the other does not meet with modern practice standards, in this report we will discuss our indications for tonsillectomy and adenoidectomy.

INDICATIONS FOR TONSILLECTOMY

Recurrent pharyngitis is by far the most debated indication for tonsillectomy. Paradise and Bluestone have shown tonsillectomy to be effective in preventing recurrent tonsillitis and/or pharyngitis in severely affected children. Entrance into their study required at least seven episodes in one year, five in two years, or three in three years. They found that if a child has tonsillectomy, there is a 50% chance of another episode of pharyngitis/tonsillitis during the first postoperative year. If surgery is not done, there is a 90% chance of another episode. They also observed that a substantial proportion of subjects who did not have tonsillectomy had a relatively low incidence of subsequent throat infections.

Their study did not address the risks versus benefits to the patient. As guidelines, we consider surgical intervention when the frequency and severity of these episodes has a significant effect on the functioning of the child or family (days and nights).
missed from work or school). For example, one to two episodes of adenotonsillitis per year that cause a child to miss one to five days from school can be treated adequately with antibiotic therapy. A child having four or more episodes per year, however, will usually miss more than 2 1/2 weeks from school, require multiple visits to the doctor, and be given numerous courses of antibiotic therapy. In addition, the morbidity that the child will incur during these episodes can be great, not to mention that of the parents. In these situations, we recommend tonsillectomy.

Recrrent tonsillitis can be a synergistic infection between (B-hemolytic Streptococcus and a B-lactamase-producing organism (Staphylococcus aureus, Bacteroides fragilis, B melaninogenicus, and B oralis). Multiple organisms are found in the tonsillar crypts of patients with recurrent tonsillitis. In these cases, treatment with clindamycin, lincomycin, or rifampin has been reported effective. If such treatment is attempted, the entire family should have throat culture to locate asymptomatic carriers, who should be treated.

Peritonsillar abscess (quinsy) is another debated indication for tonsillectomy. Abscesses develop between the tonsil and the superior constrictor muscle. Clinically, they are associated with swelling of the peritonsillar tissue and palate with displacement of the uvula. Often the patient complains of odynophagia, ipsilateral otalgia, and tender cervical lymphadenopathy, and has a classic "hot potato" voice. Many patients are dehydrated because of the associated pain on swallowing and opening the mouth. Diagnosis is confirmed by the aspiration of purulent material from the tonsillar fossa. The abscess cavity is usually located in the superior aspect of the tonsil (70%), and may contain aerobic organisms (streptococci, Haemophilus influenzae, and Streptococcus pneumoniae), along with a variety of anaerobic organisms. The treatment of choice has varied from aspiration with oral antibiotic therapy to intravenous antibiotics and emergency tonsillectomy.

A few treatment principles are important to remember. The abscess must be thoroughly evacuated and the patient treated with an antibiotic effective against the expected pathogens (penicillin is the drug of choice). Failure to aspirate purulent material from the superior pole should encourage the clinician to explore the entire tonsil bed, since 30% of peritonsillar abscesses are located in the middle and inferior pole, with 8% being multiloculated. Inadequate drainage may result in persistence or a rapid recurrence of symp
toms after antimicrobial therapy is completed. Possible injury to the carotid vasculature and possible pulmonary aspiration preclude draining peritonsillar abscesses in an awake, uncooperative child. Children below the age of 15 will usually require a general anesthetic to allow adequate drainage of the abscess. Close patient observation is necessary until recovery, and hospitalization may be required. Protocols for treating patients with oral antibiotics with frequent (daily) clinic visits have also been reported. Gargling with warm salt water and taking analgesics are to be encouraged to alleviate throat pain.

A history of recurrent tonsillitis or a previous peritonsillar abscess is an indication for immediate tonsillectomy in a child with a peritonsillar abscess. The patient is usually admitted to the hospital and given intravenous hydration and antibiotic therapy. After adequate hydration is established, the tonsils are removed. Youther patients are often treated initially with immediate tonsillectomy. Many believe that since children have a significant risk of recurrent abscess (7%), it would be prudent to remove the tonsils while the child is under the general anesthetic required to drain the abscess. This obviates the need for an additional general anesthetic and its inherent risks should the child later require tonsillectomy. Patients over age 40 who do not have a significant history of tonsillar disease have a very small incidence of recurrent tonsillar abscess. In such patients a conservative policy of watchful waiting should be strongly considered.

Other indications for tonsillectomy include airway obstruction. Nasopharyngeal airway obstruction or sleep apnea will often have a significant oropharyngeal obstructive component, which if uncorrected can lead to severe cardiorespiratory problems and cognitive abnormalities. If done early, adenotonsillectomy can reverse the majority of these complications. Severe cardiomegaly, cor pulmonale, and right-sided heart failure are unfortunately usually irreversible, and operation will serve only to help arrest their progression. Swallowing difficulties sometimes may be helped by tonsillectomy, and tonsillectomy can also be used for biopsy (eg, non-Hodgkin's lymphoma). It is unlikely that tonsillectomy will have a significant effect on drooling or tongue thrusting if oral/nasal obstructive symptoms are absent.

**INDICATIONS FOR ADENOIDECTOMY**

The most common indication for adenoidectomy is nasal obstruction. Mild nasal obstruction associated with chronic serous otitis or sinusitis
may be treated with adenoidectomy alone, but significant oral airway obstruction from adenotonsillar hypertrophy associated with severe sleep disturbance and/or failure to thrive should be treated by adenotonsillectomy. In such cases there is still a 2% failure rate to relieve airway obstruction, and snoring will persist in 13% of cases. If only the adenoids are removed, sleep apnea will often recur from pharyngeal tonsillar obstruction.

Airway obstruction in children with altered craniofacial structure is often a problem. In this population, adenoidectomy and/or tonsillectomy may not decrease upper airway obstruction and may result in significant postoperative hypernasality. Examples include children with Down's syndrome, whose airway obstruction is primarily a function of a constricted oronasopharynx, with a relative macroglossia. Oropharyngeal obstruction in children with the Pierre Robin syndrome (retrognathia and cleft palate) is caused by a posteriorly displaced tongue and neuromuscular incoordination. Anatomically, these structural problems cannot be addressed by removing the tonsils and adenoids, and removing the adenoids will greatly increase the chances of persistent hypernasality after palatoplasty.

The treatment of serious otitis media by adenoidectomy has been extensively studied in the literature, but a firm consensus has yet to be established. Many authors have found adenoidectomy not to be effective in the treatment of chronic ear disease, though other studies have shown a positive effect even when children with severe nasal obstruction were eliminated. Most studies evaluating children with nasal obstruction have found adenoidectomy to be beneficial. It is obvious that there are many conflicting reports, and a large randomized prospective study with controls for nasal obstruction is needed. Our present clinical policy is similar to that of Snow; we do not perform adenoidectomy on most children who have chronic serious otitis media without nasal symptoms.

Adenoidectomy is often used to obtain a representative sample of nasopharyngeal tissue. This is of the utmost importance when there is a question of nasopharyngeal malignancy (nasopharyngeal squamous cell carcinoma, rhabdomyosarcoma). Biopsy should always be done with caution in the operating room, and only after obtaining a contrast-enhanced CT scan. Vascular tumors (Ie, juvenile angiofibroma) are commonly found in this area, and their inadvertent curettage during surgery can lead to vigorous hemorrhage with disastrous consequences.

**COMPLICATIONS OF ADENOTONSILLECTOMY**

Bleeding, anesthetic reactions, and infection are potential complications of most surgical procedures. Of these, the first two are responsible for the majority of serious complications associated with adenotonsillectomy. In the United States approximately 1/35,000 cases has a fatal outcome. This figure may be higher, considering reporting difficulties. During a one-year period Belenky reported four postoperative deaths in the state of Michigan.

The risk of anesthetic complications does not seem to be greater for adenotonsillectomy than for other surgical procedures. Malignant hyperthermia, a rare but potentially fatal anesthetic reaction, should be mentioned. It is an autosomally inherited condition in which skeletal and cardiac muscle react to certain inhalational anesthetic agents (eg, halothane) or skeletal muscle relaxants (eg, succinylcholine), causing elevated temperatures, tachycardia, muscle rigidity, hypotension, and arrhythmias. An astute operating room team that recognizes these signs early and responds promptly is essential in avoiding fatal consequences. This devastating complication can be avoided in many instances by obtaining a good family history. A patient at risk can be evaluated preoperatively with serum and histopathologic studies in an attempt to confirm a positive family history. Unfortunately, these measures are not totally accurate, and the history remains the best indicator for determining the patient's risk for this complication.

A small amount of bleeding after tonsillectomy is not uncommon. In most studies, postoperative bleeding has required medical treatment in 2% to 5% of cases. Bleeding usually occurs within the first 24 hours after the procedure, or else is delayed for four to eight days postoperatively. Hemorrhage as late as 21 days after surgery has been reported. A substantial percentage of such bleeding episodes can be controlled with pharyngeal pressure and cauterization out of the operating room. One must remember to evaluate the hematocrit level, hemoglobin level, and urine specific gravity in all postoperative bleeders. Bleeding can be asymptomatic, with the patient swallowing most of the blood and not realizing it. This slow oozing compounds the blood loss and can turn a seemingly minor bleeding episode into a major emergency. Also, the dehydrated postoperative patient with a marginal hematocrit value will have a reduced capacity to respond to a hemorrhagic insult.

Moderate to severe hemorrhage after tonsillectomy should be addressed in the operating room.
Postoperative bleeding can be immediately lifethreatening with the involvement of major vessels (internal carotid, facial, and lingual arteries). The patient often will require resuscitation with intravenous fluids, and with blood if it is available, before or during operation. All methods of hemostasis during tonsillectomy (Cockley knots, suture ligature, or suction cautery) can produce postoperative hemorrhage. Suture ligatures should be used with caution, since the needle can perforate nearby major vessels.

Subluxation of the atlantoaxial joint is a potential complication in patients with joint laxity (as in 10% of patients with Down's syndrome). In patients at risk for this complication mouth gag suspension should not be used, and preferably there should be preoperative screening by a competent orthopedic surgeon or neurosurgeon. This complication can also occur from damage to the anterior transverse ligament of the atlas during adenoid surgery.

The several unique complications of adenoidectomy are postoperative hypernasality, nasopharyngeal stenosis, damage to the atlantoaxial joint, and damage to the torus tubarius (eustachian tube). Postoperative hypernasality, which can result in a profound speech handicap, occurs in 1/2,000 to 1/3,000 cases and rarely occurs if only a tonsillectomy is done. Children at risk are those with a repaired cleft palate, submucous cleft of the palate, mental retardation, cerebral palsy, or other neuromuscular disorders. Some atrisk patients can be identified by examination of the palate for a submucous cleft (loss of the posterior nasal spine, palatal muscle diastasis, and a bifid uvula). Location of the palatal dimple (seen when the patient gags) should be at a distance of 75% or more along the soft palate's length. The location of a uvular hump as seen with the nasopharyngoscope may also be helpful. Surgical treatment of this complication is considered after a nine-month trial of speech therapy, and usually involves a pharyngeal flap. Such a flap trades a degree of airway obstruction for improvement in the quality of speech.

Nasopharyngeal stenosis is a rare complication. It usually follows adenotonsillectomy, and consists of a circumferential scar contracture at the junction of the oropharynx with the nasopharynx. This condition can be very difficult to treat and may require surgical intervention. Unfortunately, surgical correction often cannot fully rehabilitate the patient with nasopharyngeal stenosis. Damage to the eustachian tube is surprisingly rare, though its incidence may be higher than acknowledged because the nasopharynx is not routinely examined postoperatively and only symptomatic patients are reported. Damage to the interior of the tube can cause stenosis of the eustachian tube, with resultant chronic serous otitis. Extensive fibrosis in Rosenmüller's fossa can cause a patulous eustachian tube, with disturbing auditory perception of breathing.

OUTPATIENT SURGERY

There is much debate regarding outpatient tonsillectomy and adenoidectomy. Admitting patients on the day of surgery is commonplace, and same-day discharge is being encouraged by many thirdparty payers. The decision regarding these matters should be individualized and made by the physician and family. Factors to consider include age of the child, competence of the caretakers, traveling distance, and certainly the condition of the patient. A patient should not be discharged until the immediate postoperative bleeding period has passed (which may be six to eight hours in the case of tonsillectomy), and oral intake is adequate. If the operative indication was severe oral/nasal airway obstruction, the patient should be observed overnight and not discharged the same day. Acute relief of nasopharyngeal airway obstruction has been associated with cardiac arrhythmias and death in adults. Children who had severe obstruction should be observed in an intensive care unit for at least 24 hours postoperatively.

POSTOPERATIVE CARE

Aspirin products are generally not recommended since they can increase the hazard of postoperative bleeding. Perioperative antibiotics have been shown to decrease fever, pain, and odor and to facilitate patient recovery. A five-day course of penicillin is standard. Diet should be advanced as tolerated. With tonsillectomy, cool liquids are best, and hard or salty foods should be avoided. Citrus juices can also cause considerable discomfort and are discouraged.

Parents are also instructed about postoperative bleeding and where to obtain emergency care. Minor episodes of bleeding after adenoidectomy may be controlled with vasoconstrictive nose drops, and minor bleeding after tonsillectomy can be controlled by gargling with ice water. Any persistent bleeding, no matter how small the blood loss appears, requires medical attention.

CONCLUSIONS

As with any procedure, the patient and/or family should be aware of the risks and benefits of the operation. Major risks always include bleeding, reactions to anesthetic agents, and infection. In
the case of adenoidectomy, the parents should be counseled regarding the possibility of hypernasality, and the palate should be reinspected, with the patient asleep, in the operating room before the adenoidectomy is done. The surgeon's discussions with the patient/family, along with the pertinent findings regarding surgical indications and absence (or presence) of risk factors for hypernasality, should be documented in the medical record.

References
16. Belezky W: Children's Hospital at Denver, Mich. Read before the Session on Tonsillectomy and Adenoidectomy at the AAO-HNS. San Antonio, Texas, September 1986