Tonsillectomy in children: A guide for the primary care physician

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A large number of children undergo tonsillectomy in North America every year. Despite its ubiquitous nature, there are still debates over almost every aspect of the procedure, including indications, proper surgical technique, and post-operative care. Here we discuss tonsil infection, indications and contraindications to tonsillectomy, its theoretical effects, perioperative issues, and possible complications.

Tonsillectomy is a common procedure with presumed efficacy when undertaken for the correct indications. As with any surgical procedure, there are contraindications, possible complications and dogma regarding post-operative care. Family doctors need to know when to appropriately refer patients who may be helped by this procedure and how to assist in the care of these patients during their post-operative course.

Almost 500 tonsillectomies are performed every year at the Izaak Walton Killam Children's Hospital in Halifax and this has remained uniform over the last five years (Fig. 1). Despite this number, only 20% of children referred for tonsillectomy to the IWK Department of Otolaryngology ultimately have it done.

TONSIL INFECTION

The palatine tonsils are aggregates of lymphoid follicles covered by epithelium which is folded inward to form deep crypts (1,2). Concretions of food debris and desquamated epithelium may form in the crypts and appear as white spots on the tonsils. These tonsilloliths are benign (2). Tonsils may be large in childhood and tend to involute with maturity. Along with the lingual tonsil and adenoids, the palatine tonsils form a ring of lymphoid tissue known as Waldeyer's ring (1,3,4).

Bacteria colonize tonsil surfaces and their core via the crypts, and it is infection of the core that is related to clinical illness (5). Healthy or recurrently inflamed tonsils yield comparable mixed flora on culture of core tissue, although the colony counts are higher in the latter group (6). Bacteria most commonly found include Streptococci, *Staphylococcus aureus*, *Hemophilus influenza*, *Bacteroides* species, *Fusobacterium* species, and anaerobic gram-positive cocci (5,6,7).

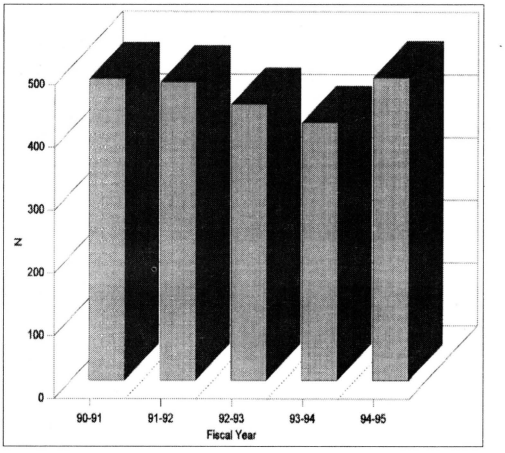

Figure 1: *Number of tonsillectomies per fiscal year at the IWK Children's Hospital from 1990-1995.*

Are tonsil surface cultures useful to indicate pathogenic bacterial presence in recurrent pharyngitis? Tonsil surfaces are bathed in bacteria rich saliva so there is

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disagreement with respect to this question (5,8,9). In children with acute pharyngitis, Group A beta hemolytic Streptococci are isolated in 40% and viruses in 16% of surface cultures (10). The management of these acute episodes is well presented elsewhere (11). Surow's 1989 paper from the Children's Hospital of Philadelphia reports 97 specimens having both surface and core cultures done. If results are examined as normal flora versus pathogen (unspecified), the contingency table generated is seen in Figure 2. We have calculated sensitivity, specificity and positive and negative predictive value of tonsil swab cultures based on this study (12).

		Pathogens on Core Culture +	Pathogens on Core Culture -
Pathogens on Swab Culture	+	37	4
	-	42	14

Sensitivity = 47% (Ability of swab cultures to detect disease)
Specificity = 78% (Ability of swab cultures to determine if no disease is present)
Positive Predictive Value = 90% (Chance of having disease if swab culture is positive)
Negative Predictive Value = 25% (Chance of not having dis ease if swab culture is negative)
Accuracy = 53%

Figure 2: *Contingency table for tonsil surface versus core cultures (5,12).*

INDICATIONS FOR TONSILLECTOMY

There are over 25 indications for tonsillectomy listed in the major otolaryngology textbooks and recent reviews (Table 1; 2-4,13-15), much of this profusion due to the varying definition of recurrent pharyngitis. A recent survey of otolaryngologists practicing in Nova Scotia shows the indications currently used in this province (Table 2).

Most patients are referred with recurrent pharyngitis (16,17). Paradise and Bluestone et al. studied the efficacy of tonsillectomy to reduce the incidence of sore throats by randomly assigning children to receive or not receive tonsillectomy. Indications for tonsillectomy, and thus inclusion in their study, were seven or more episodes of pharyngitis in one year, five in each of two years, or three per year for three years, associated with at least one of: oral temperature greater than 38.3°C, tender cervical lymph nodes or adenopathy greater than two centimetres in diameter, tonsillar exudate, or positive strep throat culture. Using these stringent indications, they found that the children who had tonsillectomies had fewer throat infections in the two year follow-up period (at a significance level of $p<0.05$; 16). Currently, the American Medical Association suggests that four or more episodes of tonsillitis per year is an indication for tonsillectomy (1,2). Evidence of tonsillar infection includes throat pain and fever with one of: erythema or exudate of the tonsils, enlarged and tender cervical adenopathy, or a positive strep throat culture (1).

Table 1. Indications for Tonsillectomy Derived From Current Mainstream Literature

1.	Upper airway obstruction causing (2,4,13-15) -Failure to thrive -Difficulty swallowing -Sleep apnea
2.	Recurrent pharyngitis (2,4,13-15) -Multiple definitions
3.	Suspicion of tonsillar malignancy (2,4,13-15)
4.	Recurrent pharyngitis in patients with poorly controlled diabetes mellitus, valvular heart disease, ventriculoperitoneal shunts (2,13)
5.	History of beta-hemolytic streptococcus infection with evidence of systemic involvement: rheumatic heart disease, rheumatic fever, nephritis (4)
6.	Diphtheria carriers (2,4,14)
7.	Streptococcus carriers (2,14)
8.	Halitosis associated with tonsillar crypt debris (2,13-15)
9.	Cervical tubercular adenitis (2,4,14)
10.	Peritonsillar abscess in children (2,4,13-15)
11.	Hemorrhagic tonsillitis (13)
12.	Tonsillitis with febrile convulsions (4,14)

Enlarged tonsils that obstruct the airway causing sleep apnea, or swallowing difficulties with weight loss or failure to thrive should be removed (1,13). Obstructive tonsils can lead to hypoventilation with pulmonary hypertension and cor pulmonale (2). Children with this disorder present with snoring, sleep apnea, daytime somnolence, enuresis, mental and growth retardation, hot potato voice, and may also have adenoid hypertrophy resulting in mouth breathing and chronic rhinitis because of nasal obstruction (2,13). Evaluation ideally includes a sleep study to show multiple episodes of apnea with hypoxia (2,13). Since these are typically unavailable in our region, parents are asked to audiotape their child sleeping so that the physician can assess this for evidence of apneic pauses (13).

Contraindications to tonsillectomy include a history

of bleeding diathesis or hemoglobin less than 100g/L (2,4), uncontrolled systemic disease or acute infection, or age less than three years (4). These are all relative contraindications, and vary among regions. For example, in some centres, peritonsillar abscess (an acute infection) is an indication for tonsillectomy (18,19).

Table 2. Indications for Tonsillectomy Used by Nova Scotia Otolaryngologists in 1995

Indication	Percentage of ENT Surgeons
Upper airway obstruction causing sleep apnea	92
Tonsillar hypertrophy affecting swallowing	92
Failure to thrive	69
Previous peritonsillar abscess	62
Sore throat with cervical adenitis: 5 episodes in each of 2 years	69
Sore throat with cervical adenitis: 7 episodes in 1 year	62
Strep culture positive tonsillitis: 5 episodes in each of 2 years	69
Strep culture positive tonsillitis: 7 episodes in 1 year	85
Recurrent tonsillitis in patients with poorly controlled diabetes, valvular heart problems, or ventriculoperitoneal shunt	77
Systemic disease due to beta-hemolytic streptococcal disease:Rheumatic fever/heart disease, nephritis	62
Tonsillitis complicated by febrile seizures	77
Suspected tonsillar tumour	100

Note: Survey was answered by 87% of Otolaryngologists practicing in Nova Scotia in 1995. Only indications used by more than 50% of surgeons are listed.

PERIOPERATIVE ISSUES

Preoperative assessment includes evaluation of the patient's systemic status. Coagulation profile including partial thromboplastin time, prothrombin time, bleeding time, and platelet count reveal occult coagulopathies in 0.6% of children scheduled for tonsillectomy (20). False positive tests are frequent, and positive tests have little relation to post-operative hemorrhage, so some authors feel that routine screening is not efficacious (21). A careful clinical history (22) is used to guide the decision to order coagulation studies at the IWK Department of Otolaryngology (Table 3).

Removal of tonsils can be undertaken under local anesthesia but typically requires general anesthesia in children to maximize control of the airway. Following oral endotracheal intubation, the neck is hyperextended and a mouth prop inserted to allow visualization of the oropharynx. Tonsils can be removed by incising the mucosa at the tonsillar pillars and bluntly dissecting the tonsil from the underlying muscle, or by using a wire

Table 3. Department of Otolaryngology, Izaak Walton Killam Children's Hospital: Pre-tonsillectomy Bleeding History (22)

Has your child had surgery, including tooth extractions, before?
- If so, did he/she have excessive bleeding during surgery?
- If so, did he/she have prolonged bleeding after surgery?

Does your child have spontaneous nosebleeds or bruising?

Do cuts bleed longer in your child than in others?

Has your child had prolonged bleeding or swelling after biting the lip or tongue?

Has your child taken any medications in the last 10 days?

Does your child have any of the following: liver disease, kidney disease, collagen vascular disease, nutritional deficiencies, Cushing's disease, or dysproteinemias?

Are there any relatives with bleeding problems?

snare (2,23). Some surgeons prefer electrocautery dissection to minimize blood loss (24). The surgery itself normally takes less than thirty minutes, and following complete reawakening, the child is able to drink immediately (23).

Various adjunctive measures to surgery including pre-operative local anesthesia, steroids, or antibiotics are used by some practitioners (25-27). A well designed study by Telian et al. showed that perioperative antibiotics, including oral amoxicillin for seven days post-operatively, was related to an earlier return to normal diet and shorter duration of pain in children (27).

There is a trend toward same-day discharge following tonsillectomy, and this is felt to be safe in healthy children with reliable caregivers and easy access to the hospital should the need arise (28-30).

COMPLICATIONS

Complications of tonsillectomy exist and the most frequently discussed is hemorrhage. Post-operative bleeding occurs in about 2% of patients and includes primary and secondary hemorrhage (2,31). Primary hemorrhage occurs in the first 24 hours following surgery (32,33) and is considered to be related to inadequate operative technique or undiagnosed coagulopathy (31,34). Secondary hemorrhage can occur up to 10 days post-operatively and many publications discuss the risk factors for this (31,33,35). It may be related to premature separation of granulation tissue which covers the raw surface (23). Typically, these bleeds are not severe, usually resolving spontaneously (2).

Death is the most serious complication of tonsillec-

tomy and has been estimated to occur in 1 out of between 1,000 and 150,000 patients (3,35). These rare events are usually related to bleeding or anesthesia complications (35).

Post-operative airway obstruction can be related to local edema, retropharyngeal hematoma, aspirated blood clots or lymphoid tissue (2). Other less serious complications are fever, emesis, inadequate oral intake leading to dehydration, pneumonia (32,33) and local infection (27). Ten percent of same-day tonsillectomies require admission for these complaints (33). Tonsillar remnants are found in 15% of cases (35). Local trauma to oral tissues is not uncommon but is usually trivial (34). Nasopharyngeal stenosis can rarely follow tonsillectomy, especially if combined with adenoidectomy (3,34). Lastly, there are anecdotal reports of depression following tonsillectomy (36).

POSTOPERATIVE CARE

Children have pain following tonsillectomy and require analgesics. They may complain of referred otalgia which should not be mistaken for otitis media (34). Pain tends to be more pronounced with increasing age (34). Our current routine is to give acetaminophen by mouth every four hours during the first post-operative night, then as necessary. Codeine elixir is used if this is inadequate. Pain gradually abates during the first five days after surgery, then often has a brief exacerbation between days 5 and 8 as the eschar (the coagulated crust which forms after cauterization) separates (37). These children typically present to the family doctor at this time, and the gray and white eschar of normally healing mucosa is misinterpreted as a raging infection (Fig. 3). In the absence of systemic evidence of infection, these children require analgesics only. It is not unusual for parents who are given prescriptions for analgesics for their post-tonsillectomy child to fail to have them filled for a variety of reasons.

Post-tonsillectomy diet should be dictated by common sense. Historically, a soft diet has been prescribed (38) but studies show that children can safely have a non-restricted diet (39-41). As well, reduced activity is routinely advocated (21), but there is evidence that unrestricted activity is just as safe (39).

Children are usually seen by the surgeon at one to two weeks, in order to monitor post- operative progress. By two to three weeks children have typically recovered completely.

CONCLUSIONS

1. A large number of tonsillectomies are performed in

Figure 3. *Normal appearance of post-tonsillectomy pharynx at 5 days. Healing eschar is grayish and mucosal edges are erythematous.*

Halifax each year.

2. The most common indications for tonsillectomy in Nova Scotia are recurrent pharyngitis (defined as 5 or more episodes per year for 2 years, or more than 7 episodes in one year), and obstructive tonsils causing sleep apnea or difficulty swallowing.

3. Throat cultures have an accuracy of 53% if core bacteria are taken to be responsible for clinical illness.

4. Tonsillectomy may reduce the incidence of sore throats if prescribed for stringent indications.

5. A preoperative bleeding history is taken; coagulation studies are not ordered unless indicated.

6. Complications of tonsillectomy include death, bleeding, airway obstruction, emesis, fever, dehydration, pneumonia, infection, local tissue trauma, nasopharyngeal stenosis, and depression.

7. Analgesics, diet and activity ad lib are the mainstays of post-operative care.

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