

## **Tonsillectomy in medical practice: A literature review**

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### **Abstract**

Tonsillectomy is one of the most frequently undertaken procedures in otolaryngology. Tonsillectomy is defined as a surgical procedure performed with or without adenoidectomy that completely removes the tonsil including its capsule by dissecting the peritonsillar space between the tonsil capsule and the muscular wall. The indications for tonsillectomy, however, remain controversial. Children undergo surgery primarily to reduce the frequency and severity of recurrent sore throats. A smaller number endures tonsillectomy – often with adenoidectomy – in order to provide relief of airway obstruction. Nonetheless, there is no evidence that the benefits of tonsillectomy for recurrent sore throat are prolonged beyond two years.

The main aim of this review is to provide clinicians with evidence-based guidance for identification of patients who are the best candidates for tonsillectomy. Secondary objectives include optimization of the peri-operative management of children undergoing tonsillectomy; emphasis on the need for evaluation and intervention in special populations; improvement of counseling and education of families who are considering tonsillectomy for their children; description of different procedures currently used for tonsillectomy; description of the management options for patients with modifying factors, and; reduction of inappropriate, or unnecessary variations in medical care.

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### **Historical notes**

Celsus in 'De Medicina' (14–37 AD) described 'induration' of the tonsils, which he advised could be removed by dissection with the fingernail. If this was not possible they could be grasped with a hook and pulled out with a 'bistoury' (1). Improved instrumentation – particularly the snares and

'guillotines' used by Morrel McKenzie (2) led to popularization of the operation in Victorian England. Sir Felix Semon (1849–1921) removed the tonsils from several of Queen Victoria's grandchildren and the procedure became fashionable in the drawing rooms of the aristocracy (3). It was said

to cure a variety of childhood ailments (4). The criteria for offering tonsillectomy have changed significantly over the years and are now much more stringent.

### The evidence-base

Despite the popularity of tonsillectomy and the enthusiasm with which it is offered and sought, high quality evidence of efficacy is sparse. A systematic review concluded that there was little evidence on the use of tonsillectomy for recurrent throat infection and a Cochrane review concludes that there is no evidence from randomized controlled trials (RCT) to guide clinicians in formulating guidelines for surgery in children or adults. There is no good evidence that any benefit from tonsillectomy for recurrent sore throat in children is sustained for more than two years after surgery.

The most celebrated trials make up the 'Paradise study' reported in 1984 (5). These randomized and nonrandomized controlled trials prospectively compared groups of children who met strict entry criteria and who received surgery (tonsillectomy with, in some circumstances, adenoidectomy) or non-surgical intervention. Participation was dependent on children having a history of seven episodes of sore throat in the year prior to the study, five or more in the preceding two years or three or more in each of the preceding three years. Well-documented clinical features had to be demonstrated to ensure eligibility. These trials showed that in such 'severely affected children' tonsillectomy was efficacious for two years, and possibly for a third year. Efficacy was measured by a reduction in the number and/or severity of throat infections. Many of the children treated non-surgically improved spontaneously. Such benefits as there were from surgery were slight. Critics point out that the study was poorly randomized. Children randomized to the nonsurgical group proceeded to surgery at the subsequent request of the parents. Children in the control limb of the study had active therapy, which may have minimized the morbidity. Perhaps inadequate knowledge of the natural history and expected outcome of recurrent sore throats in children has bedeviled the quest for a sound evidential base for current practice. Preliminary data from a study conducted during the 'tonsillectomy embargo' in the

UK in 2001, resulting from concerns about variant Creutzfeldt-Jakob disease (vCJD) transmission, suggests that spontaneous improvement is to be expected in adults (6).

### Current practice

Tonsillectomy in children is one of the most frequently performed operations in the developed world. Although numbers are declining from a peak of over 200,000 annual tonsillectomies in the 1950s (UK), some 52,000 tonsillectomies were performed in England under the National Health Service in the year 2003/04. Data from the Department of Health Statistics show that around 30,000 of these were in children with an approximately equal gender ratio ([www.dh.gov.uk](http://www.dh.gov.uk)). The majority are for recurrent sore throats with most of the remainder for airway obstruction. Parents in the UK initially present to a general practitioner. Referral patterns are dictated by thinking in primary care and many parents have firm views by the time they see an otolaryngologist. Despite the availability of guidelines and protocols in practice, a decision to undertake tonsillectomy is made by negotiation between the parent/ caregiver and the otolaryngologist.

### Socio-cultural factors

There is no published evidence that the pattern of disease varies by racial, ethnic, climatic or cultural factors across the globe, but there are wide variations in the rate of tonsillectomy by geographical region (7). A quoted incidence of 6.5 per 10,000 children in the UK National Health Service contrasts with 11.5 per 10,000 in the Netherlands and 5 per 10,000 in the USA. The figures for the UK may be higher as an estimated one-sixth of otolaryngology interventions occur in private practice where figures are not as widely available. In the developing world, the incidence of surgery is much lower, related perhaps to access to health care and parental expectations and preferences. Recent work suggests that social class and parental smoking does not influence the number of reported episodes of sore throat or tonsillitis, but that a history of parental tonsillectomy and a family history of atopy have a positive association with the frequency with which children present with sore throat and tonsillitis (8). Parental enthusiasm for

surgery varies. Some of the variation may be due to differences in demand for health care. There is evidence from the North of England and Scotland Study on Tonsillectomy and Adenoidectomy in Children (NESSTAC) that girls now present much more frequently than boys (9).

### Guidelines

The British Association of Otolaryngologists Head and Neck Surgeons suggest what are felt to be reasonable indications based on current level of knowledge, clinical observation in the field and the results of clinical audit of outcomes. Patients should meet all the following criteria:

- sore throats due to tonsillitis;
- five or more episodes of sore throat per year;
- symptoms for at least a year;
- episodes of disabling sore throat which prevent normal functioning.

As with any surgical procedure, the risks of surgery must be balanced against the potential benefit.

The American Academy of Otolaryngologists/Head and Neck Surgeons (AAO HNS) guidelines are widely accepted by US health care insurance companies. These guidelines suggest that tonsillectomy should be considered for children with 'three or more infections of tonsils and/ or adenoids per year despite adequate medical therapy'.

### Tonsillectomy technique

'Cold steel' tonsillectomy

The most common method of 'cold steel' tonsillectomy is the dissection technique. In this, the tonsil is retracted medially, the mucosa overlying the tonsil capsule incised and the plane of loose areolar tissue between the tonsil and the pharyngeal musculature dissected with steel dissectors, gauze or cotton wool until the tonsil is fully mobilized. Blood vessels traversing the plane of dissection are dealt with either by ligature or diathermy as required.

### Diathermy tonsillectomy

In recent years, the technique has evolved of using diathermy not only as an aid to haemostasis when the tonsil has been delivered, but to dissect the tonsil from its bed. This has the obvious advantage from the point of view of both operator and patient, particularly if a child, of reducing intra-operative

blood loss to a minimum. Various claims and counterclaims have been made regarding the advantages and disadvantages of this technique, the most common alternative to traditional cold steel tonsillectomy.

### Coblation tonsillectomy

This relies on the use of a specially designed bipolar electrical probe, which both coagulates and cuts the tissues as it develops the dissection plane between tonsil and capsule. The probes or 'wands' are single use and there is a cost consideration. The technique involves the use of the operating microscope. There are no good controlled studies comparing coblation with cold steel dissection without the addition of diathermy; current evidence is inadequate to justify its introduction in preference to cold steel dissection with ties and/ or packs.

### Ultrasonic dissection

Ultrasonic dissection uses an oscillating blade, which acts as both a cutting and coagulating device. Enthusiasts for the 'harmonic scalpel' have claimed advantages over conventional techniques, in terms of reduced pain and general morbidity, but evidence remains unconvincing.

### Laser tonsillectomy

With the advent of the laser as a surgical tool, the use of this method of dissecting out the tonsil has been advocated as having advantages in terms of reduction of bleeding, postoperative pain and more rapid healing. Several studies have failed to confirm these advantages. There is convincing evidence that the rate of secondary hemorrhage and late postoperative pain is significantly greater with laser (10).

### 'Capsulotomy' techniques

The above techniques are designed to remove the entire palatine tonsil. A preference for 'office-based' surgery particularly in the USA has led to the popularization of techniques to ablate a part of the tonsil, usually leaving the capsule intact. These 'tonsillotomy' techniques include thermal tissue ablation using radiofrequency volumetric reduction (RFVR) using a customized probe and surface laser surgery. They are widely used but have not been subject to good quality randomized controlled trials.

They may be considered when tonsillectomy is undertaken in the very young where it may be desirable to leave some functioning lymphoid tissue (11).

### Morbidity of tonsillectomy

Psychosocial morbidity and pain

Morbidity from the operation is significant. It includes both the expected adverse consequences and the possible complications. Pain and dysphagia are normal in the early postoperative period. Most children require at least a week to resume normal functioning and an average return to school or work time is one to two weeks. This is mainly due to pain preventing a return to normal diet and occasionally vomiting in the early postoperative period due either to the after-effects of the anesthetic or to the effect of swallowed blood on the stomach.

### Mortality

The complications of tonsillectomy may be divided into those associated with the anesthetic and those directly associated with the operation itself. As the operation is normally performed on children and young otherwise fit adults, for the majority of patients the risk of the short anesthetic required for tonsillectomy is small. There are risks inherent in anesthesia in very young children and for this reason tonsillectomy is seldom performed in children before the age of two years, even in the unlikely event of them fulfilling the above criteria for consideration for surgery. In general, tonsillectomy is not frequently indicated in children under the age of four years, the exception being children with obstructive sleep apnea syndrome. Since its instigation in 1995, the Royal College of Surgeons

in England audit on surgical mortality (12) records no deaths occurring from tonsillectomy, but there were two deaths reported in the British lay press in 2001. Extrapolating from US data and from Department of Health statistics, the potential mortality from tonsillectomy has been calculated at one per 24,000 operations or one in 16,000 to one in 35,000. There were two cases reported in Albania in the last 50 years.

### Peri-operative complications

Occasionally, patients may experience *temporo-mandibular joint dysfunction* due to the mouth being opened too widely with the tonsillectomy gag. Non-traumatic *atlantoaxial subluxation* (Grisel syndrome) may occur secondary to any inflammatory process in the upper neck. Treatment consists of cervical immobilization, analgesia and antibiotics to reduce the risk of neurological deficit.

The main early complication is *hemorrhage*. This is defined as primary (within the first 24 hours postoperatively) or secondary, i.e. occurring after 24 hours and during the phase of healing of the tonsil bed. Secondary hemorrhage can occur any time until the tonsil bed has healed, which may take as long as two weeks. It is attributed – on sparse evidence – to infection in the granulating tonsil bed, often with streptococcal organisms. The reasons for this wide variation in bleed rates is not clear; it may be related both to the technique used and to the experience of the operator, although in the NPTA there was no significant difference in rates between trainees and more experienced surgeons.

*Postoperative 'infection'* is sometimes diagnosed in primary care. The presence of severe halitosis is the most prominent feature, usually associated with fever.

#### Box 1: Recommendations of the National Prospective Tonsillectomy Audit, 2005 (12)

- When a patient is counseled for surgery, the risk of tonsillectomy complications, and in particular postoperative hemorrhage, should be carefully explained to the patients/parents.
- This risk should be quantified, preferably using the surgeon's own (or department's) figures.
- National figures can be used, but this should be made clear to patients.
- Surgeons using monopolar diathermy should consider using an alternative technique. There are no advantages to using this instrument over other methods.
- All trainee surgeons should become competent in cold steel dissection and haemostasis using ties, before learning other techniques in tonsillectomy.

- Emphasis must be placed on teaching the correct use of, and the potential hazards of, diathermy and other 'hot' techniques. Checks should be made of the power settings before starting the operation.
- Inexperienced trainees must be supervised by a more senior surgeon until competency has been achieved. This recommendation is in agreement with the College's Standards on Good Surgical Practice issued in 2002.
- Irrespective of seniority and experience, surgeons who wish to start using new techniques, such as coblation, should undergo appropriate training.
- All ENT departments should have regular morbidity and mortality meetings to monitor adverse incidents affecting patient outcome. For tonsillectomy, data should be presented by the surgeon, indicating the technique used for dissection and haemostasis and power settings if applicable, type of instrument used, and any difficulties encountered.
- It is the responsibility of the surgeon, and if appropriate his trainer, to follow up any identified problems appropriately.
- Use of single-use instruments should also be recorded, especially for cold steel dissection.
- There is an urgent need for new standards for diathermy machines so that the amount of power used is obvious to the user. Manufacturers of diathermy machines should be encouraged to produce machines with information on the total amount of energy delivered to patients.

#### **Box 2. Conclusions**

- Tonsillectomy is one of the most commonly performed surgical procedures in the developed world.
- The evidence-base for current practice is poor.
- Tonsillectomy rates vary considerably in different populations. These variations are not accounted for by variations in disease prevalence.
- Improvements following surgery are particularly small in less severely affected children. The morbidity of surgery usually outweighs any potential benefit in this group.
- There is no evidence that the benefits of tonsillectomy for recurrent sore throat are prolonged beyond two years.
- The operation is associated with significant morbidity, which may be minimized with careful peri-operative management.

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