

Indications for Tonsillectomy and Adenotonsillectomy In Children

A joint Position paper of the Paediatrics &
Child Health Division of The Royal
Australasian College of Physicians and
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Recommendations

1. An increase in access to adenotonsillectomy for children with moderate/severe obstructive sleep apnoea [OSA] is urgently required. Outpatient and surgical waiting lists should reflect this priority. Given the potential for permanent long term adverse effects in the younger age group, children under 5 years should be the first target group for increased services.
2. Improved epidemiological data are urgently required. Funding of appropriately randomized clinical studies that measure the outcomes from adenotonsillectomy in mild/moderate OSA and the role of tonsillectomy in recurrent sore throat should be a priority. These results are required before further consideration of any alterations to the recommended indications for surgery.
3. The Royal Australasian College of Physicians and the Australian Society of Otolaryngology Head and Neck Surgery should advocate to the relevant Health authorities and jurisdictions as is appropriate* for dedicated funding for definitive research into the health impact and management of mild to moderate OSA and the role of tonsillectomy for recurrent sore throat.

* In Australia, the Commonwealth Department of Health and Aged Care, State Departments of Health and the National Health & Medical Research Council

* In New Zealand, the Ministry of Health and the New Zealand Health Research Council

Conclusions

I. The indications for tonsillectomy/adenotonsillectomy are:

1. Upper Airway Obstruction in Children with Obstructive Sleep Apnoea [OSA]
2. Frequent Recurrent Acute Tonsillitis
3. Peritonsillar Abscess
4. Suspected Neoplasm
5. Uncommon indications

II. Current suboptimal rates of adenotonsillectomy for OSA in Australia and New Zealand

The incidence of adenotonsillectomy in Australia and New Zealand for this indication alone is significantly below that expected. The analysis suggests that only 1 in 7-10 children who could benefit from adenotonsillectomy is being treated.

III. Frequent recurrent acute tonsillitis.

Tonsillectomy as per Paradise criteria is supported.

IV. Operative Management

High risk children for tonsillectomy/adenotonsillectomy should be identified, and their operation should be performed in a hospital with appropriate paediatric intra and post-operative airway support services.

Introduction

In Australia and New Zealand adenotonsillectomy/tonsillectomy are frequently performed surgical procedures for obstructive sleep apnoea and frequent recurrent tonsillitis in the paediatric age group.

This position paper reviews the existing literature on the indications for these surgical procedures and makes recommendations about policy and practice in order to bring Fellows from different colleges to a common understanding of the recent literature, and provide a platform for dialogue between clinicians in differing specialities and between doctors and parents/patients.

The working group was initiated because there was concern expressed to the Colleges and the Society about the frequency of operative removal of children's tonsils within Australia and New Zealand.

The aim of the working party was to review the medical evidence relating to indications for tonsillectomy and adenotonsillectomy. The working party specifically did not address:

1. The diagnosis and treatment of sore throat and fever in infants and children.
2. The diagnosis of OSA or the indications for polysomnography (PSG).
3. The indications for adenoidectomy alone.
4. Surgical management.

Methodology

Members of the working group undertook searches of the medical and otolaryngological literature for studies which described the indications for tonsillectomy or adenotonsillectomy in children. Thirty references were identified as having relevance to the topic and were referenced in the practice guideline. These papers include two randomised controlled trials, three systematic reviews (one a Cochrane collaboration Systematic review, and one a SIGN review), two clinical practice guidelines (one from the Royal College of Paediatrics and Child Health and one from the American Academy of Pediatrics) and a Technical report (from American Academy of Pediatrics).

Table 1: NHMRC Grading of recommendations and “level of evidence”.¹

Grade of recommendation	Description
A	Body of evidence can be trusted to guide practice
B	Body of evidence can be trusted to guide practice in most situations
C	Body of evidence provides some support for recommendation(s) but care should be taken in its application
D	Body of evidence is weak and recommendation must be applied with caution

The application of a grade to a recommendation is based on an assessment of all the included studies for that recommendation (the ‘body of evidence’). The five components that are considered in judging the body of evidence are:

- volume of evidence (studies sorted by their methodological quality and relevance to patients)
- consistency of the study results
- the potential clinical impact of the proposed recommendation (including the balance of risks and benefits, the relevance of the evidence to the clinical question, the size of the patient population and resource issues)
- the generalisability of the body of evidence to the target population for the guideline
- the applicability of the body of evidence to the Australian healthcare context.¹

A formal meta-analysis was not undertaken, but the papers were all considered by the working party in their deliberations over this position paper.

The working party's review of the literature identified 5 clinical scenarios in which tonsillectomy or adenotonsillectomy was indicated. Some indications were associated with caveats. These clinical scenarios are listed below and then discussed.

- 1. Upper Airway Obstruction in Children with Obstructive Sleep Apnoea**
- 2. Frequent Recurrent Acute Tonsillitis**
- 3. Peritonsillar Abscess**
- 4. Suspected Neoplasm**
- 5. Uncommon indications**

1. Upper Airway Obstruction in Children with Obstructive Sleep Apnoea

Adenotonsillectomy is the first line of therapy after diagnosis of significant upper airway obstruction in children with sleep disordered breathing.

Grade of recommendation: B

Literature exists from multiple centres both nationally and internationally that obstructive sleep apnoea [OSA] (significant upper airway obstruction resulting in oxygen desaturation and/or sleep fragmentation) affects approximately 2-3 per cent of children under the age of 10 years.^{2 3} The prevalence data in the literature would equate to 80,000 children in Australia and 16,000 children in New Zealand. Despite this, there are no randomised controlled trials on the outcome of adenotonsillectomy in OSA due to the inherent difficulties of blinding assessors to treatment and ethical ramifications.

The prevalence of persistent snoring on most nights, considered as the mild end of the disease profile of upper airway dysfunction, is reported in 8-12 per cent of children.² The peak prevalence of all upper airway problems in the paediatric age group is between 2-8 years when upper airway lymphoid tissue size is at its peak relative to upper airway size. However, upper airway obstruction during sleep cannot be attributed solely to lymphoid tissue as many children with visible large tonsils do not have obstruction. Present evidence suggests a poor correlation between tonsillar size and the risk of OSA.⁴ Other factors, which may modulate the risk of obstruction, include altered upper airway tone, midface hypoplasia, obesity and genetic factors.⁵ Finding prominent tonsils in a child with a history of nocturnal snoring is not prima facie evidence of significant obstruction during sleep, but should alert the clinician to the possibility of OSA as a diagnosis.

Morbidity of Upper Airway Obstruction: It has been known for many years that severe upper airway obstruction in children can result in developmental delay, growth failure and cor pulmonale eg Pierre Robin Sequence prior to 1980's. What is less well appreciated are the more recently identified morbidities^{6 7} associated with less severe clinical obstruction. Over the past 20 years an extensive body of literature has detailed the effects of adult OSA on daytime functioning. The areas affected include verbal and non-verbal intelligence, memory, psychomotor efficiency, attention, concentration, executive and psychosocial functioning.⁸ The potential for similar effects in children was largely unstudied until the last decade but there is now evidence that the disruption of children's sleep architecture by repetitive episodes of hypoxaemia and arousal may result in similar deficits.⁹ The behavioural aspects most consistently reported include aggression, hyperactivity, inattention and anxiety; while learning, memory and executive functioning (flexible analytic and problem solving ability) are the neurocognitive areas most affected.¹⁰ It has more recently been claimed that even mild OSA or primary snoring can also be associated with significant deficits.^{11 12} This is particularly important as 8 -12 per cent of all children are thought to have primary snoring.

The working party recommends that adenotonsillectomy is the first line of treatment in moderate/severe OSA. For primary snoring, a conservative approach is reasonable

at the current time, as it is currently unclear what the role of adenotonsillectomy is in the management of primary snoring. Further research is needed.

Unfortunately there is not a simple method for the diagnosis of clinically relevant upper airway obstruction. Primary snoring cannot be confidently distinguished from OSA on clinical history alone.^{13 14} The literature was reviewed recently in a meta analysis.¹⁵ While those with symptoms and signs of severe obstruction or conditions that predispose to OSA, such as craniofacial syndromes or syndromes associated with poor muscle tone/co-ordination, are more straightforward, the majority of children fall into the less severe category. While PSG acquired data is used in classifications of degree of disease¹⁶, the clinically significant level of obstructive events index on PSG is unknown, (American Thoracic Society review of Cardiorespiratory sleep studies in children 1999.¹⁶) In a survey of 183 otolaryngologists in the US who estimated that they performed 24,000 adenotonsillectomies, less than 10 per cent had any overnight monitoring and less than 5 per cent had polysomnography.¹⁷ Recently Nixon et al have published guidelines regarding the assessment of upper airway obstruction severity using the more available pulse oximetry.^{18 19} Unfortunately, this has limitations in screening, with a negative predictive value of only 53 per cent, and a positive predictive value of 97 per cent. These studies need replication.

The working party did not address diagnostic criteria for OSA in children on PSG, but acknowledges that PSG is not essential for the diagnosis to be made and treatment initiated.

Treatment: In a recent extensive meta-analysis of the outcome of adenotonsillectomy,²⁰ the authors report the cumulative cure rate as approximately 80 per cent. It is recognised that studies published to date are generally from tertiary referral centres and therefore more likely to include children with co-existing morbidities or underlying abnormalities and may therefore under-estimate improvement achieved in children without co-morbidities. These data were based on only 11 studies and included a total of only 401 children. This contrasts with reported rates of improvement/cure of up to 97 per cent when symptoms alone serve as the outcome measure.²¹ Outcomes in non-tertiary settings have not been well studied. In addition, even the best studies in this area have significant methodological flaws with few studies undertaking detailed neurocognitive and PSG testing in children pre and post adenotonsillectomy, and detailed PSG being omitted in control children in two recent reports.^{22 23}

Due to the recognised failure to normalise upper airway function in 10-20 per cent of children with OSA, follow up post-intervention is recommended.

2. Frequent Recurrent Acute Tonsillitis

Tonsillectomy/adenotonsillectomy is indicated for episodes of recurrent acute tonsillitis. As a guide, seven episodes in the preceding 12 months, or 5 in each year for 24 months, or 3 per year for 3 years; account should be taken of the clinical severity of the episodes and that this may result in as little as one less episode of sore throat with fever per year.

Grade of recommendation: B

The consensus view was that there is no evidence for surgical therapy in minor or infrequent upper respiratory infections^{24 25 26} but that the current literature supports the case for tonsillectomy when frequent acute tonsillitis occurs. This recommendation is principally based on the study of Paradise et al²⁷ who evaluated recurrent sore throat with fever in a group of children aged 3 -15 years. The authors found that in children with a history of sore throat and fever numbering 7 in the past year, or 5 in each of the previous 2 years, or 3 in each of the previous 3 years, there was evidence over the subsequent 2 years of statistically significant reduction in febrile episodes compared to controls. The SIGN guidelines for tonsillectomy refer to this study as the only one within the literature to attempt randomization and longer follow-up [2-3 years] and even though there are limitations with regard to study numbers and methodology there is nothing in the literature to dispute this conclusion.²⁸ The reduction in the number of episodes of sore throat with fever is statistically significant for the first 2 years post surgery and almost reaches significance in the third year. It is more significant in the younger children, than the older children.

The results of the study of Paradise et al²⁷ could also support a conservative non surgical approach to recurrent tonsillitis /recurrent sore throat with fever, since there were no major infective events in the conservative arm. However, the children in the non operative arm did have more minor morbidity with increased episodes of sore throat and fever, with increased time away from school and day care.

In line with the 1999 Cochrane Review,²⁹ the working group could find little in the literature in the past 20 years to suggest that the general thrust of these recommendations should be altered but acknowledges the need for further research in this area given the changes in infective illness spectrum and surgical techniques since the Paradise study was published in 1984.

The working group feels it is reasonable to incorporate the severity of the event and its impact on the quality of life of the child and his/her family, as part of the decision-making process. For example, severe episodes resulting in hospitalisation, time off school/day care, disruption of work for the parents and the spread of infection to siblings.

The working group's present understanding is that the introduction of the pneumococcal conjugate vaccine into the regular schedule would be unlikely to alter the incidence of acute tonsillitis. In efficacy studies of pneumococcal conjugate vaccines in USA and Finland there was a modest reduction of otitis media (6-8 per cent) but no decrease in upper respiratory tract infections overall or of tonsillitis.^{30 31} In contrast the incidence of insertion of ventilation tubes for middle ear dysfunction is

reduced by pneumococcal conjugate vaccines by 25-39 per cent.

As the greatest reduction in subsequent acute tonsillitis is in the younger age groups [< 5 years] and for the first 2 years after surgery, it is recommended that timely intervention occurs and that this should be considered in prioritisation and in review of waiting lists for surgery in this age group.

3. Peritonsillar Abscess

Grade of recommendation: C

The indication for tonsillectomy in peritonsillar abscess should be based on a past history of recurrent tonsillitis and co-morbidities. The evidence for this recommendation is based upon studies and expert opinion. Reported rates of recurrence vary from 5 - 23 per cent,³² the incidence depending upon the duration of follow-up. Two long term prospective studies, with 5 year follow-up, reported recurrence rates of 22 per cent in 131 patients,³³ and 17 per cent in 98 patients.³⁴

4. Suspected Neoplasm – this is an absolute indication for tonsillectomy

Grade of recommendation: B

In the paediatric population an extranodal intratonsillar lymphoma is rare, but is possible in a unilateral tonsillar enlargement if there is a short history [2-6 weeks], the tonsil size is larger than 3 cm, there is associated significant lymphadenopathy [>3 cm], hepatosplenomegaly and systemic symptoms.³⁵ The evidence for this recommendation is based upon expert opinion.

5. Uncommon indications

Grade of recommendation: D

Because these presentations are uncommon the recommendations are based upon expert opinion.

- Chronic diphtheria carrier status after failed antibiotic eradication
- Recurrent large tonsilloliths or tonsillar cysts
- Recurrent tonsillar haemorrhage

Complications of Adenotonsillectomy /Tonsillectomy

Tonsillar bed haemorrhage

Tonsillar bed haemorrhage is the most frequent complication after surgical removal of tonsils and the incidence increases with the increasing age of the patient i.e. lowest in the patients under 5 years. A recent surgical audit within the National Health System of England and Northern Ireland³⁶ of 33,921 tonsillectomies [72 per cent paediatric patient age 0-15 years] found an incidence of haemorrhage of 1.9 per cent in 0-4 years, 3.0 per cent in 5-15 years and 4.9 per cent in adults [with return in theatre in 0.8 per cent, 0.8 per cent and 1.2 per cent respectively]. No deaths were reported in the paediatric age group [0-15yrs]. Those operated on for peritonsillar abscess were most likely to have a tonsillar bed haemorrhage [5.4 per cent] and those for OSA least likely [1.4 per cent], with the incidence in recurrent acute tonsillitis at 3.7 per cent.

Similar rates of haemorrhage were found in a recent Australian audit.³⁷

Table 2: John Hunter Hospital /John Hunter Children’s Hospital secondary tonsillar bleed complications by age.

Age group	N	Secondary bleed
0-4 years	308	2 (0.6 per cent)
5-9 years	369	14 (3.73 per cent)
10-17 years	218	12 (5.5 per cent)
18 and over	238	24 (10.1 per cent)

Anaesthetic and post-operative care

Recommendation: It is recommended that all children who have surgical removal of tonsils for moderate and severe OSA be monitored as inpatients post-operatively.

Grade of recommendation : C

Complications related to the general anaesthetic required for the procedure vary between countries and facilities. Anaesthetic complications were not raised as a problem in the National Health System audit.³⁶ Review of the recent literature suggests it is largely due to differing techniques and the use or not of narcotics as analgesia in the post-operative period.³⁸ In children under 3 years who have tonsillectomy for OSA there is an increase in respiratory management difficulties resulting in oxygen desaturation events on induction and emergence, but these do not lead to a longer in-patient stay or recovery duration.^{39 40} It is essential that the anaesthetist is experienced in infant airway management to avoid significant episodes.

Some studies of post-operative complication for tonsillectomy in OSA have reported increased respiratory events in the post-operative period compared to children having tonsillectomy for other indications.^{41 42 43} These studies do not determine whether this increased rate of post-operative oxygen desaturation and carbon dioxide retention is actually unchanged pre-existing respiratory compromise due to the OSA.

Post-operative monitoring can range from oximetry as a minimum, to intensive care with a need for airway support. The facility within which the procedure is performed should be able to provide this. Young age [less than 3 years], severity of OSA and comorbidities are indicators for increased post-operative care needs.

Incidence of Tonsillectomy in Australia and New Zealand

The national health services data banks were accessed for information on the incidence of surgical removal of tonsils in Australia and New Zealand. Current population demographics and frequency of tonsillectomy / adenotonsillectomy were collated separately for incidence in Australia and New Zealand due to data incompatibility.

Australian Data

Table 3: Removal of Tonsils either alone or with adenoids – incidence per thousand in the age groups 0-4 years and 5-9 years

	Population	2002-03	2003-04
0-4 years	1.1 million	7.2	6.4
5-9 years	1.4 million	6.4	6.4

Source: Australian census data, Australian Institute of Health and Welfare (AIHW) and Medicare Australia.

Medicare Australia had no specific data available as to the number of children in the two age brackets able to access treatment within the private health system, but had data on the number of procedures. If we assume the distribution of children with private health insurance is similar to that within the adult population i.e. approx. 40%, the incidence of tonsillectomy /adenotonsillectomy in the public sector approximates 3.2 per thousand for 0-4 year group and 3.5 per thousand for 5-9 year group.

New Zealand Data

The population denominator has been set at 290,000 for each 5 year period; this is not an exact measurement for each year. No differential between the New Zealand public and private sector is available; it is acknowledged that the private sector is small.

Table 4: Removal of Tonsils either alone or with adenoids – incidence per thousand in the age groups 0-4 years and 5-9 years (New Zealand data: NZHIS)

	Population	2002-2003	2003-2004
0-4 years	290,000	3.4	3.1
5-9 years	290,000	4.5	4.3

Australian and New Zealand Experience: Present data suggests that only 0.3 - 0.7 per cent of children aged 0-9 years currently undergo adenotonsillectomy. Even if one

accepts that the present epidemiology data may be over-estimating the incidence of OSA in children, the incidence of adenotonsillectomy in Australia and New Zealand for this indication alone is significantly below that expected. The above analysis suggests that only 1 in 7-10 children who could benefit from adenotonsillectomy is being treated.

In Australia this difference is particularly marked within the public health system. The present overall adenotonsillectomy rate is approximately 3 - 7 per thousand, but within the public health systems of both countries it is less than 4 per thousand. The best epidemiological data suggests that the figure should be closer to 20 - 30 per thousand.

Abbreviations

AIHW	Australian Institute of Health and Welfare
ASOHNS	Australian Society of Otolaryngology Head and Neck Surgery
NHMRC	National Health and Medical Research Council
NZHIS	New Zealand Health Information Service
OSA	Obstructive Sleep Apnoea
OSAS	Obstructive Sleep Apnoea Syndrome
PSG	Polysomnography
RACP	The Royal Australasian College of Physicians
SIGN	Scottish Intercollegiate Guidelines Network

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