

# Tonsillectomy versus tonsillotomy for sleep-disordered breathing in children

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Tonsillectomies are performed in children with sleep disordered breathing (SDB) to reduce obstruction due to hypertrophic tonsils usually in conjunction with adenoidectomy.

Systematic reviews strongly support this as an effective treatment.

The significant issues of tonsillectomy are post-operative pain, difficulty with oral intake (drinking and eating) and the potential for serious post-operative bleeding.

Tonsillotomy, also referred to by other terms such as partial tonsillectomy, intracapsular tonsillectomy and subtotal tonsillectomy have been performed in increasingly significant numbers since the 1990s as an alternative to tonsillectomy to treat SDB in children.

Tonsillotomy is proposed to minimise post-operative pain, deliver a better recovery and improve oral intake, while still being as effective as tonsillectomy for resolving upper-airway obstructive symptoms for SDB in children.

SDB in children presents with breathing difficulties noted during sleep, including simple snoring, obstructive sleep apnoea and upper airway resistance syndrome. It results from obstruction or dynamic collapse of upper airway soft tissue during sleep which can manifest as snoring, hypopnoea, apnoea and restless sleep.

As well as tonsillar and adenoid hypertrophy as factors, nasal obstruction can also contribute to SDB, typically secondary to hypertrophy of the turbinates or septal deviation.

SDB can result in significant quality of life and health consequences. It has been associated with a 5-point decrease in IQ, lethargy, hypersomnolence, reduce exercise tolerance, emotional lability, decreased attention, small stature, enuresis, cardiopulmonary morbidity and missed school depending on severity.

Numerous studies have evaluated the outcomes of the two techniques, particularly in the last two decades. Uncertainty remains with regard to the efficacy and complications of tonsillotomy versus a 'traditional' tonsillectomy.

The gold standard for measuring SDB is overnight polysomnography (PSG).



Recent systematic reviews and meta-analysis do provide guidance as to treatment options in children with SDB. The issues surrounding treatments are outlined below.

## 1) Does surgery improve sleep disordered breathing

- *Firstly tonsillectomy versus taking a watch and observe approach, what can be expected? Resolution of SDB can be looked at from several parameters.*

### Objective measures

Apnoea-hypopnea index (AHI), Sleep-related quality of life (e.g. Obstructive Sleep Apnoea-18 (OSA-18) Paediatric Sleep Questionnaire (PSQ)) Generally studies show an improvement in these measures compared with taking a watch and observe approach, with the benefit consistent across all age ranges (1-18 years).

The benefits seem to be durable, with study design ranging from 3 months to 4 years duration of effects. The effects are proportionally greater and therefore more significant in children having mild or moderate SDB, this would include the vast majority of children presenting with SDB.

### Sleep related quality of life

Using various outcome measures it is found sleep related quality of life improves significantly after tonsillectomy compared to a watch and wait approach, one such measure to assess this is Pediatric Quality of Life Inventory (PedsQL).

### Behavioural outcomes

Although behaviour of children improved in these studies, the clinical significance and magnitude of the improvement is not clear.

### Executive function

Limited studies with mixed results, but studies do show some improvements but no conclusions can be drawn.

### Cardio-pulmonary

Limited studies addressing this, and no valid conclusions can be drawn. However the trend is towards increasing BMI in underweight children.

Other outcomes have been studied such as health facility usage post tonsillectomy.

A reduction in facility usage can be shown compared to watch and wait groups. In summary, tonsillectomy shows improvements in AHI, behaviour, sleep related



quality of life versus a wait and watch approach but no conclusions could be drawn about executive function, IQ or cardiopulmonary improvements.

There is a distinct lack of studies comparing tonsillectomy with other options such as CPAP (continuous positive airways pressure) or antibiotics.

- *Secondly does tonsillotomy confer the same benefits as tonsillectomy above?*

If tonsillectomy is the gold standard for improving SDB in children, given the cause is tonsillar hypertrophy is it sufficient to remove the bulk of the tonsil tissue for the procedure to be effective i.e. tonsillotomy?

Three systematic reviews/meta-analysis came to a similar conclusion that tonsillotomy was as effective as tonsillectomy. One used pooled OSA-18 scores.

The method of tonsillotomy and tonsillectomy varied between studies.

One review showed there was no significant difference in terms of resolution of obstructive symptoms, quality of life in the long term but while tonsillotomy had initially the same resolution rate.

There was some relapse and around 6% in the tonsillotomy group had re-development of SDB felt to be secondary to regrowth compared with a SDB relapse rate of around 1.6% in the tonsillectomy group.

Risk factors affect tonsillar regrowth, including age at the time of surgery, upper respiratory tract infections, and a history of allergies.

Younger children with tonsillar tissue that has not reached maximum size have an increased risk of regrowth.

In some patients, chronic tonsillitis may not have been recognised prior to surgery and the remaining tonsillar tissue might be stimulated to become hyperplastic. This suggests that tonsillectomy should be performed following a diagnosis of SDB concurrent with tonsillitis either recurrent acute episodes or chronic and possibly if there are co-existing allergies

### 2) Post-operation oral intake

The literature confirms our anecdotal observations that children undergoing a tonsillectomy are slower to return to a normal diet compared to children undergoing tonsillotomy.

Of 12 RCTs (randomised controlled trials), nine found a significantly earlier return to normal diet in those having tonsillotomy compared to tonsillectomy.

### 3) Post-operative pain

Post-operative pain is significant following tonsillectomy and lasts 7-14 days in duration.

The conclusion from anecdotal observation is that tonsillotomy has less post-operative pain than tonsillectomy is supported by 9 of 16 RCTs.

Different techniques of surgery make some of the comparison difficult without bias.

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With a tonsillotomy procedure, the exposure of the pharyngeal muscles is avoided, which may contribute to the rapid recovery and less pain.

#### 4) Post-tonsillectomy/tonsillotomy bleed rate

Post-operative haemorrhage is a recognised risk following tonsillectomy and tonsillotomy and is classified as either primary or secondary.

Haemorrhage is an important consideration in the paediatric population as any haemorrhage is significant given the lower blood volume in children when compared with adults.

With tonsillectomy dependent on definitions used in published series, primary haemorrhage occurring within the first 24 hours is rare but has been shown to occur in approximately 1% of children who have had a total tonsillectomy.

Secondary haemorrhage beyond 24 hours most commonly occurs 5-10 days post-operatively has an incidence of around 4%.

To define this further, the incidence of any bleeding is 4% but a reoperation rate to control haemorrhage is below 1%.

In comparison, children who have had a tonsillotomy have been found to have a similar incidence of primary haemorrhage but a significantly lower incidence of secondary haemorrhage at less than 1%.

A large European study incorporating 24,038 patients found that secondary haemorrhage after a tonsillotomy occurred in only 0.8% of patients, compared with 3.7% post-tonsillectomy.

These figures include any reported bleeding post-operation significant or insignificant.

It is assumed with tonsillotomy the capsule of the tonsil is not breached and it is in the extracapsular plane that a lot of blood vessels lie, either venous or arterial so hence are not disrupted as part of the procedure.

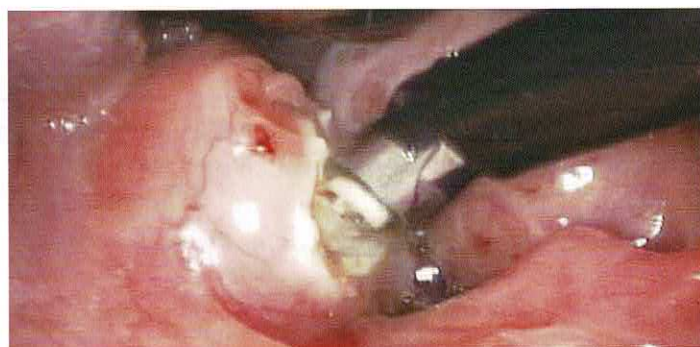
As an aside, different techniques may affect haemorrhage incidence but data analyses is difficult due to large numbers of study subjects required for comparison to be made with statistical significance.

#### Summary

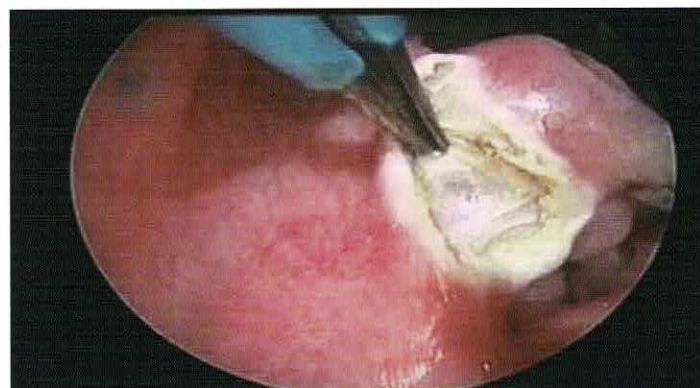
Tonsillotomy does have benefits as a technique for children with SDB.

My practice is to offer this for children of any age, who have symptoms and signs of SDB and where there is no history of tonsillitis either recurrent acute or chronic. Tonsillotomy I perform with a coblation wand technique and tonsillectomies I perform with bipolar cautery forceps.

It is important to warn parents of the potential for regrowth and the potential for future tonsillitis in the remnant tonsil tissue in subsequent years, right through into adulthood.



**Coblation tonsillotomy being performed**



**Bipolar tonsillectomy being performed**

If this does occur, a completion tonsillectomy can then be performed with no more difficulty than a primary tonsillectomy case at any time in the future.

Questions that the literature hasn't yet been able to answer remain.

What is the natural history of SDB children may outgrow the indications to intervene? Can we predict those within the population who will and how long can one take an observational approach before permanent effects on a child's learning and development happens?

The difficulty is the long term nature of the studies required. To date the longest published studies are around the six year duration, regrowth and subsequent tonsillitis may take longer to present.

Are there subpopulations with certain characteristics who benefit more, i.e. mild OSA, craniofacial syndromes?

#### References

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