Tonsillotomy: An alternative surgical option to total tonsillectomy in children with obstructive sleep apnoea

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Background

Total tonsillectomy remains one of the most common ear, nose and throat (ENT) procedures performed in children. General practitioners (GPs) are commonly involved in the referral of children with obstructive sleep apnoea (OSA). Intracapsular tonsillectomy (partial tonsillectomy) is fast becoming a popular surgical option to total tonsillectomy in children with OSA.

Objective

The objective of this article is to provide information about partial tonsillectomy and its potential benefits over total tonsillectomy in the treatment of children with OSA for referring GPs.

Discussion

Obstructive sleep apnoea (OSA) is a common paediatric condition and remains the most common cause of sleep-disordered breathing in children.1 OSA can have a profound impact on a child's quality of life,2 resulting in poor school performance, daily lethargy and behavioural issues.3 Currently, removal of the adenoids, tonsils or both remains the first-line surgical treatment for the management of OSA in children over the age of two years with hypertrophied tonsillar tissue.4 Although common, total tonsillectomy can be associated with several operative risks, including postoperative pain, haemorrhage and infection. In recent years, intracapsular tonsillectomy (partial tonsillectomy) has emerged as an alternative surgical option to total tonsillectomy for OSA in children.

Aetiology

Adenotonsillar hypertrophy remains the most common form of obstructive sleep-disordered breathing in children.5 Adenotonsillectomy in children usually cures OSA in 80–90% of children.4 Recurrent tonsillitis may cause the glands to further enlarge and, hence, result in increased frequency/severity of apnoeic episodes. Other factors that may contribute to OSA in children include obesity and allergic rhinitis.

Pathophysiology

Adenoids and pharyngeal tonsils are collections of lymphatic tissue that occur within the posterior nasal space and oropharynx, respectively. Enlargement of these lymphatic tissues can result in mechanical narrowing/obstruction of the upper airway. When a child sleeps, the soft tissue of the pharynx usually relaxes and can further occlude the already narrowed airway. Tonsil size can be categorised using Brodsky’s tonsil classification system, which classifies tonsil size using a scale of 0 to 4, depending on the percentage of oropharynx narrowed (Table 1).

Presentation

Children with OSA commonly present to the GP with symptoms such as snoring, witnessed apnoeic episodes and difficulty with sleep. OSA can have a dramatic impact on the child’s quality of life,2 with morbidities such as daily lethargy, learning difficulties and behavioural issues. Children with OSA who have visibly enlarged tonsils and no other obvious causes for symptoms usually benefit from referral to an ear, nose and throat (ENT) specialist.

Surgical options

Total tonsillectomy

Tonsillar extraction was first described in ancient Rome around 40 AD by Cornelius Celsus.6 Over time, it underwent
multiple refinements in technique and instrumentation. Today, it remains one of the most commonly performed operations by ENT specialists in Australia, with >40,000 cases performed annually.7

The indications for total tonsillectomy in children include recurrent tonsillitis and OSA. In the case of OSA, an adenoidectomy may also be performed if the adenoids are enlarged. There are a number of different techniques that may be used to perform a total tonsillectomy, including cold steel dissection, bipolar diathermy or coblation tonsillectomy.8 Common postoperative complications associated with total tonsillectomy include pain, postoperative haemorrhage (primary and secondary) and slow return to a normal diet. Primary haemorrhage is defined as bleeding occurring within the first 24 hours postoperatively, whereas secondary haemorrhage is defined as occurring after 24 hours postoperatively.

Tonsillotomy

Tonsillotomy (also known as intracapsular, subtotal or partial tonsillectomy) is becoming a popular surgical alternative in children with OSA. Partial tonsillectomies can be performed using ‘microdebriders, bipolar electrocautery, radiosurgical scissors or radiofrequency ablation devices to debulk obstructing portions of tonsil parenchyma’.5

Although it originated in the last decade of the 19th century, partial tonsillectomy became a relatively uncommon procedure until its re-emergence nearly 100 years later. The first reference to the use of partial tonsillectomy as an alternative procedure for the treatment of OSA was described by Lantslov and Kovalova in 1993.10 Since then, there have been multiple studies and systematic reviews into the use of partial tonsillectomy as an alternative to total tonsillectomy in OSA. Complications after a partial tonsillectomy are similar to those of a total tonsillectomy (ie postoperative pain, haemorrhage, decreased oral intake). Additionally, tonsillar lymphoid tissue may regrow over time after a partial tonsillectomy and, hence, children may experience further episodes of OSA, potentially resulting in the need for further surgery. A large systematic review found that the rate of tonsillar regrowth after a partial tonsillectomy is approximately 6%.13

**Comparison**

Multiple studies and systematic reviews have compared common surgical outcomes of total tonsillectomy with partial tonsillectomy. These outcomes include time taken to return to a normal diet, duration of postoperative pain, risk of postoperative haemorrhage and resolution of OSA symptoms.

**Return to diet**

Children who undergo a total tonsillectomy are usually slower to return to normal diet as a result of pain, compared with children who undergo a partial tonsillectomy. The literature suggests that children who undergo a partial tonsillectomy return to a normal diet one to two days earlier than children who undergo a total tonsillectomy.15 This has been further confirmed by a recent large systematic review comprising 12 randomised controlled trials (RCTs) of children who underwent total or partial tonsillectomy for OSA. Nine out of the 12 RCTs reported a significantly earlier return to normal diet in patients who underwent a partial tonsillectomy when compared with those who underwent total tonsillectomy.13

**Postoperative pain**

Postoperative pain is to be expected in patients after undergoing either a total or partial tonsillectomy. In patients who undergo total tonsillectomy, pain usually persists for 7–14 days.14 Pain is commonly localised to the throat, but can also include otalgia as referred pain from the pharynx. Current literature suggest that patients who undergo the less invasive partial tonsillectomy generally experience significantly less amounts of postoperative pain.15 Furthermore, children who undergo partial tonsillectomy generally have a quicker recovery than those who undergo a total tonsillectomy.15,16 This was further reinforced in a systematic review comparing 15 RCTs of children who underwent both treatments. Nine out of the 15 trials found a significant reduction in postoperative pain in patients who underwent partial tonsillectomy, compared with those who underwent total tonsillectomy.13 Another study that compared the total analgesia requirement after total and partial tonsillectomy found that patients who underwent partial tonsillectomy required significantly less analgesia than those who underwent total tonsillectomy.16

**Postoperative haemorrhage**

Postoperative haemorrhage is a recognised risk following total and partial tonsillectomy, 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.

Primary haemorrhage has been shown to occur in approximately 1.3%17 of children who have had a total tonsillectomy. Secondary haemorrhage most commonly occurs 5–10 days postoperatively,18 and has an incidence between 2.5%19 and 3.5%20 after total tonsillectomy. In comparison, children who have had a partial tonsillectomy have been found to be at a significantly lower risk of primary and secondary postoperative haemorrhage.21 One large European

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### Table 1. Brodsky’s tonsil classification system

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>0</td>
<td>Tonsils situated in the tonsillar fossa</td>
</tr>
<tr>
<td>1</td>
<td>Tonsil occupies &lt;25% of the oropharynx</td>
</tr>
<tr>
<td>2</td>
<td>Tonsil occupies 25–50% of the oropharynx</td>
</tr>
<tr>
<td>3</td>
<td>Tonsil occupies 50–75% of the oropharynx</td>
</tr>
<tr>
<td>4</td>
<td>Tonsil occupies &gt;75% of the oropharynx</td>
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study incorporating 24,038 patients found that secondary haemorrhage after a partial tonsillectomy occurred in only 0.8% of patients, compared with 3.7% post–total tonsillectomy.22 Furthermore, a systematic review incorporating 33 articles reported a 71% reduction in the incidence of postoperative haemorrhage in patients who underwent partial tonsillectomy compared with total tonsillectomy.23

Resolution of OSA
Ultimately, the main goal of total or partial tonsillectomy in children with OSA is to improve, if not eliminate, their apnoea. The majority of recent studies found that partial tonsillectomy offers the same long-term outcomes as total tonsillectomy with regards to resolution of OSA in children. Several long-term studies have found no difference in the recurrence of OSA symptoms in children following partial, compared with total tonsillectomy over six-year24 and 10-year25 periods. Furthermore, children who undergo partial tonsillectomy have been found to experience the same improvement in their quality of life postoperatively, compared with those who have had a total tonsillectomy.24

Conclusion
In conclusion, partial tonsillectomy represents a safe technique for the treatment of OSA in children. Current evidence suggests there is no difference in OSA recurrence in the short-term and long-term between partial and total tonsillectomy. Additionally, partial tonsillectomy has been found to be associated with a lower risk of postoperative haemorrhage, significantly reduced pain and analgesia requirement, and earlier return to diet.

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