

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

Sabin Smith

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 tonsillotomy (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

Current evidence suggests that partial tonsillectomy is a safe and effective treatment for children with OSA. Partial tonsillectomy has been shown to be associated with a lower incidence of postoperative haemorrhage, faster recovery time and higher parent satisfaction than total tonsillectomy. Furthermore, it has been found to have comparable results to total tonsillectomy in the improvement of OSA symptoms in children.

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 tonsillotomy (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

Table 1. Brodsky's tonsil classification system⁹

Grade	Description
0	Tonsils situated in the tonsillar fossa
1	Tonsil occupies <25% of the oropharynx
2	Tonsil occupies 25–50% of the oropharynx
3	Tonsil occupies 50–75% of the oropharynx
4	Tonsil occupies >75% of the oropharynx

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 electro-surgical scissors or radiofrequency ablation devices to debulk obstructing portions of tonsil parenchyma'.⁹

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 Kovaleva 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%.¹¹

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.¹² 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

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.

Author

Sabin Smith MBBS, Non-training Surgical Registrar, Townsville Hospital, Townsville, Qld. sabin.smith@health.qld.gov.au

Competing interests: None.

Provenance and peer review: Not commissioned, externally peer reviewed.

References

- McGahan L, Scott A. Tonsillectomy, adenoidectomy and adenotonsillectomy for obstructive sleep apnoea: Review of clinical evidence and guidelines. East Melbourne, Vic: Australian Safety and Efficacy Register of New Interventional Procedures – Surgical, 2015; p. 65.
- Wood JM, Cho M, Carney AS. Role of subtotal tonsillectomy ('tonsillotomy') in children with sleep disordered breathing. *J Laryngol Otol* 2014;128:S3–S7.
- Escarra F, Vidaurreta SM. Assessment of quality of life before and after adenotonsillectomy among children with hypertrophic tonsils and/or adenoids. *Arch Argent Pediatr* 2015;113(1):21–27.
- Marcus CL, Brooks LJ, Draper KA, et al. Diagnosis and management of childhood obstructive sleep apnea syndrome. *Paediatrics* 2012;130(3):576.
- Benninger M, Walner D. Obstructive sleep-disordered breathing in children. *Clin Cornerstone* 2007;9(1):S6–12.
- Feldmann H. 2000 year history of tonsillectomy: Images from the history of otorhinolaryngology, highlighted by instruments from the collection of the German Medical History Museum in Ingolstadt. *Laryngorhinootologie* 1997;76(12):751–60.
- Australian Institute of Health and Welfare. Australian hospital statistics 2013–14: Elective surgery waiting times. Canberra: AIHW, 2014.
- Wilson YL, Merer DM, Moscatello AL. Comparison of three common tonsillectomy techniques: A prospective randomised, double-blinded clinical study. *Laryngoscope* 2009;119(1):162–70.
- Wood J, Cho M, Carney AS. Role of subtotal tonsillectomy ('tonsillotomy') in children with sleep disordered breathing. *J Laryngol Otol* 2014;128:S3–7.
- Lantslov AA, Kovaleva LM. A method of organ preserving tonsillectomy [in Russian]. *Vestn Otorinolaringol* 1993;5(6):39–42.
- Windfuhr JP, Savva K, Dahm JD, Werner JA. Tonsillotomy: Facts and fiction. *Eur Arch Otorhinolaryngol* 2015;272(4):949–69.
- Koltai, PJ, Solares CA, Mascha EJ, Xu M. Intracapsular partial tonsillectomy for tonsillar hypertrophy in children. *Laryngoscope* 2002;112(8 Pt 2 Suppl 100):17–19.
- Walton J, Ebner Y, Stewart MG, April MM. Systematic review of randomized controlled trials comparing intracapsular tonsillectomy with total tonsillectomy in a pediatric population. *Arch Otolaryngol Head Neck Surg* 2012;138:243–49.
- Stewart DW, Ragg PG, Sheppard S, Chalkiadis GA. The severity and duration of postoperative pain and analgesia requirements in children after tonsillectomy, orchidopexy, or inguinal hernia repair. *Paediatr Anaesth* 2012;22(2):136–43.
- Vicini C, Eesa M, Hendavvy E, et al. Powered intracapsular tonsillotomy vs conventional extracapsular tonsillectomy for pediatric OSA: A retrospective study about efficacy, complications and quality of life. *Int J Pediatr Otorhinolaryngol* 2015;79(7):1106–10.
- Hultcrantz E, Ericsson E, Hemlin C, et al. Paradigm shift in Sweden from tonsillectomy to tonsillotomy for children with upper airway obstructive symptoms due to tonsillar hypertrophy. *Eur Arch Otorhinolaryngol* 2013;270(9):2531–36.
- Gysin C, Dulguerov P. Haemorrhage after tonsillectomy: Does the surgical technique really matter? *ORL J Otorhinolaryngol Relat Spec* 2013;75(3):123–32.
- Liu JH, Anderson KE, Willging JP, et al. Posttonsillectomy hemorrhage: What is it and what should be recorded?. *Arch Otolaryngol Head Neck Surg* 2001;127(10):1271.
- Lee WT, Witsell DL, Parkham K, et al. Tonsillectomy bleed rates across the CHEER Practice Research Network: Pursuing guidelines adherence and quality improvement. *Otolaryngol Head Neck Surg* 2016;155(1):28–32.
- Lowe D, van der Meulen J, Cromwell D. Key messages from the National Prospective Tonsillectomy Audit. *Laryngoscope* 2007;117(4):717–24.
- Moriniere S, Roux A, Bakhos D, et al. Radiofrequency tonsillotomy versus bipolar scissors tonsillectomy for the treatment of OSAS in children: A prospective study. *Eur Ann Otorhinolaryngol Head Neck Dis* 2013;130(2):67–72.
- Hultcrantz E, Ericsson E, Hemlin C, et al. Paradigm shift in Sweden from tonsillectomy to tonsillotomy for children with upper airway obstructive symptoms due to tonsillar hypertrophy. *Eur Arch Otorhinolaryngol* 2013;270(9):2531–36.
- Acevedo JL, Shah RK, Brietzke SE. Systematic review of complications of tonsillotomy versus tonsillectomy. *Otolaryngol Head Neck Surg* 2012;146(6):871–79.
- Ericsson E, Lundeberg I, Hulcrantz E. Child behavior and quality of life before and after tonsillotomy versus tonsillectomy. *Int J Pediatr Otorhinolaryngol* 2009;73(9):1254–62.
- Eviatar E, Kessler A, Shlamkovich N, Vaiman M, Ziber D, Gavriel H. Tonsillectomy vs. partial tonsillectomy for OSAS in children –10 years post surgery follow up. *Int J Pediatr Otorhinolaryngol* 2009;73(5):637–40.

correspondence afp@racgp.org.au