Tonsillectomy

Marshall, Tom

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Tonsillectomy: a critical view

Tonsillectomy is a well-established and common surgical procedure with around 31,000 tonsillectomies carried out annually in England.[1] The most common reason for tonsillectomy remains recurrent sore throat followed by obstructive sleep apnoea (OSA) and peritonsillar abscess.[2] Tonsillectomy rates vary seven fold across English local authority areas, without an obvious explanation, raising questions about whether may be under or over provision in some areas.[3] Well-established practices may not always have a scientific basis. As professionals, clinicians have a right to reach their own conclusions. What does a dispassionate view of the evidence say about which children could benefit from tonsillectomy?

Evidence of effectiveness

Recurrent sore throat

There is evidence from a number of randomised controlled trials that tonsillectomy is beneficial in children with recurrent sore throat.[4] However, the evidence is of low quality and only short term. The benefits are modest, amounting to one fewer sore throat episode in the year after surgery and 1 to 3 fewer days off school. There is no evidence of improvements in quality of life. Without surgery, spontaneous improvement is common. One key study included only children with documented, frequent (≥7 documented sore throats in the previous year, or ≥5 yearly in two years, or ≥3 yearly in 3 years), clinically important (with fever, pus, lymphadenopathy or evidence of Streptococcal infection) sore throats. Yet even in the control arm 17% (95%CI: 5%-30%) had none in the following year.[5] Guidelines tend to adopt the entry criteria for this study as eligibility criteria for tonsillectomy: the Paradise criteria.

Obstructive sleep apnoea (OSA)

To date the only evidence supporting tonsillectomy for obstructive sleep apnoea (OSA) is in children aged 5 to 9 years with polysomnography confirmed OSA. This evidence shows with improvements in polysomnography parameters, in caregiver reported symptoms and behaviour, but no improvement in objective measures of attention and neurocognitive performance. For OSA diagnosed on clinical grounds evidence is of very low quality and is inconclusive.[6] Furthermore, there are no long-term data on effectiveness, half of children in the control group improve within 7 months and observational data show most OSA (and sleep-disordered breathing) resolves by adolescence.[6,7,8,9] Further trials of tonsillectomy for OSA are ongoing.[10]

Peritonsillar abscess

One randomised controlled trial found medical treatment for peritonsillar abscess to have modest advantages over surgery.[11] Recurrence of peritonsillar abscess is uncommon and no randomised controlled trials have evaluated the effectiveness of tonsillectomy on recurrence.[12]

Evaluation of current practice

Variation in tonsillectomy rates implies there may be overprovision or under-provision. To assess overprovision we could investigate the proportion of childhood tonsillectomies which have evidence-based indications. To assess under-provision we could find out how many children with evidence-based indications subsequently undergo tonsillectomy.

Both questions were addressed in an analysis of a large database of primary care records. It found 18,281 children underwent tonsillectomy between 2005 and 2016, and 15,760 children met

evidence-based criteria for tonsillectomy. The numbers are similar, but unfortunately they were not the same children.

Children who undergo tonsillectomy

Of the children who underwent tonsillectomy only 11.7% (2144/18 281) met evidence-based criteria (mainly recurrent sore throats).[13] OSA was not included as an evidence-based indication (reflecting the lack of evidence) but its inclusion would have made little difference: only 3.9% of children undergoing tonsillectomy had ever consulted for OSA. Even adding a further 12.3% who had consulted for sleep-disordered breathing would have changed little. Most tonsillectomies are not evidence-based. Neither the tonsillectomy rate nor the proportion that were evidence-based changed much over 12 years.

Can we believe this? In 95% of cases it was possible to identify a plausible indication from the primary care records. The pattern of indications was similar to that described in the most recent Royal College of Surgeons audit of tonsillectomy.[2] The analysis almost certainly overestimated the number of tonsillectomies undertaken in eligible children for three reasons. First, no evidence was required that the sore throat was of sufficient severity to count towards eligibility criteria (fever, pus, lymphadenopathy, evidence of Streptococcal infection). Second, any upper respiratory tract consultation counted as a potential sore throat including those that made no mention of the throat (e.g. coryza, otitis media). Third, children who met eligibility criteria were considered eligible for tonsillectomy at any date in the future (e.g. a child meeting criteria at age 4 would be considered eligible at age 15). If the definition of a sore throat required a mention of the throat, the proportion eligible fell to 4.4%.

Children who are eligible for tonsillectomy

What of the children who meet evidence-based eligibility criteria for tonsillectomy? Only 13.9% (2144/15 760) underwent tonsillectomy. In fact, for every possible indication for tonsillectomy only a small minority of children ever underwent surgery: 14.8% of children who consulted for peritonsillar abscess; 22.2% of those with OSA; 14.8% with sleep-disordered breathing; 8.9% of those with 5 to 6 sore throats in a year. If the definition of sore throat required a mention of the throat, the proportions of children with multiple sore throats who underwent tonsillectomy increased: to 32% of those meeting evidence-based criteria and 27% of those with 5 to 6 sore throats. It remained true that for all possible indications only a small minority of children ever underwent tonsillectomy.

Unlike the tonsillectomy rate, which is relatively constant, frequency of some indications changed from 2005 to 2016. Primary care consultations for OSA rose from 0.05 to 0.08 per 100 person years from 2005 to 2016 while those for sleep-disordered breathing remained stable at 0.36 per 100 person years. Both figures are much lower than the reported 3-4% prevalence of OSA in surveys, suggesting that consultation for OSA in children is much less common than the symptom.[14] Similar observations have been made for a wide range of self-reported symptoms.[15]

Wider implications of tonsillectomy

Could reducing tonsillectomy rates have wider health effects? From the 1990s increasing rates of hospital admission for tonsillitis, peritonsillar abscess and deep neck space abscesses have been reported in both Scotland and Wales.[16,17] It has been argued that has been caused by declining tonsillectomy rates. This is unlikely. No clinical trials have shown tonsillectomy to reduce incidence of peritonsillar or deep neck space abscesses.

Correlation is not causation and even this apparent correlation is illusory. In Wales tonsillectomy rates fell by three quarters from 1999 to 2002 and rose nearly four-fold from 2002 to 2003 before

declining modestly from 2004 to 2014. Admissions for deep neck space abscesses, tonsillitis and peritonsillar abscess followed a completely different trend, increasing gradually throughout this period. In Scotland tonsillectomy rates fell by more than half from 1998 to 2002 but admissions for tonsillitis also declined in this period and those for peritonsillar abscess remained unchanged. Scottish tonsillectomy rates were unchanged from 2003 to 2016 but tonsillitis and peritonsillar abscess admissions rose modestly. Deep neck space abscesses increased gradually from 1997 to 2016. Hospital admissions are a very incomplete picture of the frequency of sore throat and peritonsillar abscess, in primary care consultations for recurrent sore throats and peritonsillar abscess in children fell markedly from 2005 to 2012.[13]

Long-term effects tonsillectomy

The long-term effects of tonsillectomy are uncertain. A study of 1.2 million Danish children identified an increased risk of developing respiratory, infectious and allergic conditions including asthma among the 43,207 who underwent tonsillectomy.[18] A Tasmanian study followed up a birth cohort of 8483 and observed increased mortality in young adults who previously underwent tonsillectomy.[19] Follow up of 179,875 Swedish tonsillectomy patients observed increased incidence of autoimmune conditions including thyroid disease, rheumatic diseases, inflammatory bowel disease and type 1 diabetes.[20] It is unclear if tonsillectomy is an indicator of or a cause of future ill health.

Conclusion

Randomised controlled trials find modest benefits of tonsillectomy in children meeting very specific criteria. A sceptic would be unconvinced as there is a moderate risk of bias in the trials. In the UK most children meeting these criteria never undergo tonsillectomy. Long-term benefits or harms of tonsillectomy are unknown. Evidence to date suggests most tonsillectomies in children are not evidence-based. No evidence has been produced to contradict this finding. Clinicians have every reason to exercise caution before recommending tonsillectomy.

[1] NHS Digital. Hospital admitted patient care activity, 2018–19. https://digital.nhs.uk/data-and-information/publications/statistical/hospital-admitted-patient-care-activity/2018-19 (accessed 28 Feb 2018).
[2] Royal College of Surgeons. National prospective tonsillectomy audit final report. 2005. https://www.rcseng.ac.uk/library-and-publications/rcs-publications/docs/tonsillectomy-audit/ (accessed 17 Oct 2018).
[3] Suleman M, Clark MP, Goldacre M, Burton M. Exploring the variation in paediatric tonsillectomy rates between English regions: a 5-year NHS and independent sector data analysis. Clin Otolaryngol 2010; 35(2): 111–117.
[4] Burton MJ, Glasziou PP, Chong LY, Venekamp RP. Tonsillectomy or adenotonsillectomy versus non-surgical treatment for chronic/recurrent acute tonsillitis. Cochrane Database Syst Rev. 2014 Nov 19;(11):CD001802. doi: 10.1002/14651858.CD001802.pub3.
[5] Paradise JL, Bluestone CD, Bachman RZ, Colborn DK, Bernard BS, Taylor FH, Rogers KD, Schwarzbach RH, Stool SE, Friday GA, et al. Efficacy of tonsillectomy for recurrent throat infection in severely affected children. Results of parallel randomized and nonrandomized clinical trials. N Engl J Med. 1984 Mar 15;310(11):674-83.
[6] Venekamp RP, Hearne BJ, Chandrasekharan D, Blackshaw H, Lim J, Schilder AGM. Tonsillectomy or adenotonsillectomy versus non-surgical management for obstructive sleep-disordered breathing in children. Cochrane Database of Systematic Reviews 2015, Issue 10. Art. No.: CD011165. DOI: 10.1002/14651858.CD011165.pub2
[7] Spilsbury JC, Storfer-Isser A, Rosen CL, Redline S. Remission and incidence of obstructive sleep apnea from middle childhood to late adolescence. Sleep. 2015 Jan 1;38(1):23-9. doi: 10.5665/sleep.4318.
[8] Goodwin JL, Vasquez MM, Silva GE, Quan SF. Incidence and remission of sleep-disordered breathing and related symptoms in 6- to 17-year old children--the Tucson children's assessment of sleep apnea study. J Pediatr. 2010;157:57–61.
[9] Bonuck KA, Chervin RD, Cole TJ, Emond A, Henderson J, Xu L, Freeman K. Prevalence and persistence of sleep disordered breathing symptoms in young children: a 6-year population-based cohort study. Sleep. 2011 Jul 1;34(7):875-84. doi: 10.5665/SLEEP.1118.
[10] US National Library of Medicine. ClinicalTrials.gov. NCT02315911. Randomized control trials of surgery for pediatric OSA. https://clinicaltrials.gov/ct2/show/study/NCT02315911 (accessed 26th Feb 2020).
[11] Battaglia A, Burchette R, Hussman J, Silver MA, Martin P, Bernstein P. Comparison of Medical Therapy Alone to Medical Therapy with Surgical Treatment of Peritonsillar Abscess. Otolaryngol Head Neck Surg. 2018 Feb;158(2):280-286. doi: 10.1177/0194599817739277. Epub 2017 Nov 7.
[12] Wang YP, Wang MC, Lin HC, Chou P. The impact of prior tonsillitis and treatment modality on the recurrence of peritonsillar abscess: a nationwide cohort study. PLoS One. 2014 Oct 7;9(10):e109887. doi: 10.1371/journal.pone.0109887
[13] Šumilo D, Nichols L, Ryan R, Marshall T. Incidence of indications for tonsillectomy and frequency of evidence-based surgery: a 12-year retrospective cohort study of primary care electronic records. Br J Gen Pract 2019; 69: e33e41.
[14] Schlaud M, Urschitz MS, Urschitz-Duprat PM, Poets CF. The German study on sleep-disordered breathing in primary school children: epidemiological approach, representativeness of study sample, and preliminary screening results. Paediatr Perinat Epidemiol. 2004 Nov;18(6):431-40.
[15] Elliott AM, McAteer A, Hannaford PC. Revisiting the symptom iceberg in today's primary care: results from a UK population survey. BMC Fam Pract. 2011; 7;12:16. doi: 10.1186/1471-2296-12-16.
[16] Douglas CM, Altmyer U, Cottom L, Young D, Redding P, Clark LJ. A 20-year observational cohort of a 5 million patient population-Tonsillectomy rates in the context of two national policy changes. Clin Otolaryngol. 2019 Jan;44(1):7-13. doi: 10.1111/coa.13233. Epub 2018 Oct 25.
[17] Yap D, Harris AS, Clarke J. Serious tonsil infections versus tonsillectomy rates in Wales: A 15-year analysis. Ann R Coll Surg Eng 2017; 99(1): 31–36.
[18] Byars SG, Stearns SC, Boomsma JJ. Association of Long-Term Risk of Respiratory, Allergic, and Infectious Diseases With Removal of Adenoids and Tonsils in Childhood. JAMA Otolaryngol Head Neck Surg 2018; 144(7):594-603. doi: 10.1001/jamaoto.2018.0614.
[19] Mészáros D, Dharmage SC, Matheson MC, et al. Poor lung function and tonsillectomy in childhood are associated with mortality from age 18 to 44. Respir Med 2010; 104(6):808-15. doi: 10.1016/j.rmed.2009.12.001.

[20] Ji J, Sundquist J, Sundquist K. Tonsillectomy associated with an increased risk of autoimmune diseases: A national cohort study. J Autoimmun 2016; 72:1-7. doi: 10.1016/j.jaut.2016.06.007.