# The Effect of Tonsillectomy on the Morbidity from Recurrent Tonsillitis

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Key Words

Tonsillitis, quality of life, sore throat, SIGN guidelines.

**Abstract**

Background

Tonsillitis is a common condition with an incidence in UK general practice of 37 per 1000 population a year[1]. Recurrent tonsillitis results in significant morbidity and impacts on individuals' quality of life. This study assesses the morbidity and quality of life of adults with recurrent tonsillitis, and the impact of surgical intervention on their health state.

Objectives

1. To describe disease specific and global quality of life for adults with recurrent tonsillitis six months after tonsillectomy, using two instruments: the Health Impact of Throat Problems (HITP) and EuroQol-visual analogue scale (EQ-VAS) questionnaire.
2. To assess the overall health benefit from tonsillectomy as an intervention using the Glasgow Benefit Inventory (GBI).
3. To assess potential predictors of tonsillectomy benefit.

Design

A prospective, observational cohort audit of patients who have fulfilled Scottish Intercollegiate Guideline Network (SIGN) criteria for tonsillectomy[2].

Setting: Secondary care, teaching hospital

Participants: Seventy patients (57 female), median age 20 years (range 13-41).

Results

Median pre-operative HITP was 47 (range 15-67), compared to 4 (0-72), ($p< 0.001$) 6 months following surgery. Median HITP difference was 39.5 (range -20 to 75). There was no significant change in global Quality of Life. Median overall 6 months GBI was 39 (-3-100). Patients had an average of 27 episodes of tonsillitis over a period of seven years before "achieving" tonsillectomy, significantly higher than the SIGN guidelines of three or more episodes over three years.

Conclusions

Recurrent tonsillitis causes a poor disease specific quality of life. Patients experienced a median of three episodes per year for seven years before tonsillectomy. Following tonsillectomy, patients had a significant improvement in

their disease specific quality of life.  Baseline HITP significantly improved after tonsillectomy. The results imply patients with recurrent acute tonsillitis may be experiencing undue delay

## Introduction

Tonsillectomy is one of the most commonly performed surgical procedures in the UK accounting for 20% of all operations performed by otolaryngologists and we have national guidelines in place giving recommendations on when tonsillectomy should be performed[2]. Tonsillitis is a common condition with an incidence in general practice of 37 per 1000 population a year, in the UK[1 4]. Recurrent tonsillitis results in significant morbidity, including time off work[5]. The effectiveness of tonsillectomy for recurrent tonsillitis in adults is still controversial. Several studies have demonstrated that tonsillectomy is followed by clinically important improvements in patient health [6,7]. However, a recent large scale prospective study assessing the overall health related quality of life in otolaryngology patients found only a small overall benefit from tonsillectomy[8]. A recent Cochrane Review concluded that "Insufficient information is available on the effectiveness of adeno-/tonsillectomy versus non-surgical treatment in adults to draw a firm conclusion."[9]

Our team is contributing to the UK NAtional Trial of Tonsillectomy IN Adults (NATTINA), a nationally funded trial aiming to provide level one evidence for tonsillectomy. The randomised controlled trial in adults examining tonsillectomy versus medical treatment is currently recruiting patients in the UK but results will not be available for some years[10].

The aims of this prospective audit were to assess

1. The morbidity of tonsillitis in adults with regards to disease specific and global and quality of life, using a both a disease specific and global quality of life tool.
2. The impact of tonsillectomy on these quality of life measures.
3. The extent of any derived health benefit from tonsillectomy.

## Materials and Methods

### Ethical considerations

This prospective audit was approved by the hospital clinical effectiveness department. The clinical effectiveness department collected all completed questionnaires from the ENT clinic, gave each patient a unique study number, entered the results into an anonymised database and sent out follow up questionnaires. All follow up questionnaires were returned to the clinical effectiveness department and data was entered into an anonymised database. The completed anonymised database was transferred to author W.M.W for analysis.

### Entry and Exclusion Criteria

Entry criteria for the study were based on the indication for tonsillectomy. All patients that were recruited had been listed electively for tonsillectomy due to recurrent tonsillitis, being identified from general ENT clinics. It was the policy of the local health board that patients aged 13 and above were treated in the adult hospital, therefore there were a small number of teenagers included in the study. All patients were listed for tonsillectomy. After being listed, while in the clinic, they were invited to participate in the audit.

Exclusion criteria were as follows: suspected tonsil malignancy[11], tonsillectomy for sleep disordered breathing[12], adenotonsillectomy, revision tonsil surgery, patients listed directly from emergency inpatient admission. Patient recruitment ran for one year.

Any method of dissection removal of the palatine tonsils was included in the audit (cold steel, bipolar).

### Questionnaires

The Health Impact of Throat problems (HITP) questionnaire was used as the disease specific questionnaire. It is a 16 item questionnaire that is a translation of the Tonsillectomy Outcome Inventory 14 questionnaire13 with two additional questions (snoring and halitosis). The two additional questions were originally in the first phase of validation for the TOI 14 questionnaire. The TOI14 is being used to assess

throat related quality of life in adults in NATTINA10. The 16 items offer categorical response options graded 0 to 5 (5 = most severe; 0 = no problem), reflecting patients' experience of symptoms over the previous six months. Total Score thus ranges from 0–80, with a higher score reflecting poorer throat related quality of life.

1) The EuroQol Visual Analogue Scale (EQ-VAS) was used as the global quality of life questionnaire. It is a visual analogue scale that records the respondent's self-rated health on a vertical, visual analogue scale where the endpoints are labelled "Best imaginable health state" (100) and "Worst imaginable health state" (0). This information can be used as a quantitative measure of health outcome as judged by the individual respondents.
2) The Glasgow Benefit Inventory (GBI) was chosen as it has been widely used in otolaryngology to assess benefit derived following an intervention. The GBI poses 18 questions concerning change in health status resulting from the intervention/ management. The response to each question is based on a five-point Likert-type scale; these are then scaled and averaged to give a final score. The score ranges from -100 to +100, with negative scores meaning a worse outcome after intervention, zero meaning no change and a positive score representing benefit. The GBI has three domains, general health, social support and physical health, with six items per domain, which can be examined independently.

Patients completed the EuroQol-visual analogue scale (EQ-VAS) and health impact of throat problems (HITP) at enrolment in the study before tonsillectomy was performed. Patients also provided demographic data (age, sex) indicated the number of episodes of sore throat per year, and duration of history in years. Six months' after tonsillectomy, EQ-VAS, HITP and a GBI were sent to each patient for completion.

## Statistical Analysis

All analyses were performed using SPSS v. 21 (IBM). Responses on all questionnaires were first tested for normality using the one-sample Kolmogorov-Smirnov tests. Multiple measures were shown to have a skewed distribution, hence non-parametric tests were used to analyse differences (related-samples Wilcoxon

signed rank test; rank-sum test for gender differences) and correlations (Spearman's rho). Variables correlated were pre and post op EQ-VAS, EQ-VAS difference, GBI Total and subscales, pre and post op HITP, HITP difference, age, sore throat episodes.

## Results

From 123 patients (Male: Female ratio, 1:2) who were listed for tonsillectomy due to recurrent tonsillitis, 105 proceeded to surgery and were eligible for the study. 18 patients decided not to proceed to surgery. Seventy (67%) patients fully completed all pre and post op questionnaires. The median age was 20 years (range 13-41), with 13 males and 57 females. The mean duration of tonsillitis was 7.3 years with the mean number of episodes each year being 3.8 – an average of 27 episodes prior to tonsillectomy. The SIGN compliance rate was 96%.

### EuroQol-Visual Analogue Scale

The median pre-operative EQ-VAS score was 85 (40-100) increasing to 90 (40-100) post operatively ($z$ = 1.65; p = 0.10). The median pre-post difference was-3 (range -60-60). Forty-one (59%) patients had an EQ-VAS improvement, 17 patients had a lower score and 12 patients had no change. EQ-VAS scores were independent of gender.

### Health Impact of Throat Problems

The median pre-operative score on the HITP was 47 (range 15 to 67). The median postoperative HITP score was 4 (0 to 72), a very substantial decrease (p< 0.001). The median pre-post operative difference was 39.5 (-20-75). Sixty-five patients (93%) had an improvement in their HITP score post tonsillectomy. Results were independent of gender.

### GBI

The median overall postoperative benefit as assessed by the GBI was 39 (-3 to 100, Table 1). Overall and subscale GBI scores, as well as all three subscales, showed a statistically significant benefit (i.e., either the median was significantly positive, or in the case of the Social Support subscale, the skew was significantly positive). There was a slightly greater median score among female respondents (42) in the GBI general subscale than in males (29, $z$ = 2.28; $p$ = 0.02).

*Table 1. Overall GBI and subscales.*

| | Overall GBI | General | Social Support | Physical Health |
|---|---|---|---|---|
| Median | 39 | 42 | 0 | 67 |
| Range | -3 to100 | 4 to 100 | -17 to100 | -83 to 100 |
| *Z* | 7.21 | 7.28 | 3.99 | 6.60 |
| *P* | < 0.001 | < 0.001 | < 0.001 | < 0.001 |

Correlations

As age increased, the pre operative EQ-VAS decreased. Significant correlations are shown in Table 2. The post operative EQ-VAS correlated with overall, general and physical health subscales of the GBI. The post operative HITP correlated with the physical health subscale of the GBI and the post operative EQ-VAS. The GBI social support scale was median rank zero and not surprisingly therefore failed to show any meaningful correlations.

*Table 2. Significant Correlations (Spearman's rho) between GBI/GBI subscales, HITP and EQ-VAS*

| | GBI Total | GBI General | GBI Physical Health | Postop EQ-VAS | Preop HITP | Age |
|---|---|---|---|---|---|---|
| GBI General | 0.963* | | | | | |
| GBI Physical Health | 0.673* | 0.522* | | | | |
| Preop EQ-VAS | | | | | | -0.379* |
| Postop EQ-VAS | 0.368* | 0.339* | 0.4* | | | |
| Postop HITP | | | -0.349* | -0.367* | | |
| HITP Difference | | | | | 0.793* | |

*Asterisk indicates statistically significant correlations at $\alpha = 0.05$ with Bonferroni correction for multiple comparisons (i.e. actual $\alpha = 0.005$).

There was no correlation between HITP and the total number of sore throat episodes per person. The pre-op HITP showed no correlations.

## Discussion

This study highlights the hidden morbidity that patients with recurrent tonsillitis suffer, with patients having an average of 27 episodes of tonsillitis before "achieving" tonsillectomy, waiting an average of seven years in the process. The intervention of tonsillectomy significantly improved the HITP score ($p<0.0001$), suggesting that tonsillectomy does significantly improve the disease specific burden of chronic tonsillitis.

### Benefit of Tonsillectomy compared to other ENT procedures.

The median overall GBI was considerably higher than some retrospective reports of tonsillectomy (17 to 35) in the presence of lower completion rates compared to our study (67% vs. 26- 39%[6,14,15]). It was also higher than certain prospective reports with less stringent entry criteria [7,16]. A GBI median score of 39 is very favourable in comparison to other common ENT procedures including septal surgery (5 - 15[17,18]) or functional endoscopic sinus surgery, ( 23[19]), and comparable to surgery for hearing impairment (34 -40)[5,16.] The very high level of physical health benefit has been reported previously as has the nonresponsiveness of GBI social wellbeing to tonsillectomy[7].

### Benefit of Tonsillectomy compared to other general operations.

In 2009 McKinsey reported that £700m of NHS funding is unnecessarily spent on operations with limited clinical benefit, which include tonsillectomy, varicose vein surgery and inguinal hernia surgery[20]. This study adds to the body of literature already published that shows tonsillectomy is, on the contrary, highly effective in treating adults with recurrent tonsillitis[6,7]. This series of patients is the first series to use EQ-VAS pre and post operatively. The median pre operative score is high was 85, comparable to the mean score of the UK national questionnaire survey on general health status - 82.5[21]. Forty-one patients (59%) reported an increase in general health as measured by the EQ-VAS, which is comparable to the most recent Department of Health figures for hip and knee replacement surgery (65% increase of health and 55.1% increase respectively). Interestingly, only 37% of groin hernia patients report an increase in general health after surgery and only 40% of varicose

vein patients[22]. It may be that the EQ-VAS alone is not sensitive enough to identify a statistically significant change in global quality of life, and was an inappropriate choice of assessment tool for this study. It may also be that the high score reflects a ceiling effect and tonsillitis does not have a significant impact on the EQ-VAS. Furthermore, the stringent (SIGN) entry criteria may have so tightly grouped patients that the data dispersion is too narrow to detect any such variance.

## Value of SIGN Guidelines

This study highlights the consequences of the more or less universal take up of the SIGN guidelines, which to date lack supporting Level 1 evidence in adults[2]. Previous tonsillectomy audits have largely sought to endorse guideline compliance, by demonstration that surgery is confined to those with a 'qualifying minimum' number of episodes to warrant tonsillectomy[23,24]. Conversely, avoidance of surgery unless SIGN criteria are met, has presumably contributed to the significant drop in tonsillectomy numbers over the past decade[25]. However, this study has shown that there is a, hidden morbidity from recurrent tonsillitis that is not currently being addressed. The current patient pathway in Scotland has lead patients to experience two to three times more tonsillitis than the minimum required by current SIGN guidelines. However, unfortunately we don't have historical data to demonstrate conclusively if this morbidity has always been present, even before SIGN was introduced. The associated morbidity that comes with this is highlighted by the significant change in HITP after tonsillectomy. Recurrent tonsillitis not only causes a disease burden to the individual patient but also results in a wider burden to society due to lost work days and recurrent health care utilization. With the lack of evidence for the current SIGN guidelines then other tools should be considered to help select patients for tonsillectomy and a tool such as HITP may be of more value.

## Weakness of Study

This study had a follow up period of six months. As patients experienced an average of 3.4 sore throats per year, then it may be that longer follow up may not have demonstrated as much benefit. Furthermore, 33% of the participants that completed the first set of questionnaires did not complete the second set of

questionnaires.  Although the demographics of this group were similar to the group that completed all questionnaires we were unable to contact those that didn't respond despite multiple attempts.

In summary our audit demonstrates that patients with recurrent tonsillitis experience prolonged morbidity (7 years on average), SIGN guidance has usefully supported the avoidance of surgery for milder sore throats. Now, however, primary and secondary care clinicians, together with purchasers of healthcare need to refocus on the prolonged and excessive morbidity experience by those with moderate or severe episodes. Until the ongoing NATTINA study provides Level I evidence concerning tonsillectomy effectiveness, clinicians should review their own patient pathways and facilitate earlier access to surgery where excessive delay is demonstrated.

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## References


1. Ashworth M, Latinovic R, Charlton J, Cox K, Rowlands G, Gulliford M. Why has antibiotic prescribing for respiratory illness declined in primary care? A longitudinal study using the General Practice Research Database. *J Public Health (Oxf).* 2004;26(3):268-274.

2. SIGN. Management of sore throat and indication of tonsillectomy. SIGN 117. . 2010; http://www.sign.ac.uk/guidelines/fulltext/117/. .

3. van Staaij BK, van den Akker EH, Rovers MM, Hordijk GJ, Hoes AW, Schilder AG. Effectiveness of adenotonsillectomy in children with mild symptoms of throat infections or adenotonsillar hypertrophy: open, randomised controlled trial. *BMJ.* 2004;329(7467):651.

4. Shvartzman P. Are antibiotics appropriate for sore throats? Careful prescribing is beneficial. *BMJ.* 1994;309(6960):1011-1012.

5. Georgalas C, Tolley N, Kanagalingam J. Measuring quality of life in children with adenotonsillar disease with the Child Health Questionnaire: a first U.K. study. *Laryngoscope.* 2004;114(10):1849-1855.

6. Bhattacharyya N, Kepnes LJ, Shapiro J. Efficacy and quality-of-life impact of adult tonsillectomy. *Arch Otolaryngol Head Neck Surg.* 2001;127(11):1347-1350.

7. Koskenkorva T, Koivunen P, Laara E, Alho OP. Predictive factors for quality of life after tonsillectomy among adults with recurrent pharyngitis: a prospective cohort study. *Clin Otolaryngol.* 2014;39(4):216-223.

8. Swan IR, Guy FH, Akeroyd MA. Health-related quality of life before and after management in adults referred to otolaryngology: a prospective national study. *Clin Otolaryngol.* 2012;37(1):35-43.

9. 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;11:CD001802.

10. Rubie I, Haighton C, O'Hara J, et al. The NAtional randomised controlled Trial of Tonsillectomy IN Adults (NATTINA): a clinical and cost-

effectiveness study: study protocol for a randomised control trial. *Trials.* 2015;16:263.

11. Berta E, Atallah I, Reyt E, Boyer E, Karkas A, Righini CA. The role of tonsillectomy in the initial diagnostic work-up of head and neck squamous cell carcinoma of unknown primary. *European annals of otorhinolaryngology, head and neck diseases.* 2014;131(5):305-308.

12. Holmlund T, Franklin KA, Levring Jaghagen E, et al. Tonsillectomy in adults with obstructive sleep apnea. *The Laryngoscope.* 2016.

13. Skevas T, Klingmann C, Plinkert PK, Baumann I. [Development and validation of the Tonsillectomy Outcome Inventory 14]. *HNO.* 2012;60(9):801-806.

14. Baumann I, Kucheida H, Blumenstock G, Zalaman IM, Maassen MM, Plinkert PK. Benefit from tonsillectomy in adult patients with chronic tonsillitis. *Eur Arch Otorhinolaryngol.* 2006;263(6):556-559.

15. Richards AL, Bailey M, Hooper R, Thomson P. Quality-of-life effect of tonsillectomy in a young adult group. *ANZ J Surg.* 2007;77(11):988-990.

16. Senska G, Ellermann S, Ernst S, Lax H, Dost P. Recurrent tonsillitis in adults: quality of life after tonsillectomy. *Dtsch Arztebl Int.* 2010;107(36):622-628.

17. Calder NJ, Swan IR. Outcomes of septal surgery. *J Laryngol Otol.* 2007;121(11):1060-1063.

18. Uppal S, Mistry H, Nadig S, Back G, Coatesworth A. Evaluation of patient benefit from nasal septal surgery for nasal obstruction. *Auris Nasus Larynx.* 2005;32(2):129-137.

19. Mehanna H, Mills J, Kelly B, McGarry GW. Benefit from endoscopic sinus surgery. *Clin Otolaryngol Allied Sci.* 2002;27(6):464-471.

20. http://www.hsj.co.uk/comment/leader/mckinsey-report-unthinkable-solutions-set-scene-for-nhs-cuts/5015368.fullarticle.

21. Kind P, Dolan P, Gudex C, Williams A. Variations in population health status: results from a United Kingdom national questionnaire survey. *BMJ.* 1998;316(7133):736-741.

22. http://www.hscic.gov.uk/catalogue/PUB20283.

23. Silva S, Ouda M, Mathanakumara S, Ridyard E, Morar P. Tonsillectomy under threat: auditing the indications for performing tonsillectomy. *J Laryngol Otol.* 2012;126(6):609-611.

24. Williams A, Lee P, Kerr A. Scottish Intercollegiate Guidelines Network (SIGN) guidelines on tonsillectomy: a three cycle audit of clinical record keeping and adherence to national guidelines. *J Laryngol Otol.* 2002;116(6):453-454.

25. Lau AS, Upile NS, Wilkie MD, Leong SC, Swift AC. The rising rate of admissions for tonsillitis and neck space abscesses in England, 1991-2011. *Ann R Coll Surg Engl.* 2014;96(4):307-310.