**Is tonsillectomy mandatory for asymmetric tonsils in children? A review of our diagnostic tonsillectomy practice and the literature.**

# Abstract

## Introduction

Diagnostic tonsillectomy is performed to exclude malignancy. It is associated with a post-operative hemorrhage rate of 3.5%,(1) which is more dangerous in small children. No previous case series for asymmetrical tonsils have detected tonsil lymphoma.(2–6) We aimed to review our local diagnostic tonsillectomy practice.

## Method

The authors reviewed the clinical notes and histological results for all diagnostic tonsillectomies carried out from June 2013 to June 2016.

## Results

We recorded data for 168 patients. There were four post-operative bleeds and one return to theatre. Bilateral tonsillectomies accounted for 152 operations (90.5%). Lymphoid hyperplasia accounted for 95% of histological diagnosis with no malignancies found. Pre-operative tonsil grading demonstrated no statistically significant association with histological tonsil weight difference (ANOVA p=0.10). Actinomyces colonisation had little affect on tonsil weight difference when we compared patients with bilateral colonisation and no colonisation (t-test p=0.540) and between tonsils in patients with unilateral tonsil Actinomyces colonisation (paired t-test p=0.448). Recurrent tonsillitis was more prevalent in patients with Actinomyces colonisation than OSA/sleep disordered breathing (39% vs 15%).

## Conclusion

A literature search yielded five smaller case series of palatine tonsil asymmetry in children with no malignancy found.(2–6) Case-control studies report tonsillar asymmetry as the most common presenting symptom (73%) in tonsillar lymphoma.(7) This enlargement usually occurs rapidly within 6 weeks with new obstructive or systemic B-type symptoms.(3) A Turkish epidemiological study found asymmetrical tonsils in 1.7% of the healthy paediatric population.(8) We therefore estimate there to be over 210,000 children with asymmetrical tonsils in the UK. With an unreliable grading system, we believe asymmetrical tonsils in isolation, unchanged for over 6 weeks may not warrant tonsillectomy.

# Keywords

Tonsil Lymphoma

Asymmetric tonsils

Pediatric

# Main Article

## Introduction

Diagnostic tonsillectomy is performed to exclude malignancy of the palatine tonsils. Debate between Otolaryngologists at our unit about when to operate for purely diagnostic reasons prompted the study. The aim of the study was to review the local practice of diagnostic tonsillectomy, learn lessons and possibly reduce unnecessary surgery. It became a more pertinent topic recently with the post-tonsillectomy death of a young child in a nearby hospital.

There is a paucity of useful investigations for tonsil malignancy therefore the decision to operate is usually based on clinical suspicion. Tonsil malignancy is rare in children despite Lymphoma being the 3rd most prevalent childhood malignancy(9). For obstructive or infective symptoms tonsils are not routinely sent for histological analysis at our unit. This approach is supported by the literature(10). The individual consultant surgeon decides on histological analysis based on their suspicion of malignancy.

Tonsillectomy can be associated with significant morbidity. A major complication is post-operative hemorrhage. The rate in the national prospective tonsillectomy audit for the 21,063 children was 1.9% and 3% in the <5 and 5-15 age group respectively. Out of a total of 36,000 patients included in the audit, one patient died within 28 days. The authors did not describe whether this was related to the surgery however.(1)

Bleeding in children can be more occult because they can swallow blood and not report it. This together with a lower circulating blood volume can make post tonsillectomy haemorrhage more dangerous in small children. No details on the UK’s tonsillectomy mortality rate could be found but anecdotally we believe it to be one patient every two years. By comparison two children died of bleeding related airway obstruction in Sweden out of 82,527 tonsillectomies performed between 2004-2011.(11)

## Method

The authors reviewed the clinical notes and histological results for all diagnostic tonsillectomies carried out from June 2013 to June 2016. Diagnostic tonsillectomies were defined as any tonsils sent for histological analysis. Pre-operative details including demographics, symptoms and indication for tonsillectomy were recorded. Pre-operative tonsil grade was collated when documented. Pre-operate grade at our institution is performed by the Brodsky(12) or Friedman(13) classification system. From the histology review we collated tonsil weight, definitive histological diagnosis and Actinomyces colonisation.

**Statistical method**

Proportional weight and grade differences between tonsils were compared using Analysis of Variance (ANOVA). To establish the effect of Actinomyces colonisation on the weight differences we used t-test, paired t-test and Analysis of Variance (ANOVA).

**Inclusion Criteria**

* All tonsillectomy cases from June 2013 to June 2016 that sent one or both tonsils for histological analysis

**Exclusion Criteria**

* Histology not from tonsil tissue.
* During data collection we excluded tonsil grading performed with Boyle Davis gag in situ as grading is described for use in an awake patient.

## Results

We recorded data for 168 patients with a mean age of 8.0 years (range 2- 17). Bilateral tonsillectomies accounted for 152 operations (90.5%) with 16 being unilateral tonsillectomies (9.5%). There were four re-admissions with post-operative bleeding with one patient requiring operative intervention to stop it.

Table 1 summarises the factors that prompted histological analysis. 123 tonsillectomies were performed and sent for histological analysis because of asymmetry. No indication for histological analysis was provided in 13% of cases despite there being clear documentation of the need for tonsillectomy (either recurrent tonsillitis or sleep disordered breathing). In 10% of cases it was intra-operative findings that prompted histological analysis. This included asymmetry with the Boyle Davis gag in situ, difficult dissection planes and hard or friable tonsils. 102 children had synchronous indications for tonsillectomy. 61 children were suffering with recurrent tonsillitis, 37 had sleep disordered breathing or obstructive sleep apnoea (OSA) and 4 had another diagnosis (chronic sore throat, halitosis, peri-tonsillar abscess and retching).

As expected the vast majority of cases represented lymphoid hyperplasia (Table 2). There were no cases of malignancy in all 168 cases. A discrete lesion was seen on the tonsil in the outpatient clinic prior to the operation in all 3 cases of lymphangioma. Actinomyces colonies were only found in lymphoid hyperplastic tonsils, bilaterally occurring in 40 tonsil specimens and unilaterally occurring in 21 tonsil specimens.

### Grading Accuracy

To look at how accurate our pre-operative clinical grading was we compared the difference in grade with the proportional difference in tonsil weight. If we were accurate we would expect the patients with the greatest difference in tonsil grade to have the greatest difference in tonsil weight. We grouped patients into 3 groups. Patients with no grading difference, patients with a difference of only one grade point (i.e. grade 2 left tonsil and grade 3 right tonsil) and patients with a grade difference of 2 or more. Table 3 and Graph 1 demonstrate the relative weight difference in the tonsils compared with the difference in grading. There was an increase in mean weight differences with increase in grade difference but this was not statistically significant (p=0.10, ANOVA).

## Role of Actinomyces colonisation

We looked at the tonsil weights of patients with no Actinomyces and those with unilateral or bilateral colonisation. There was no statistically significant difference between the 78 patients not colonised and those 37 patients with both tonsils colonised (Table 4. t-test p=0.540). To further evaluate the effect Actinomyces had we compared the relative weight difference in a patient’s tonsils and whether they had no Actonomyces, unilateral colonisation or bilateral colonisation (Table 5). Again there was no statistically significant difference (p=0.641, ANOVA). Finally we looked at Actinomyces colonisation with concurrent OSA/Sleep disordered breathing and recurrent tonsillitis (Table 6). We found that recurrent tonsillitis was more prevalent in the Actinomyces group than OSA/Sleep discorded breathing (39% vs 15%).

## Discussion

There were no cases of tonsil lymphoma (TL) diagnosed in the last 3 years. Table 7 summaries a literature search, which yielded five smaller case series of palatine tonsil (PT) asymmetry in children. No malignancy was found in any of these series either. It is important to stress that many case series exist describing TL. These case control studies however identified patients by their diagnosis not on their presenting signs and symptoms. With our study we have increased the published pool of patients with asymmetrical tonsils to 322 patients with no malignancy found.

Previous case-control studies report tonsillar asymmetry as the most common presenting symptom in TL (73%).(7) A Turkish epidemiological study found that 1.7% of the healthy paediatric population (aged 4-17) had asymmetrical tonsils.(8) A recent office for national statistics estimates that 18.9% of the 65. 6 million population of the UK are under 15.(14) This means that if the rate of asymmetry is similar to Turkey at 1.7%, over 210,000 children will have asymmetrical tonsils in the UK. We know that lymphoma is the third most common malignancy in childhood with 12% out of a total childhood cancer incidence of 130 per million children in the UK.(9) With 15% of Head and neck Lymphoma presenting in the Palatine tonsil involvement we can estimate that less than 30 children would have lymphoma detectable in their palatine tonsils per year out of a pool of 210,000 with asymmetry. Based on our results of zero detected TL and this low incidence there is an argument to ration tonsillectomy for diagnostic purposes.

Tonsillar enlargement in TL is thought to occur rapidly within 6 weeks and in the majority of TL cases, children will also present with new systemic or obstructive symptoms.(3) In this particular study 86% of children either had new obstructive symptoms (snoring, dysphagia, airway obstruction) or systemic symptoms. (weight loss, lymphadenopathy or night sweats) A systematic review found 88% of tonsillar lymphoma patients had other symptoms suspicious for malignancy.(15) Given the high rate of associated symptoms and the fact that 1.7% of the healthy paediatric population have asymmetrical tonsils(8) we would advocate careful consideration when considering tonsillectomy.

Based on our findings, the role of tonsil grading as a means to risk stratify those children requiring tonsillectomy for asymmetry has to be called into question. Although there was a weak association between tonsil grade and actual tonsil weight it was not statistically significant (p=0.1). It may be more useful as a monitoring tool. If children have no new systemic or obstructive symptoms and the enlargement has been present for over 6 weeks it would be extremely unlikely to be malignant. Histological results that varied from simple hyperplasia were all anticipated because the lesion was seen in clinic prior to the operation.

Previous papers have associated Actinomycosis and Actinomyces colonisation with a larger tonsil size.(16,17) Our results do not support this finding. There was no statistically significant difference in tonsil weight between those patients bilaterally colonised and bilaterally non-colonised tonsils (p=0.540) Actinomyces colonisation had little effect when it was found unilaterally in patients as there was no statistically significant difference in weight (p=0.448)

In our series, recurrent tonsillitis is more common than OSA in patients with tonsillar Actinomyces colonisation (39% vs 15% respectively). Previous papers have described higher rates of OSA/Sleep disordered breathing in children with Actinomycosis and Actinomyces(16,17)

## Conclusion

In our series 66 of 168 patients had tonsillectomy for histology in the absence of another reason such as OSA or recurrent tonsillitis. We should be aiming to greatly reduce this number given what we now know about how most TLs present with rapid tonsil growth, associated with obstructive or systemic B-type symptoms. We can more confidently say that asymmetrical tonsils in isolation should not be an indication for tonsillectomy. This approach is supported by a recent US publication which found a very low incidence of 0.021/100,000 paediatric tonsil malignancies per year.(18)

We believe grading has a role in monitoring asymmetrical tonsils. TL is most commonly Non-Hodkins and is diagnosed early (Ann Arbor grade 1-2) in 90% of cases.(19) We should therefore be reassured that active monitoring for these additional symptoms is an appropriate management plan in children with apparently asymmetrical tonsils.

Based on our data it is impossible to draw conclusions about tonsil weight as a predictor for malignancy. It would be useful if a future case controlled study of TL published the weights of the tonsils for statistical comparison with our data. Actinomyces colonistation appears to have little effect on the size of tonsils and contrary to previous studies, appears more frequently in patients with recurrent tonsillitis than OSA and sleep disordered breathing.

## Ethical Considerations

The study was granted HRA approval by West Midlands - Coventry & Warwickshire Research Ethics Committee. (REC Reference: 17/WM/0042)

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## References

1. National Prospective Tonsillectomy Audit Final Report. Royal College of Surgeons. https://www.rcseng.ac.uk/library-and-publications/college-publications/docs/tonsillectomy-audit/ (last accessed 20 April 2018).

2. A.C. Ballin, H.N. Koerner, C.H. Ballin, R. Pereira, L.J.L Alcântara, G.R. Taques, et al. Assimetria de tonsilas palatinas: experiência de 10 anos do serviço de otorrinolaringologia do hospital de clínicas da Universidade Federal do Paraná. Arq Int Otorrinolaringol. 15 (2011) 67–71.

3. R.G. Berkowitz, M. Mahadevan. Unilateral tonsillar enlargement and tonsillar lymphoma in children. Ann Otol Rhinol Laryngol. 108 (1999) 876–9.

4. E.H. Harley. Asymmetric Tonsil Size in Children. Arch Otolaryngol Neck Surg. 128 (2002) 767–9.

5. A.F. Oluwasanmi, S.J. Wood, D.L. Baldwin, F. Sipaul. Malignancy in asymmetrical but otherwise normal palatine tonsils. Ear Nose Throat J. 85 (2006) 661–3.

6. E. Spinou, H. Kubba, I. Konstantinidis, A. Johnston. Tonsillectomy for biopsy in children with unilateral tonsillar enlargement. Int J Pediatr Otorhinolaryngol. 63 (2002) 15–7.

7. A.C. Guimarães, G.M. de Carvalho, L.R. Bento, C. Correa, R.J. Gusmão. Clinical manifestations in children with tonsillar lymphoma: A systematic review. Crit Rev Oncol Hematol. 90 (2014) 146–51.

8. A. Akcay, C.O. Kara, E. Dagdeviren, M. Zencir. Variation in tonsil size in 4- to 17-year-old schoolchildren. J Otolaryngol. 35 (2006) 270–4.

9. P. Kaatsch. Epidemiology of childhood cancer. Cancer Treat Rev. 36 (2010) 277–85.

10. S.P. Verma, T. Stoddard, I. Gonzalez-Gomez, J.A. Koempel. Histologic analysis of pediatric tonsil and adenoid specimens: Is it really necessary? Int J Pediatr Otorhinolaryngol. 73 (2009) 547–50.

11. E. Østvoll, O. Sunnergren, E. Ericsson, C. Hemlin, E. Hultcrantz, E. Odhagen, et al. Mortality after tonsil surgery, a population study, covering eight years and 82,527 operations in Sweden. Eur Arch Otorhinolaryngol. 272 (2015) 737–43.

12. L. Brodsky L, Modern Assessment of Tonsils and Adenoids. Recent Adv Pediatr Otolaryngol. 36 (1989) 1551–69.

13. M. Friedman, H. Tanyeri, M. La Rosa, R. Landsberg, K. Vaidyanathan, S. Pieri, et al. Clinical Predictors of Obstructive Sleep Apnea. The Laryngoscope. 109 (2009) 1901–7.

14. Overview of the UK population - Office for National Statistics [Internet]. [cited 2017 Sep 3]. Available from: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/july2017 (last accessed 20 April 2018).

15. A.C. Guimarães, G.M de Carvalho, C.R.S. Correa, R.J. Gusmão. Association between unilateral tonsillar enlargement and lymphoma in children: A systematic review and meta-analysis. Crit Rev Oncol Hematol. 93 (2015) 304–11.

16. A. Kutluhan, M. Salvız, G. Yalçıner, O. Kandemir, C. Yeşil. The role of the actinomyces in obstructive tonsillar hypertrophy and recurrent tonsillitis in pediatric population. Int J Pediatr Otorhinolaryngol. 75 (2011) 391–4.

17. D. Bhargava, B. Bhusnurmath, K.R. Sundaram, R. Raman, H.M Al Okbi, R. Al Abri, et al. Tonsillar actinomycosis: a clinicopathological study. Acta Trop. 80 (2001) 163–8.

18. E.A. Adil, G. Medina, M.J. Cunningham. Pediatric Tonsil Cancer: A National and Institutional Perspective. J Pediatr. (2018) online. DOI: <https://doi.org/10.1016/j.jpeds.2018.01.022>.

19. M. Mohammadianpanah, Y. Daneshbod, M. Ramzi, N. Hamidizadeh, S.J. Dehghani, F. Bidouei, et al. Primary tonsillar lymphomas according to the new World Health Organization classification: to report 87 cases and literature review and analysis. Ann Hematol. 89 (2010) 993–1001.

## Appendix

**Table 1. Indication for histological analysis.**

|  |  |
| --- | --- |
| **Indication** | **Number (%)** |
| Asymmetry in clinic | 123 (73.2%) |
| No indication for histology | 22 (13.1%) |
| Intraoperative findings | 16 (9.5%) |
| Discrete lesion on tonsil | 3 (1.8%) |
| Cervical lymphadenopathy | 2 (1.2%) |
| Other | 2 (1.2%) |

### Table 2. Histological Outcomes

|  |  |
| --- | --- |
| **Histology Result** | **Number of cases (%)** |
| Lymphoid hyperplasia | 159 (94.6%) |
| Normal | 6 (3.6%) |
| Lymphangioma | 3 (1.8%) |

### Table 3. Proportional difference in tonsil weight by difference in clinical grading

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Weight Difference as a percentage of smaller tonsil** | | | | |
| **Difference in Grade** | n= | Mean | Standard Deviation | Min Difference | Max Difference |
| **0** | 32 | 18% | 16% | 0 | 69% |
| **1** | 35 | 26% | 30% | 0 | 129% |
| **≥2\*** | 24 | 33% | 29% | 0 | 119% |

\* 23 patients had a grade difference of 2 and 1 patient had a grade difference of 3

### Graph 1. Mean tonsil weight difference with 95% confidence intervals for each Brodsky grade difference category.

**Table 4. Mean weight of tonsils in patients with and without bilateral Actinomyces colonisation.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **n=** | **Mean weight (g)** | **Standard**  **Deviation** | **Standard**  **Error** | **Minimum** | **Maximum** |
| **Both tonsils unaffected** | 78 | 3.73 | 1.43 | 0.16 | 1.00 | 7.85 |
| **Both tonsils affected** | 37 | 3.89 | 1.11 | 0.18 | 1.60 | 6.55 |

(t-test p=0.540).

### Table 5. Proportional weight difference between tonsils in patients with bilateral, unilateral and no Actinomyces colonisation.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Difference in weight as percentage of smaller tonsil weight** | | | | |
|  | **n=** | **Mean** | **Std Dev** | **Minimum** | **Maximum** |
| Bilateral colonisation | 37 | 20% | 24 | 0 | 119% |
| No colonisation | 78 | 25% | 26 | 0 | 129% |
| Unilateral colonisation | 13 | 25% | 20 | 3% | 75% |

(p=0.641, ANOVA).

### Table 6. Recurrent tonsillitis and OSA in patients with and without Actinomyces colonisation.

|  |  |  |
| --- | --- | --- |
|  | **Recurrent Tonsillitis** | **OSA/Sleep disordered breathing** |
| Actinomyces (n=61) | 39% | 15% |
| No Actinomyces (n=107) | 34% | 26% |

(Some data excluded as weight not recorded in histology result)

### Table 7. Summary of case series describing asymmetrical tonsils in children.

|  |  |  |
| --- | --- | --- |
| **Case Series** | **Number of patients** | **Cases of Lymphoma** |
| Our study | 123 | 0 |
| Ballin et al.(2) | 39 | 0 |
| Berkowitz et al.(3) | 47 | 0 |
| Harley et al.(4) | 47 | 0 |
| Oluwasanmi et al.(5) | 19 | 0 |
| Spinou et al.(6) | 47 | 0 |