Serious tonsil infections versus tonsillectomy rates in Wales: A 15-year analysis

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ABSTRACT

INTRODUCTION Sore throat and tonsillitis place a significant burden on the National Health Service. National guideline criteria for gauging the severity of sore throat and tonsillitis have reduced the number of tonsillectomies performed, which is thought to have increased the rate of tonsil-related infections.

METHODS Data was extracted from the prospective Patient Episode Database of Wales and analysed to determine the annual number of tonsillectomies for recurrent tonsillitis, adjusted for population changes. Admissions to acute hospitals for tonsillitis, peritonsillar abscess and deep neck space abscesses were also examined.

RESULTS Between 1999 and 2014, hospital admissions for tonsillitis rose three-fold ($r=0.968$), while admissions for peritonsillar abscess rose by 48% ($r=0.857$) and retro or parapharyngeal abscess admissions also increased ($r=0.709$). In contrast, the number of tonsillectomies per 100,000 population gradually decreased ($r=-0.16$). There was a positive correlation between the incidence of tonsillitis and admissions for peritonsillar abscess (adjusted r^2 0.631; $p=0.015$) and retropharyngeal abscess (adjusted r^2 0.442; $p=0.00254$). There was a statistically significant negative correlation between the incidence of tonsillitis and the number of tonsillectomies performed (adjusted $r^2=-0.07$; $p=0.0235$).

CONCLUSIONS The significant rise in tonsillitis in Wales raises the question as to whether we should revisit the criteria for tonsillectomy. The perceived cost saving from limiting certain procedures should not prevent healthcare policymakers from considering all other evidence. The rise in peritonsillar, retropharyngeal and parapharyngeal abscess is alarming, as they are associated with significant morbidity and mortality.

KEYWORDS

Tonsillectomy – Tonsillitis – Retropharyngeal abscess – Otolaryngology – Peritonsillar abscess

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Sore throat, including tonsillitis, represents a considerable health burden in the UK, with an estimated 35 million work days lost per year, and an annual cost to the National Health Service (NHS) of £100 million.^{1,2} Although most people will experience tonsillitis at some point during childhood or adolescence, this is a rare event for the majority of patients and most are adequately managed in the community with supportive treatment and antibiotics. However, tonsillitis becomes, in a proportion of patients, a regular, recurrent condition, occurring several times a year; in addition to patient suffering, this has implications for education and career progression due to an accumulation of absences. Furthermore, severe complications occur secondary to tonsillitis, such as peritonsillar abscess and deep neck space abscesses (including parapharyngeal and retropharyngeal abscess). For these patients, tonsillectomy is a vital part of the treatment and management of recurrent tonsillitis.³ Moreover, tonsillectomy performed for recurrent severe tonsillitis in a timely manner has been shown to be cost effective.²

Tonsillectomy may lead to complications, however, and this includes a risk of life-threatening haemorrhage. Furthermore, any operation undertaken on a significant number of patients must inevitably undergo financial scrutiny. This is particularly important in the modern NHS, where there is a constant push for efficiency savings, and routine procedures must be shown to be cost effective. There have therefore been efforts made to identify which patients would benefit from and should be offered a tonsillectomy. Following implementation of the Scottish Intercollegiate Guidelines Network (SIGN) recommendations for tonsillectomy in 1999, there has been a significant decline in the number of tonsillectomies performed.⁴ Over the same period, there has been a significant increase in the number of hospital admissions for tonsillitis and peritonsillar abscess in the UK.^{5,6}

This paper aims to describe and discuss the trend in patients admitted to secondary care for tonsillitis and associated infections in the context of the number of tonsillectomies performed each year in Wales.

Methods

We undertook an observational longitudinal study of the population of Wales. Data was extracted from the Patient Episode Database for Wales (PEDW), which records all episodes of inpatient and day case activity within NHS Wales Hospitals and includes all planned and emergency admissions for minor and major operations and hospital stays for giving birth.⁷ It does not include cases seen within primary care. Population numbers were obtained from the NHS Wales Informatics Service. Research ethics committee approval was not required for the use of anonymous, open-access population data. This is in accordance with the author's institution's research ethics policy and the NHS Health Research Authority guidelines.

Data for the 15 years between 1999 and 2014 were analysed to determine the overall population in Wales, alongside the number of tonsillectomies performed (code F34) and the number of hospital admissions for tonsillitis (code J030, J038, J039), peritonsillar abscess (code J36X) and retropharyngeal and parapharyngeal abscess (code J590).

Data was recorded and analysed using Microsoft Excel 2013 (Microsoft, Redmond, Washington, USA).

Results

The population in Wales increased steadily over the 15-year study period, as shown in Figure 1. During that period, 48,505 tonsillectomies were performed, and there were 67,205 admissions for tonsillitis, 8,567 admissions for peritonsillar abscess and 187 admissions for retropharyngeal or parapharyngeal abscess.

The number of tonsillectomies performed per 100,000 population gradually decreased throughout the study period

(Pearson correlation coefficient, $r=-0.161$), as shown in Figure 2. In contrast, there was a considerable increase in the number of admissions for tonsillitis ($r=0.968$), peritonsillar abscess ($r=0.857$) and retro or parapharyngeal abscess (Figs 3–5).

On linear regression analysis, there was a statistically significant negative correlation between the rate of tonsillectomy and admissions for tonsillitis (adjusted $r^2=-0.07$; $p=0.0235$). There was a strong correlation, however, between the rate of tonsillitis admissions and the number of admissions for retro/parapharyngeal abscess (adjusted $r^2=0.442$; $p=0.00254$) and peritonsillar abscess (adjusted $r^2=0.631$; $p=0.015$).

Discussion

Tonsillitis is an acute infection of the palatine tonsils. ENT UK defines tonsillitis as an episode lasting 5–14 days, in which the patient experiences some or all of the following: fever, malaise, nausea, severe sore throat, white spots in the tonsils and cervical lymphadenopathy. Tonsillitis is more common in children than adults; however, in adults it may be more frequent and severe. Episodes usually last 3–5 days and can occur several times per year. This may have a significant impact in children, with loss of time in school, and lead to loss of work time in adults. ENT UK estimated that 35 million school and work days are lost annually due to sore throat throughout the UK, while the cost of GP consultations is estimated as £60 million a year. Tonsillitis clearly has a considerable economic impact.¹

Deep neck abscesses includes peritonsillar, retropharyngeal and parapharyngeal abscesses.⁸ Peritonsillar abscess is the most frequent, followed by parapharyngeal abscess.⁹ Deep neck space infections may arise from an infection of the

Figure 1 The Welsh population, by year

Figure 2 Tonsillectomies performed per 100,000 population per year

Figure 3 The number of tonsillitis admissions per year

tonsil, teeth, salivary gland, deep neck lymph nodes or malignancy.¹⁰ It is therefore likely that some of the infections described here are secondary to non-tonsil infections. There is currently no literature available describing the proportion of deep neck abscesses caused by infection in the different sites; peritonsillar abscess, however, is predominantly seen in association with tonsil infection. Parapharyngeal space abscess can lead to severe complications, such as airway compromise, Lemierre's syndrome, Horner's syndrome, mediastinitis and carotid artery haemorrhage.^{8,9} The rising trend of deep neck abscesses in Wales is therefore concerning and should be a focus of ongoing research. It is likely that the picture seen in Wales will be comparable to that in the rest of the UK and other similarly developed western countries.

Tonsillectomy is one of the most common surgical procedures throughout the world, especially in children.¹⁰ The

surgical rate varies considerably, from 1.9 per 1000 children in Canada to 11.8 per children in Northern Ireland in 1998.¹¹ In 1999, SIGN published guidance on the management of tonsillitis and the indications for tonsillectomy.⁴ It stipulated that patients would be considered for tonsillectomy only if they fulfilled specific criteria:^{1,4} that the sore throats are due to tonsillitis; that there be five or more episodes of sore throat per year; that symptoms have been present for at least a year; and that the episodes of sore throat are disabling and prevent normal functioning.

However, the literature used for the SIGN guidance has limitations. The criteria in the guideline are based solely on a study by Paradise et al, published in 1984.⁴ While it is a good-quality study, it was not designed to determine the level of recurrent tonsillitis at which patients would benefit from tonsillectomy. It set the criteria arbitrarily and

Figure 4 The number of peritonsillar abscess admissions per year

Figure 5 The number of retropharyngeal and parapharyngeal abscess admissions per year

demonstrated that tonsillectomy was of benefit in this group. There is therefore a question as to whether the bar has been set too high, and if there is benefit from treating patients with lower levels of tonsillitis. Another major limitation in the evidence base is that the severity of the tonsillitis is not taken into account; above the vague level of 'clinical significance', the criteria is merely number of episodes and does not allow for hospital admission or other factors that might suggest increased severity.

SIGN is not alone in its conclusions or in its reliance on the Paradise et al study; similar guidelines have been published throughout the world.^{12–15} Ultimately, organisations such as SIGN produce guidelines based on the available

evidence and, other than Paradise et al, there are few good-quality papers that help clarify this issue. In 2008, a Cochrane Review reported no clear evidence of clinical and cost-effectiveness in the treatment of recurrent sore throat among children.¹⁶ In 2010, a pragmatic, randomised controlled trial showed a clinical benefit lasting at least 2 years with tonsillectomy versus watchful waiting.¹⁷ There are also many non-controlled studies that suggest a benefit in children who have had tonsillectomy; these describe not only an improvement in their general health but also their overall wellbeing.⁴ A multi-centre randomised controlled trial in 2012 concluded that, in UK school-age children, tonsillectomy is more cost effective if it is performed

promptly.² A delay of tonsillectomy in children with a 2 year history of five annual tonsillitis for up to 12 months is counterproductive, in terms of cost.²

In 2006, some primary care trusts categorised tonsillectomy as a 'procedure of low clinical effectiveness' or 'procedure of limited clinical value' (PLCV).⁵ A Royal College of Surgeons Briefing says that PLCV is a term that NHS managers have applied to a range of elective surgical procedures that they no longer wish to fund.¹⁸ Traditionally, it included complimentary or alternative medicine, aesthetic treatment or treatments without NICE guidance over cost effectiveness.¹⁸ However, the concept has been extended to include many elective operations.¹⁸ In spring 2009, the Department of Health, with the management consultancy firm McKinsey and Company, produced a report for the NHS on how to make cost savings.¹⁹ As part of the report on efficiency savings that could be made in NHS, tonsillectomy was regarded as a "relatively ineffective intervention".⁵

The publication of these documents may explain the reduction in number of tonsillectomies performed during the study period. Although our study cannot establish cause and effect, the negative correlation between the number of tonsillectomies performed and admissions for tonsillitis would suggest that the bar for tonsillectomy is being set too high. There was also a significant rise in incidence of peritonsillar, retropharyngeal and parapharyngeal abscess. These findings have also been observed in England.^{5,6}

ENT UK states that tonsillectomy, in appropriately selected patients, is not only a treatment for severe recurrent tonsillitis but leads to an improvement in the patient's quality of life.¹ There is currently no published data to suggest that tonsillectomy is overused or abused in the UK. Indeed, the number of tonsillectomies performed in the UK is lower than that in any other country in Europe.¹

A significant drop in the number of tonsillectomies performed in Wales was seen in 2001. In 2000, the Spongiform Encephalopathy Advisory Committee identified a theoretical risk of transmission of variant Creutzfeld-Jacob disease from reusable surgical instruments.^{18,20,21} Tonsillectomy was identified as a high-risk procedure due to it being performed on children and young adults.⁷ Hence, tonsillectomy ceased to be undertaken in the UK (except for emergency cases) for a period of time. Single-use disposable instruments were introduced in 2001 to prevent the potential spread of the disease; however, their use was withdrawn soon afterwards, as there were reports of poor surgical quality, resulting in increased complications such as post-tonsillectomy haemorrhage.⁷ While England and Northern Ireland returned to using reusable instruments, Wales opted to cease tonsillectomy again and carried out a detailed investigation to provide better quality single-use instruments, as specified by surgeons in Wales.⁷ Consequently, the Welsh Assembly, in collaboration with the Welsh Otorhinolaryngological Association (currently ENT Wales) and Public Health Wales, have established the Surgical Instruments Surveillance Programme to deliver safe surgery in Wales.⁷

Potential limitations of our study include missing data and miscoding; however, this is unlikely to have a large effect in tonsillectomy and tonsillitis, as the relevant codes are

common and well-defined. Indeed, a systematic review of discharging coding accuracy of the Hospital Episode Statistics, PEDW and Scottish Morbidity Record databases by Burns et al suggested that routinely collected data are sufficiently robust to be used for research and managerial decisions.²² Linear regression analysis is a statistical method that is designed to show correlation between two variables. It does not prove, however, relationship is causal. In this case, it can only suggest that the rise in tonsillitis is positively correlated to the rise in peritonsillar and deep neck abscesses. It is not designed to prove that the increases in tonsillitis cases causes an increase in the incidence of peritonsillar and deep neck abscess.^{8,9,23} Finally, the data provided in the PEDW do not differentiate between the diagnosis of retropharyngeal and parapharyngeal abscesses; hence, we are not able to analyse them separately. As the PEDW data are derived from hospital coding, the study includes only the small proportion of severely ill patients who reach secondary care and is likely to represent the tip of the iceberg, as many individuals in the community will suffer with recurrent tonsillitis.

Conclusions

The significant rise in tonsillitis admissions observed in this large analysis of data, across 15 years and multiple centres, raises the question of whether the threshold for proceeding to tonsillectomy is too high. The evidence provided in this study alone cannot support a change in guidelines but we hope it will prompt further research and discussion. Particularly in this climate of healthcare rationing and the resultant limitation in the provision of certain procedures, it is important for clinical researchers to expand the evidence base and show which operations can benefit which patients.

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