Why we Should be in Increasing Tonsillectomies Four Fold

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Introduction

Tonsillectomy rates throughout the world are increasing with the realization that sleep disordered breathing (SDB) secondary to adenotonsillar hypertrophy is a major cause of morbidity in childhood. Obstructive sleep disorder (OSD) and obstructive sleep apnoea (OSA) — sometimes jointly called obstructive sleep apnoea syndrome (OSAS) are by far the major indication for adenotonsillectomy, with 70% of all such procedures done for this indication.

While the figures used in this chapter relate to Australian statistics, we believe that they are representative of results reported from other countries throughout the world. With increasing medical knowledge, and parent awareness of OSAS, we expect the adenotonsillectomy rate to approach three percent of children between 1-16 years, commensurate with the number of children who have obstructive sleep apnoea.

We acknowledge this will produce a severe strain on the medical system with increased numbers of patients requiring consultations, sleep studies and surgery. However, with new evidence relating to the neurocognitive and behavioural issues of not only OSAS but with primary snoring, it will be incumbent on all those involved in the care of these children to advocate early treatment to avoid the possible lifetime social, educational and vocational sequelae of neurocognitive delay.

Incidence of Tonsillectomy for Obstructive Sleep Disorder in Australia

Utilizing the Australian figures it is generally acknowledged that 10% of children snore and that 2-3% snore and have significant obstructive sleep apnoea[1]. Yet, of children aged between one and 16 years, only 0.7% of children in Australia have tonsillectomy with or without adenoidectomy, of which (70%) or 0.5% are performed for obstructive sleep disorder and the remaining 30% are for recurrent acute tonsillitis, quinsy, biopsy purposes or chronic tonsillitis. Interestingly in Australian and New Zealand 0.64% of children aged 0-4 have tonsillectomy performed and more of these are in the private sector (64%) than the public sector - similarly 0.69% of children between the ages of five and nine years have tonsillectomy performed with preponderance in privately insured patients.

Therefore if the generally acknowledged figure of 2-3% of children having obstructive sleep disorder with apnoea is accepted, then in Australia we should be performing at the minimum four times as many tonsillectomies as we are currently performing.

Why the increase in obstructive sleep disorder?

The reports on persistent snoring throughout most nights (which is considered at the lower end of the obstructive sleep disorder) is reported in 8-12% of children with a general figure of about 10%.This is usually because of upper airway lymphoid size relative to the upper airway size is at its peak between the ages of 2-8 years. Other factors that may contribute to cause obstruction in the upper airway include altered upper airway tone, mid-face hypoplasia, obesity, nasal obstruction and genetic factors.[2]

Large tonsils in themselves do not indicate the presence of obstructive sleep disorder and apnoea but certainly should be an indicator that this may be a possibility.

Review of features of obstructive sleep disorder

Obstructive sleep disorder is a constellation of symptoms which may vary from mild snoring through to severe snoring with apnoea and cardiac complications. It is the commonest reason for tonsillectomy world wide and the symptoms and signs of obstructive sleep disorder in children vary from the night time features of snoring, apnoeic episodes, struggling to breathe, chronic mouth breathing and sweating, through to restless sleep, frequent wakening, sleep walking, sleep talking and night terrors or hypersomnolence. In addition there may be teeth grinding, choking and vomiting, enuresis, cyanosis and sleeping in unusual positions.

The day time symptoms include waking up tired and grumpy in the morning or after an afternoon nap, daytime somnolence, difficulty swallowing meat and apple peel and failure to thrive and growth retardation,- however they may also have inactivity and obesity, hyperactivity, ADHD like symptoms, behavioural problems as well as learning difficulties and executive functioning problems particularly in school aged children. (**Table 1**)

Table 1. Symptoms and Signs of OSD in children

DAYTIME

- Waking up tired/grumpy in morning/after afternoon nap
- Daytime somnolence
- Difficulty swallowing meat/apple peel
- FTT, growth retardation
- Obesity, inactivity
- Hyperactivity, ADHD symptoms, behaviour problems
- Learning difficulties, concentration problems

NIGHT TIME

- Snoring
- Apnoeic Episodes
- Struggling to breathe
- Chronic Mouth Breathing
- Sweating
- Restless sleeping, frequent waking

- Sleep walking, sleep talking, night terrors
- Hypersomnolence
- Teeth grinding
- Choking & vomiting
- Bed Wetting (enuresis)
- Cyanosis
- Sleeping in unusual positions (eg head arched back)

Diagnosis of obstructive sleep disorder/apnoea

The gold standard for diagnosing the presence or absence of OSA and the degree of severity of obstructive sleep disorder/apnoea is the polysomnogram. It is generally acknowledged that an apnea- hypopnea index of greater than five per hour is a good indication for adenotonsillectomy and that an apnea hypopnea or 3-5 per hour is a marginal or grey area indication for adenotonsillectomy.
However there is a conundrum in that you may have a child with a normal sleep study who still has quality of life issues- for example being below the 3rd percentile for height and weight or have significant gagging and choking on meat or apple peel or similar hard bulky food. These may be, by themselves, an indication for adenotonsillectomy. Although the effects of severe upper airway obstruction in children have been known for many years, more recently, particularly after extrapolation of data from the literature regarding adult obstructive sleep apnoea ,there is increasing attention on their day time neuro-cognitive functioning. In children the areas that can be involved include verbal and non-verbal intelligence, memory, psychomotor efficiency, attention, concentration, executive and psychosocial functioning.[3]

There is now evidence that although severe upper airway obstruction in children has been known for decades to cause growth failure, cor pulmonale and developmental delay, the more subtle findings affecting behaviour and intellect have been unrecognized until recently. The repeated disruption of the child's sleep may cause repetitive episodes of hypoxemia and minimal brain damage. [4] In addition there are behavioural problems which are consistently noted including hyperactivity, inattention, anxiety and aggression. There have been reports of IQ drop of up to 10-15 IQ points in children with significant sleep apnoea and this obviously translates to decreased school performance and executive functioning.

These neurocognitive changes may include learning, memory and executive functioning concerns with executive functioning including flexible analytical and problem solving ability. [5]

Primary snoring where the child does not have apnoea or signs of hypoxia may well also lead to neurocognitive issues and this of course is very important because of the 10% of children that have snoring most nights.

Evidence for Neurocognitive Issues

Gozal [6] had a cohort of 297 first graders who were performing poorly academically and had snoring as well. Examination of these children revealed a 6-9 fold increase in the presence of obstructive sleep apnoea syndrome. Half of the parents elected to have their child's adenotonsillectomy performed while the

other half refused. A year later that child who has had adenotonsillectomy had significant improvement in their academic performance whilst those who had not had the surgical management had academic performance that had not improved above the first year level.

Urshitz et al [7] assessed 1 144 children and found an association between snoring and intermittent hypoxia where there were desaturation events of 90% or less and they found there was poor academic performance in 3rd graders on a six point scale in maths, science, reading spelling and handwriting. They utilized nocturnal home pulse oximetry and a parental questionnaire and found that snoring was always associated with poor performance in mathematics, science and spelling and frequently associated with poor performance in mathematics and spelling. They concluded that habitual snoring was associated with poor academic performance in this primary school group.

In a later article the same author described pulse oximetry-derived variables that qualify hypoxemia with impaired academic performance in maths in 995 primary school children.[8] Of the ten variables that they studied only the nadir of $sp0_2$ values were significantly associated with impaired performance. They suggested using nadir of $Sp0_2$ values in overnight sleep studies to qualify hypoxemia in future studies and that this may predict neurocognitive deficits in school children. This study needs to be repeated to ensure that the findings are valid. Other supporting papers are those by Blunden et al and Friedman et al. [9.10]

Management

In 80% of cases adenotonsillectomy relives the symptoms of obstructive sleep disorder/ apnoea. However in the remaining 20% of children there may be ongoing obstructive sleep disorder symptoms relating to other factors such as poor muscle tone, airway obstruction at a different level, nasal obstruction including septal deformity and turbinate hypertrophy and the presence of obesity with pressure on the pharyngeal structures. The studies that have been performed to delineate the outcome of adenotonsillectomy in a recent extensive meta analysis did mention that these studies were primarily from tertiary referral centres and more likely to include children with co-morbidities and therefore possibly skewed the results. [11]

It is critical then, that following adenotonsillectomy if there is no improvement in the snoring and other obstructive symptoms that the child have a follow up polysomnogram and further evaluation to establish the cause of the ongoing airway obstruction. In some children this will not be treatable and they will then require CPAP.

Summary

In Australia, and more than likely in other countries in the world, the incidence of obstructive sleep disorder apnea and primary snoring has been underestimated and these conditions may well be a cause of subtle behavioural and neurocognitive deficits in children. Given the relatively low rate of adenotonsillectomy in children with these OSD/A syndromes, it would be reasonable to expect that we should be increasing the number of adenotonsillectomies we perform in the future at least four fold

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