The effectiveness of tonsillectomy and adenoidectomy in the treatment of pediatric obstructive sleep apnea/hypopnea syndrome: a meta-analysis

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CRD summary
The authors concluded that adenotonsillectomy is effective in uncomplicated paediatric patients with obstructive sleep apnoea/hypopnoea syndrome. The evidence came from case series, which are not considered to provide high-quality evidence, therefore the results, whilst promising, should be interpreted with caution.

Authors' objectives
To determine the effectiveness of adenotonsillectomy (T/A) in uncomplicated paediatric patients with obstructive sleep apnoea/hypopnoea syndrome (OSAHS).

Searching
PubMed, EMBASE and the Cochrane Library were searched (from inception to 1 December, 2005) for papers published in any language; the search terms were reported. References were also checked.

Study selection
Study designs of evaluations included in the review
Other than the evaluation of outcomes before and after surgery, no a priori study design was reported. All of the studies included in the review were case series.

Specific interventions included in the review
Studies that included surgical treatment (removal of adenoids and both tonsils) were eligible for inclusion.

Participants included in the review
Studies of children (younger than 18 years old) with OSAHS, but without significant co-morbidity including craniofacial syndrome, morbid obesity and neuromuscular disorders, were eligible for inclusion. Where reported, the mean age ranged from 4.5 to 7.5 years, the pre-intervention Apnea Hypopnea Index (AHI) scores ranged from 6.375 to 31.5, and the polysomnogram (PSG) criteria for OSAHS ranged from 1 to 5.

Outcomes assessed in the review
Studies that evaluated participants with nocturnal PSG before and after surgery and assessed, at a minimum, the measurement of apnoea and hypopnoea using plethysmography and pulse oximetry with calculation of an AHI, were eligible. The overall success (percentage) of normalising PSG measurements was also included in the review; criteria for success ranged from 1 to 5 events per hour. Studies must have presented sufficient data to allow calculation of the parameters of interest (change in AHI and number of patients successfully treated).

How were decisions on the relevance of primary studies made?
Article titles and abstracts were reviewed for eligibility against the inclusion criteria. The authors did not state how the primary papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
A hierarchy of evidence appears to have been used to evaluate the quality of the included trials. The authors did not state how many reviewers performed the validity assessment.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. Sample size, mean age and diagnostic criteria for OSAHS were data extracted. An effect size (Hedge's adjusted $g$) was calculated as the standardised difference in means based on the change in AHI scores before and after surgery.

**Methods of synthesis**

**How were the studies combined?**

The studies were pooled using a random-effects model. Summary estimates and their 95% confidence intervals (CIs) were reported for change in AHI after surgery, the percentage of patients successfully treated, and a standardised measure of effectiveness (change in AHI). Publication bias was assessed using a funnel plot and visual inspection.

**How were differences between studies investigated?**

The chi-squared test was used to assess statistical heterogeneity. Meta-regression was performed to investigate potential sources of confounding (age, gender, PSG criteria and baseline AHI).

**Results of the review**

Fourteen case-series studies ($n=355$) were included in the review.

All the included studies were judged to be evidence level 4 (no additional information was reported).

A statistically significant decrease in AHI was found after surgery; the mean change was 13.92 events/hour (95% CI: 10.05, 17.79), based on 14 studies. Significant heterogeneity was found ($p<0.001$). The standardised measure of change in AHI found a significant treatment effect after surgery (Hedge's adjusted $g$ 1.43, 95% CI: 1.25, 1.60; based on 14 studies). Significant heterogeneity was found ($p=0.001$). The percentage of patients with OSAHS successfully treated with T/A was 82.9% (95% CI: 76.2, 89.5), based on 11 studies (range: 52.9 to 100%). Significant statistical heterogeneity was found ($p=0.009$). Mean age, PSG criteria and pre-operative AHI did not significantly impact on the results of the meta-analysis (data not reported).

The Begg and Mazumdar test did not find any publication bias ($p=0.17$)

**Authors’ conclusions**

Paediatric T/A was effective in the treatment of OSAHS, and successful in normalising PSG measurements in the majority of patients. However, given the prevalence of OSAHS, the presence of residual OSAHS in a large number of patients may have paediatric public health consequences.

**CRD commentary**

The review question was supported by clear inclusion criteria. Appropriate databases were searched for relevant literature, unrestricted by language. No specific attempts to locate unpublished studies were reported, but publication bias was assessed and no evidence of bias was found. A lack of reported methods for the study selection and data extraction processes mean that it is not possible to assess the likelihood of reviewer error or bias at these stages. The analysis seems appropriate, statistical heterogeneity was assessed, and the effect of some confounding variables was examined. Significant statistical heterogeneity was found for all meta-analyses, showing that the size of the treatment effect was not consistent across studies; the studies appeared to have a similar direction of treatment effect. The evidence for this review came from a number of case series, which are not considered to provide high-quality evidence, therefore the results, whilst promising, should be interpreted with caution.

**Implications of the review for practice and research**

Practice: The authors also suggested that inexpensive noninvasive screening tests that could be used in place of PSG may prove beneficial.
Research: The authors recommended the collection of prospective data on larger groups of uncomplicated paediatric patients with homogeneous PSG criteria. They also stated that there is an urgent need to study the large number of patients who have residual OSAHS after T/A.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.