Updated systematic review of tonsillectomy and adenoidectomy for treatment of pediatric obstructive sleep apnea/hypopnea syndrome

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CRD summary
The authors concluded that paediatric sleep apnoea was often not cured by tonsillectomy and adenoidectomy. Although complete resolution was not achieved in most cases, tonsillectomy and adenoidectomy offered significant improvement in apnoea-hypopnoea index. The authors’ conclusions represented the evidence presented, but given poor reporting of results the reliability of the authors conclusions are unclear.

Authors' objectives
To determine the effectiveness of tonsillectomy and adenoidectomy for obstructive sleep apnoea/hypopnoea syndrome in children.

Searching
PubMed and The Cochrane Library were searched up to July 2008 for studies in English. Search terms were reported. References of identified studies were searched. Case reports, abstracts and letters to the editor were excluded.

Study selection
Eligible studies were of tonsillectomy and adenoidectomy in obese or non-obese patients less than 20 years old who had obstructive sleep apnoea/hypopnoea syndrome (confirmed by an abnormal preoperative polysomnographic data) and that reported both preoperative and postoperative polysomnogram.

Studies that included mostly patients with craniofacial syndromes, chromosome disorders or neuromuscular disorders were excluded.

Studies were either prospective trials or retrospective observational studies. All studies appeared to be uncontrolled as no details of control groups were provided. Mean patient age ranged from three to 9.3 years. The proportion of male patients reported in the studies ranged from 49% to 86%. Definition of success rate varied between studies: approximately half of studies used an apnoea-hypopnoea index <1 and half used an apnoea-hypopnoea index <5; one study used an apnoea-hypopnoea index <2. Mean preoperative apnoea-hypopnoea index ranged from 6.9 to 69.3. Outcome assessments points were stated by the review authors to have been inconsistent among the studies, but were reported in the studies. Nine studies were defined as having children with comorbidities; at least three quarters of children were obese or had severe obstructive sleep apnoea/hypopnoea syndrome.

The main outcomes of interest were treatment success as defined per study and mean change in apnoea-hypopnoea index from preoperative to postoperative polysomnogram. Additional outcomes of interest were: treatment success defined as apnoea-hypopnoea index <1; treatment success defined as apnoea-hypopnoea index <5; mean change in apnoea-hypopnoea index from preoperative to postoperative polysomnogram for children without comorbidities; and mean change in apnoea-hypopnoea index from preoperative to postoperative polysomnogram for children with comorbidities.

Two reviewers independently performed study selection.

Assessment of study quality
The authors stated that study quality was assessed. Details on items assessed and results of the assessment were lacking.

Data extraction
Data were extracted in order to calculate the percentage of patients successfully treated (as defined per study) and 95% confidence intervals (CI) and calculate the mean change in apnoea-hypopnoea index from preoperative to postoperative polysomnogram and 95% CI.
The authors did not state how many reviewers performed data extraction.

**Methods of synthesis**
Success rates or mean change were combined in a random-effects model. Heterogeneity was assessed using the $I^2$ test. Publication bias was assessed using a funnel plot and Egger’s test.

**Results of the review**
Twenty-three studies were included in the review ($n=1,079$ patients, sample size ranged from 10 to 199 patients).

Overall treatment success rate (as defined per study) was $66.3\%$ (95% CI 57.5% to 74.1%; 23 studies). Treatment success rate defined as apnoea-hypopnoea index $<1$ was $59.8\%$ (95% CI 43.6% to 74.0%; nine studies). Treatment success rate defined as apnoea-hypopnoea index $<5$ was $66.2\%$ (95% CI 54.5% to 76.3%; 16 studies). There was evidence of statistically significant heterogeneity for all three measures of treatment success (84%, 92% and 83% respectively).

The mean change in apnoea-hypopnoea index was a decrease of 12.4 events per hour (95% CI 10.7 to 14.2; 23 studies). In children with no comorbidities, the mean change in apnoea-hypopnoea index was a decrease of 11.7 events per hour (95% CI not reported). In children with comorbidities, the mean change in apnoea-hypopnoea index was a decrease of 22.0 (95% CI not reported). The authors did not state whether or not these results were subject to statistically significant heterogeneity.

There was evidence of publication bias (Begg test ($p=0.01$), Egger's test ($p=0.0008$) and funnel plot asymmetry.

**Authors’ conclusions**
Paediatric sleep apnoea was often not cured by tonsillectomy and adenoidectomy. Although complete resolution was not achieved in most cases, tonsillectomy and adenoidectomy offered significant improvement in apnoea-hypopnoea index.

**CRD commentary**
The review addressed a clear research question. Inclusion criteria were adequate. The search was conducted in a limited number of databases, was restricted to English-language studies and there were no apparent attempts to locate unpublished material, so relevant studies may have been missed. This appeared to be the case as the authors found evidence of publication bias. No study quality assessment was performed and there were no details of the included studies designs; therefore, the reliability of the data could not be assessed. Study selection was reported to have been performed in duplicate, which reduced risks of reviewer error and bias. It was unclear how the process of data extraction was performed. Synthesis methods appeared to be appropriate. However, 95% confidence intervals were not reported for any of the subgroup analyses of mean change in apnoea-hypopnoea index from preoperative to postoperative polysomnograph and $I^2$ values were not reported for any of the analyses of mean change in apnoea-hypopnoea index from preoperative to postoperative polysomnogram. Therefore, the results for mean change in apnoea-hypopnoea index from preoperative to postoperative polysomnogram could not be interpreted.

The authors’ conclusions represented the evidence presented, but a lack of details of included study designs, lack of reporting on study quality assessment, incomplete reporting of results and presence of statistically significant heterogeneity made the reliability of the authors’ conclusions unclear.

**Implications of the review for practice and research**
**Practice:** The authors stated that tonsillectomy and adenoidectomy should be considered first-line therapy for most children with obstructive sleep apnoea/hypopnoea syndrome. However, if tonsillectomy and adenoidectomy was unsuccessful in curing or reducing symptoms of obstructive sleep apnoea/hypopnoea syndrome, additional treatment should be indicated.

**Research:** The authors stated that additional studies were needed that focused on individual patient variables that may predict success or failure and examine whether additional surgical procedures further improved polysomnogram
parameters in children.

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