



# Tonsillotomy in the treatment of obstructive sleep apnea syndrome in children: Polysomnographic results

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## KEYWORDS

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## Summary

**Introduction:** The therapy of choice in the treatment of pediatric obstructive sleep apnea syndrome (OSAS) consists of tonsillectomy or tonsillotomy combined with adenoidectomy. While tonsillectomy unfortunately has a notable risk of secondary hemorrhage and postoperative pain, tonsillotomy is safer and less painful for children. The effect of both surgical methods on symptoms of OSAS seems to be equal, but up to now postoperative polysomnographic data for children treated by tonsillotomy are missing.

**Materials and methods:** Twenty children aged 2–9 years (mean age:  $4.1 \pm 2.0$  years) with OSAS diagnosed by full-night polysomnography were included in the study. OSAS was defined as an apnea–hypopnea index (AHI) of 5 or more with minimum oxygen saturation ( $\text{SaO}_2$  min) of less than 90%. Exclusion criteria were obesity, craniofacial abnormalities or other pulmonary, cardiac or metabolic diseases as well as a history of recurrent tonsillitis. All children were treated by  $\text{CO}_2$  laser tonsillotomy and adenoidectomy. Three to 12 months (mean: 7.7 months) after the procedure a control-polysomnography was performed in all children.

**Results:** No statistically significant changes were seen in the pre- and postoperative distribution of sleep stages, sleep efficacy and total sleep time. The AHI decreased from  $14.9 \pm 8.7$  to  $1.1 \pm 1.6$  ( $p < 0.001$ ),  $\text{SaO}_2$  min increased from  $71.1 \pm 11.1\%$  to  $91.2 \pm 3.5\%$  ( $p < 0.001$ ). Thus, all children were cured by the operation.

**Discussion:** These polysomnographic data show that  $\text{CO}_2$  laser tonsillotomy in combination with adenoidectomy is highly effective in the treatment of pediatric OSAS

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and should be preferred over tonsillectomy because of less postoperative pain and a lower risk of postoperative bleeding.

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## 1. Introduction

The therapy of pediatric obstructive sleep apnea syndrome (OSAS) consists of the removal of hyperplastic lymphatic tissue of the oro- and nasopharynx. Only in rare exceptions are maxillofacial or orthodontic procedures [1], surgery of the tongue base or the larynx or even CPAP ventilation therapy [2] used. Until a few years ago, adenotonsillectomy was considered the golden standard therapy, as it cured OSAS in most cases [3]. This could be confirmed by polysomnographic results in numerous studies [4–8]. Tonsillectomy as a stand-alone procedure, however, proved to be less effective than adenotonsillectomy [7,9].

In the last 10 years tonsillotomy, the partial removal of the hyperplastic tonsils, in combination with adenoidectomy, has been gaining more and more significance and is being favoured over the classic tonsillectomy as a therapy for pediatric tonsillar hyperplasia by many authors [10–12]. Several comparative studies showed that tonsillotomy was associated with less postoperative pain and painkiller usage, a lower rate of secondary hemorrhage and a shorter recovery time than tonsillectomy [10,11,13]. The reason for this is thought to be that nerve fiber and blood vessel containing peritonsillar tissue can be spared. A further possible advantage is the preservation of immunocompetent tissue in remnant tonsils, which seems to be of use in the development of active immunisation in younger children, although this remains unclear [14–16]. The idea that scarring in remnant tonsils would lead to chronic tonsillitis and an increased recurrence of complications has since been disproved clinically and histologically [11,17,18]. Nevertheless, it should be mentioned that in up to 16% of all treated cases there occurs a regrowth of tonsillar tissue with reappearance of symptoms, which necessitates a second intervention [19]. Besides the frequently used CO<sub>2</sub> laser [20], there are several other tools at the ENT-surgeon's disposal for tonsillotomy, such as radiofrequency volume tissue reduction [10,21,22], the intracapsular microdebrider technique [23], the argon-assisted monopolar needle [24] or the coblation method [25].

The therapy of pediatric OSAS tonsillotomy consistently shows a positive and continuing effect regarding the disappearance of typical OSAS symptoms such as snoring, pauses in breathing, nocturnal sweating, abnormal sleeping posture or behaviour disorders. However, these parameters have only been assessed subjectively by questionnaires, visual analogue scales or by patient interviews [26]. Therefore, the aim of the present investigation was to objectively evaluate the effects of tonsillotomy combined with adenoidectomy in children with OSAS by polysomnography for the first time.

## 2. Materials and methods

### 2.1. Subjects

Between January 2006 and January 2008, 20 children (5 w, 15 m) aged 2–9 years (mean age  $4.1 \pm 2.0$  years) were included as subjects in this study. All children met the criteria of pediatric OSAS diagnosed by full-night polysomnography (see Section 2.2). Parents reported OSAS-typical symptoms as follows: all children snored and had pauses in breathing with increased thoraco-abdominal movements. In 12 of 20 children, parents reported nocturnal sweating. All children had a normal weight (BMI  $15.3 \pm 2.8$  kg/m<sup>2</sup>). Among the exclusion criteria were pulmonary, cardiac or metabolic diseases, craniofacial malformations and adiposity. Previous tonsillar surgery and recurring tonsillar infections were also considered as exclusion criteria. Upon ENT examination all children presented a tonsillar and adenoid hyperplasia.

CO<sub>2</sub> laser tonsillotomy and standard adenoidectomy were performed under general anesthesia after parental information and consent. 11/20 children received an additional tympanic paracentesis with or without the insertion of a drainage tube. CO<sub>2</sub> laser tonsillotomy was carried out in focussed mode at a power of 12–18 W in order to reduce the hyperplastic tonsillar volume protruding the palatal arches to the middle (Fig. 1). Minor hemorrhages were cauterized by bipolar coagulation. No secondary hemorrhaging occurred and all children were discharged on the third postoperative day.

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