HELPFUL REFERENCES

1. Pediatr Pulmonol. 2008 Sep;43(9):837-43.
Obstructive sleep disordered breathing in children: beyond adenotonsillectomy.

Praud JP, Dorion D.
Source

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Abstract
Traditionally, adenotonsillectomy (AT) has long been the treatment of choice for obstructive sleep disordered breathing (SDB) in children. AT is usually considered a safe procedure, which cures 80% of children with SDB. Accumulated data have however challenged this overly simplistic view. Indeed, AT is invariably associated with significant morbidity, post-operative pain, and a mortality rate which, though low, cannot be ignored. In addition, aside from a recurrence of SDB at adolescence in an unknown percentage of cases, some recent results suggest that complete SDB cure is not achieved in as much as 75% of cases after AT. Interestingly, several treatment options have been recently proposed for replacing or complementing AT. Continuous positive airway pressure (CPAP) is now suggested in children with remaining SDB after AT; however, compliance and suitability of equipment remain important hurdles, especially in small children and infants. Anti-inflammatory treatments, including nasal glucocorticoids and/or the anti-leukotriene montelukast, appear to hold great promise. Finally, orthodontic treatments are an appealing option, with recent results in children suggesting that it is possible to improve or perhaps even cure SDB in a durable manner by enlarging the nasal passages and/or the oropharyngeal airspace. In conclusion, while we are currently in the midst of an exciting time with several new treatments being developed for childhood SDB, randomized controlled trials are urgently needed to delineate their indications. In the meantime, it appears that systematic detection of orthodontic anomalies and better collaboration with maxillofacial specialists, including orthodontists and/or dentists, is needed for deciding the best treatment options for childhood SDB.

2. Sleep. 2004 Jun 15;27(4):761-6.

Rapid maxillary expansion in children with obstructive sleep apnea syndrome.

Pirelli P, Saponara M, Guilleminault C.
Source

Department of Odontological Sciences, University Tor Vergata, Rome Italy.

Abstract
OBJECTIVE:
To evaluate the effect of rapid maxillary expansion on children with nasal breathing and obstructive sleep apnea syndrome.

METHOD:
Recruitment of children with maxillary contraction, without adenoid hypertrophy, with a body mass index < 24 kg/m2, with obstructive sleep apnea syndrome demonstrated by polysomnography, and whose parents signed informed consent. Otolaryngologic and orthognathic-odontologic evaluation with clinical evaluation, anterior rhinometry and nasal fibroscopy, panoramic radiographs, anteroposterior and laterolateral telecephalometry were performed at entry and follow-up. Intervention: Rapid maxillary expansion (ie, active phase of treatment) was performed for 10 to 20 days; maintenance of device (for consolidation) and orthodontic treatment on teeth lasted 6 to 12 months.

RESULTS:
31 children (19 boys), mean age 8.7 years, participated in the study. The mean apnea-hypopnea index was 12.2 events per hour. At the 4-month follow-up, the anterior rhinometry was normal, and all children had an apnea-hypopnea index < 1 event per hour. The mean cross-sectional expansion of the maxilla was 4.32 +/- 0.7 mm. There was a mean increase of the pyriform opening of 1.3 +/- 0.3 mm.

CONCLUSION:
Rapid maxillary expansion may be a useful approach in dealing with abnormal breathing during sleep.

3. Angle Orthod. 1990 Fall;60(3):229-33; discussion 234.
Rapid maxillary expansion in the treatment of nocturnal enuresis.

Timms DJ.
Source

Oral Surgery Department, Royal Preston Hospital, United Kingdom.

Abstract
There is growing consensus that upper airway obstruction is a causative factor in nocturnal enuresis. This phenomenon has an unhappy history, although some surgeons in the past have touched on its treatment through the relief of upper airway obstruction. Only recently have sleep laboratory investigations presented a clearer, though still incomplete, picture of the etiology of nocturnal enuresis through disturbed sleep patterns. The obstruction is usually an adenoidal hypertrophy or, less commonly, an anterior nasal stenosis. While the otolaryngologist can readily cope with the former, surgical difficulties make treating the latter problematic. In many cases, the constriction can be reduced by rapid maxillary expansion. In the ten cases examined in this study, nocturnal enuresis ceased within a few months of maxillary expansion.

4. http://www.einstein.yu.edu/news/releases/771/kids-abnormal-breathing-during-sleep-linked-to-increased-risk-for-behavioral-difficulties/

Kid's Snoring Linked to Hyperactivity

5. http://abcnews.go.com/WNT/video/snoring-babies-sign-trouble-15853888

6. www.med.umich.edu/opm/newspage/2006/sleep.htm

April 3, 2006

Kids behave and sleep better after tonsillectomy, University of Michigan study finds

Hyperactivity, attention deficit, sleepiness, and ADHD often improved - whether or not sleep studies showed sleep apnea before surgery

7. Sleep Breath. 2012 Mar;16(1):23-9. Epub 2011 Jan 16.

Primary snoring in school children: prevalence and neurocognitive impairments.

Brockmann PE, Urschitz MS, Schlaud M, Poets CF.

Source

Working Group on Paediatric Sleep Medicine, Department of Neonatology, University Children's Hospital, University of Tuebingen, Tuebingen, Germany.

Abstract

PURPOSE:
We aimed to investigate the prevalence of primary snoring (PS) and its association with neurocognitive impairments.

METHODS:
Data from a community-based study in 1,114 primary school children were used to identify children who never (N = 410) or habitually snored (N = 114). In order to separate children with PS from those with upper airway resistance syndrome (UARS) or obstructive sleep apnoea (OSA), home polysomnography was conducted in all habitually snoring children. Neurocognitive impairments and poor school performance were compared between children who never snored, PS, and UARS/OSA.

RESULTS:
Polysomnography was successfully conducted in 92 habitual snorers. Of these, 69 and 23 had PS and UARS/OSA, respectively. Prevalence [95% confidence interval (95% CI)] of PS was 6.1% (4.5-7.7). Compared to children who had never snored, children with PS had more hyperactive (39% vs. 20%) and inattentive behaviour (33% vs. 11%), as well as poor school performance in mathematics (29% vs. 16%), science (23% vs. 12%), and spelling (33% vs. 20%; all P values <0.05). PS was a significant risk factor (odds ratio; 95% CI) for hyperactive behaviour (2.8; 1.6-4.8), inattentive behaviour (4.4; 2.4-8.1), as well as daytime sleepiness (10.7; 4.0-28.4). PS was also an independent risk factor for poor school performance in mathematics (2.6; 1.2-5.8), science (3.3; 1.2-8.8), and spelling (2.5; 1.1-5.5). Odds ratios throughout were similar to the UARS/OSA group.

CONCLUSIONS:
Children with non-hypoxic, non-apnoeic PS may exhibit significant neurocognitive impairments. Consequences may be similar to those associated with UARS or OSA. If

confirmed, PS is not "benign" and may require treatment. Children with non-hypoxic, non-apnoeic PS may exhibit significant neurocognitive impairments. Consequences may be similar to those associated with UARS or OSA. If confirmed, PS is not "benign" and may require treatment.

8. http://www.bristol.ac.uk/alspac/

9. Kid's Snoring Linked to Hyperactivity http://www.einstein.yu.edu/news/releases/771/kids-abnormal-breathing-during-sleep-linked-to-increased-risk-for-behavioral-difficulties/

10. How Children's Sleep Affects their Health and Well being

11. http://www.psychologytoday.com/em/4594

11. Snoring, mouth breathing, or apnea early in life may predict later behavioral and emotional problems, researchers found. http://www.medpagetoday.com/Pediatrics/GeneralPediatrics/31477 and the link to the abstract http://pediatrics.aappublications.org/content/early/2012/02/29/peds.2011-1402

12. **- Serving the Smallest Sleep Apnea Patients with CPAP Masks:** Ann Halbower MD Pulmonary Department at Children's Hospital Colorado Read More»