

## Abstract

**RATIONALE:** It has been shown that Maxillary Expansion (ME) improves sleep disordered breathing (SDB) in children. It has been shown that the respiratory scoring including oxygen desaturation or significant flow reduction could reduce detection of respiratory events (1,2). To evaluate the effectiveness of the ME, we compared the apnea-hypopnea index (AHI). The AHI-FL, which includes hypopneas associated to 2% oxygen desaturation and the AHI-3, which is based on the detection of Flow Limitation Events known to be equivalent to Respiratory Effort-Related Arousals (RERAs) (3).

**METHODS:** From 16 children diagnosed with SDB, we analyzed the first 10 consecutive patients who underwent the maxillary expansion polysomnography. A flow limitation event is defined as two or more breaths that had a flattened appearance on the inspiratory nasal cannula flow signal (1).

**RESULTS:** All patients (6 males) showed a decrease in the severity of clinical symptoms. The mean age was 12 ± 2 years. AHI-3 decreased of 22 % (from 47.6 to 36.4 per hour, p<0.05) whereas AHI-FL decreased of 16% (from 22.6 to 19.4 per hour, p<0.05).

**CONCLUSION:** Maxillary expansion improves SDB in children with high narrow palate and occlusal anomalies. The use of AHI-3 fails to detect respiratory events. Recognition of the whole spectrum of respiratory events is essential to evaluate accurately the effectiveness of treatment in children.

(1) Hagen CC et al. Hypopnea definitions VIII.4 and VIII.4.B fail to detect clinically significant nocturnal sleep apnea hypopnea syndrome in lean patients. Sleep volume 3, Abstract Supplement 2008.

(2) Haseleit JJ et al. Classification of sleep disordered breathing. Am J Respir Crit Care Med 2001; 163:398-405.

(3) Ayappa I et al. DM: Non-invasive detection of respiratory effort-related arousals (RERAs) by a nasal cannula/pressure transducer system. Sleep 2000; 23:763-771.

## Background

Maxillary Expansion (ME) is a proven treatment of Sleep Disordered Breathing (SDB) in children.

We have proposed the use of the nasal cannula to better score the non apneic respiratory events using a definition of hypopnea which requires no oxygen desaturation or EEG arousal. We have shown that we obtain similar results in detecting all respiratory events without EEG recording (1,2).

The AASM hypopnea definition still requires oxygen desaturation when the flow reduction of the nasal cannula signal is  $\geq 30\%$ . It has shown that adding 3 % oxygen desaturation fails to identify SDB in lean patients (3).

## Objective

- To evaluate the effectiveness of Maxillary Expansion in children diagnosed with SDB.

- To compare the consequences of different hypopnea definitions for the diagnosis and for treatment evaluation in children with clinical symptoms of SDB.

## Methods

16 consecutive patients (5 females) (mean age 13 years [6-19]) underwent pre and post-expansion respiratory polysomnography.

All patients presented for medical evaluation for parental report of snoring and clinical symptoms associates with SDB such as snoring, agitated sleep, fatigue, sleepiness, hyperactivity, attention deficit or low school performance.

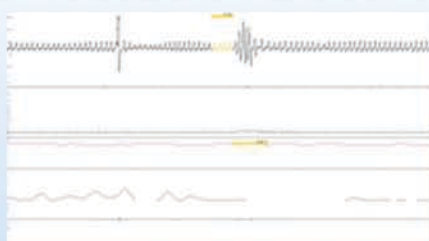
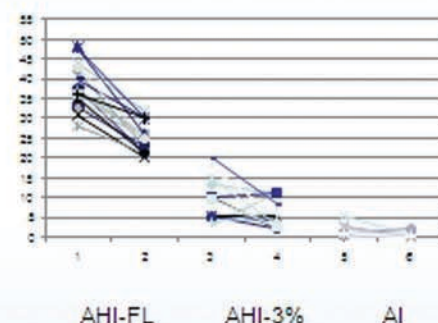
All patients had higher and narrower than expected hard palates and some degree of dental crowding.

Sleep studies were scored utilizing Flow Limitation (AHI-FL) and 3 % oxygen desaturation (AHI-3%) methods.

A flow limitation event is defined as two or more breaths that had a flattened appearance on the inspiratory nasal cannula flow signal (1,2).

## Results

N=16	PRE	POST	p
IAH-FL	39	25	<0.002
IAH-SaO2 3%	11	6	ns
IA	1.3	0.4	<0.05
Snoring	14	5	
Hyperactivity	13	3	
Attention deficit	14	4	



## Conclusions

Maxillary Expansion is effective in improving the majority of sleep-related respiratory disorder symptoms in children.

The use of AHI-3% fails to identify SDB in some children with clinical symptoms of SDB. This reduction of the AHI unacceptably reduces detection and treatment for patients with SDB.

The use of AHI-3% may result in an overestimation of the effectiveness of SDB treatments. With the AHI-FL method, most patients exhibit residual hypopnea indices after the orthodontic treatment.

## References

(1) Haseleit JJ, et al. Classification of sleep disordered breathing. Am J Respir Crit Care Med 2001; 163:398-405.

(2) Ayappa I, et al. DM: Non-invasive detection of respiratory effort-related arousals (RERAs) by a nasal cannula/pressure transducer system. Sleep 2000; 23:763-771.

(3) Hagen CC et al. Hypopnea definitions VIII.4.A and VIII.4.B fail to detect clinically significant obstructive sleep apnea hypopnea syndrome in lean patients. Sleep volume 3, Abstract Supplement 2008.