

# Non-Invasive Positive Pressure Ventilation (NPPV) for Sleep-Related Breathing Difficulties in Children with Early Onset Scoliosis

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# Background

- Children with EOS develop restrictive lung disease with low lung volumes that predispose them to hypoxemia during sleep.
- 90% of children with EOS have abnormal Apnea-Hypopnea (AHI) and Arousal Indices (AI) during sleep.\*
- The # of children with EOS and sleep-associated breathing disorders that merit nighttime treatment is not known.
- The effect of NPPV on breathing during sleep and sleep quality in this group of children has not been reported.



\*Striegl A. *Ped Pulm* 45(5):469-474, 2010.

# Methods

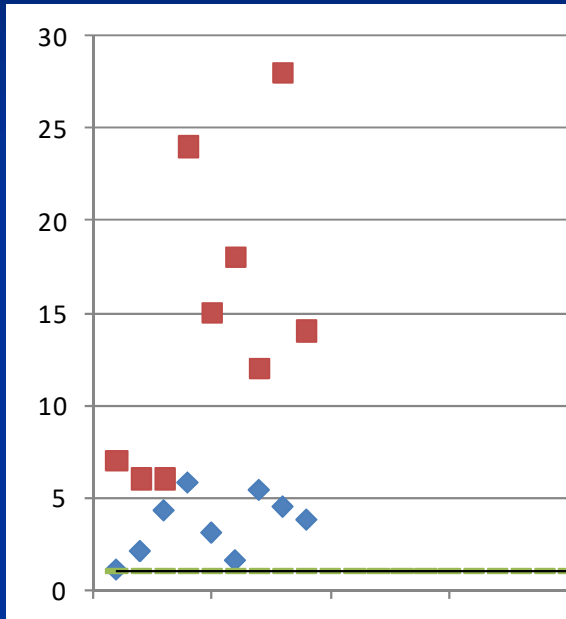
- Overnight polysomnograms (PSG) of 20 children with EOS were reviewed in order to:
  - 1) compare the AHI and AI Indices, the nadir SaO<sub>2</sub>, and end-tidal pCO<sub>2</sub> values in those treated and those not treated with NPPV at night (as decided by sleep specialists).
  - 2) compare the PSG results before and after NPPV was begun in 9 children with EOS.

# Patient Demographics

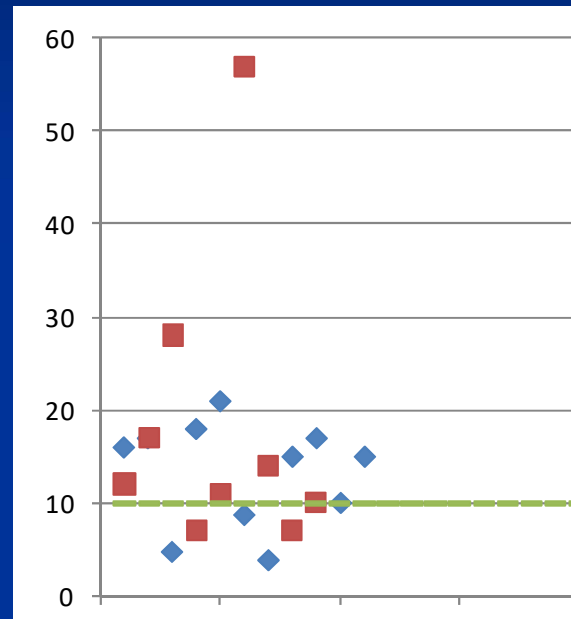
	Pts not Rx'd	Pts Rx'd
Number	11	9
Ages at initial PSG (yrs)	7.0 +/-2.5	9.3+/-5.6
Diagnoses		
-Congenital Scoliosis	1	3
-Infantile Scoliosis	4	1
-Neuromuscular Scoliosis	2	2
-Other (syndromes)	4	3
Cobb angle at PSG	68 +/-15	66+/-10
# surgically Rx'd before initial PSG	6/11	6/9
Duration of NPPV use (months)	--	24+/-16

# Results: PSG Values of Rx'd and Un-Rx'd Children with EOS

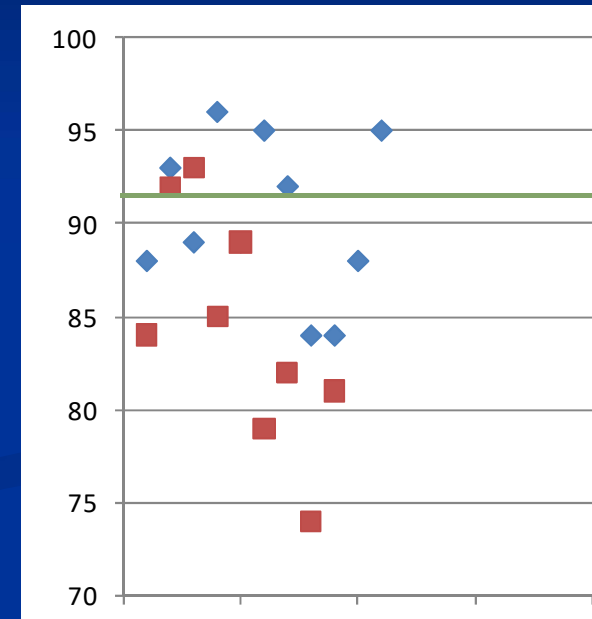
## AHI



## AI



## Nadir SaO<sub>2</sub>



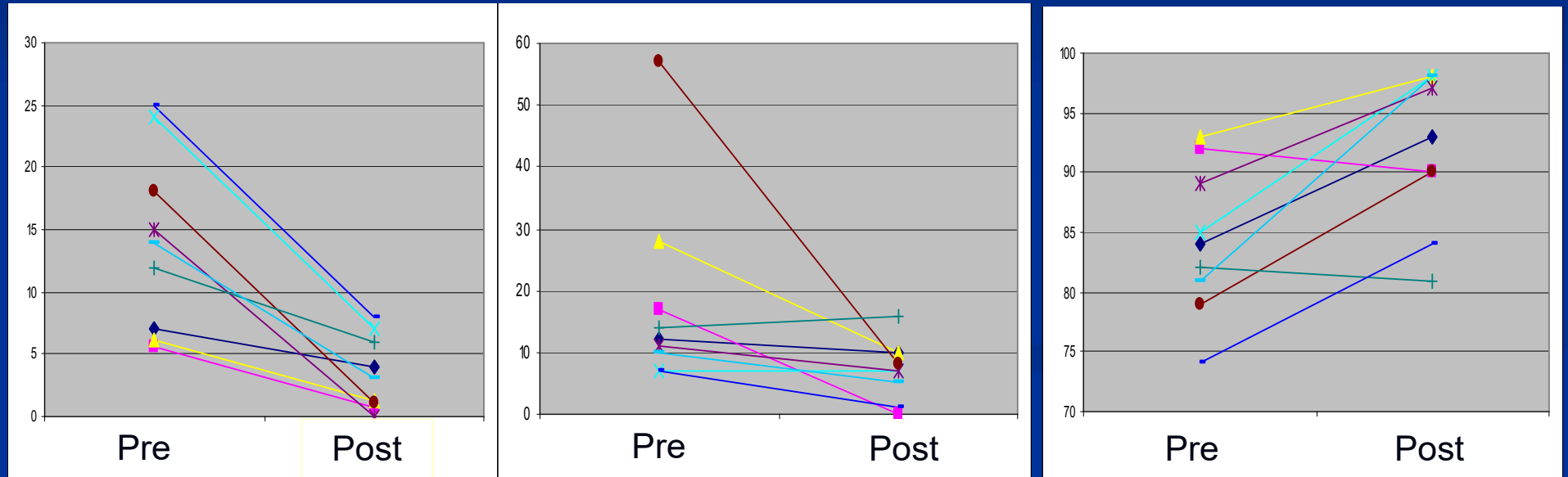
◆ Un-Treated  
■ Treated  
— NL

# Results: Changes in Sleep Indices After NPPV Use

AHI\*

AI\*

SaO<sub>2</sub>\*



\*Significant  $p < .05$  by paired t-test

# Conclusions

- Patients with EOS, including those who have received surgical treatment, have frequent arousals and nighttime hypoxemic events. 40% received NPPV treatment in this small series.
- NPPV normalized hypopneas and hypoxemic events at night but did not alter pCO<sub>2</sub> values.
- NPPV is a useful adjunctive Rx to improve sleep in children with EOS, either before and/or after surgical treatment is initiated.