Pulmonary Function and EDF Casting – A Follow-Up Study

Authors & Disclosures

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- **Disclosures submitted**

Introduction

- While EDF Casting for Early Onset Scoliosis (EOS) has gained popularity and acceptance, little is known about the effects of the cast on pulmonary function
- Pulmonary function changes were studied during the application of EDF Casts for EOS
- Preliminary study was presented at IMAST 2012, Istanbul.
- A follow-up study with findings from a consecutive series of patients treated by the same surgeon and anesthesiology protocol is being reported

Methods

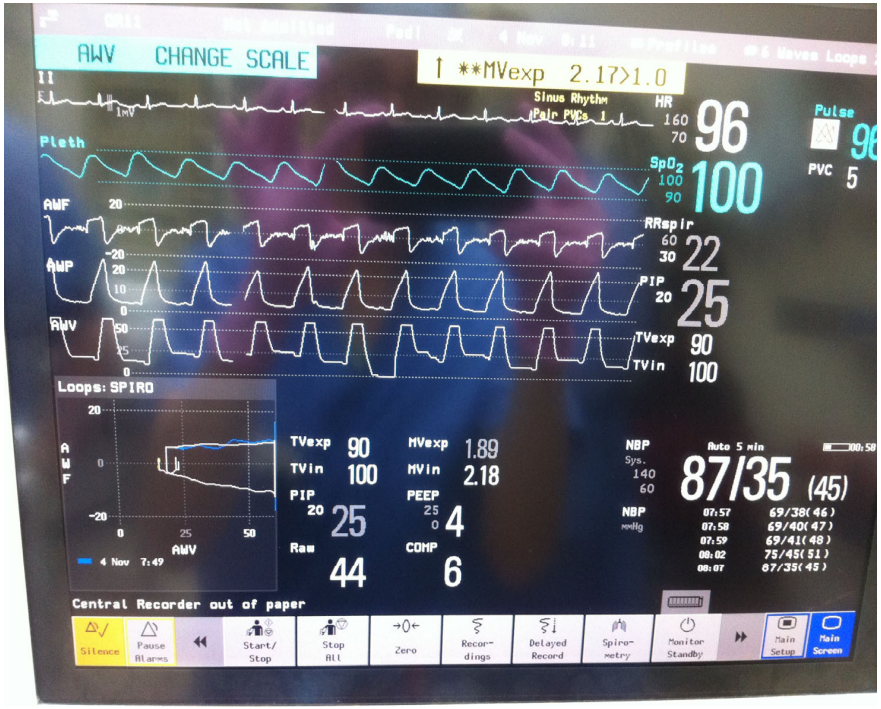
- 16 children (8 months to 9 years) with EOS were treated with EDF Casting under general endotracheal anesthesia using a standard protocol by one Pediatric Orthopaedic Surgeon.
- Measurements of compliance, tidal volume, airway resistance, and peak inspiratory pressure were made using a Philips M1014A Spirometry Module and Philips Healthcare Airway Flow Sensor

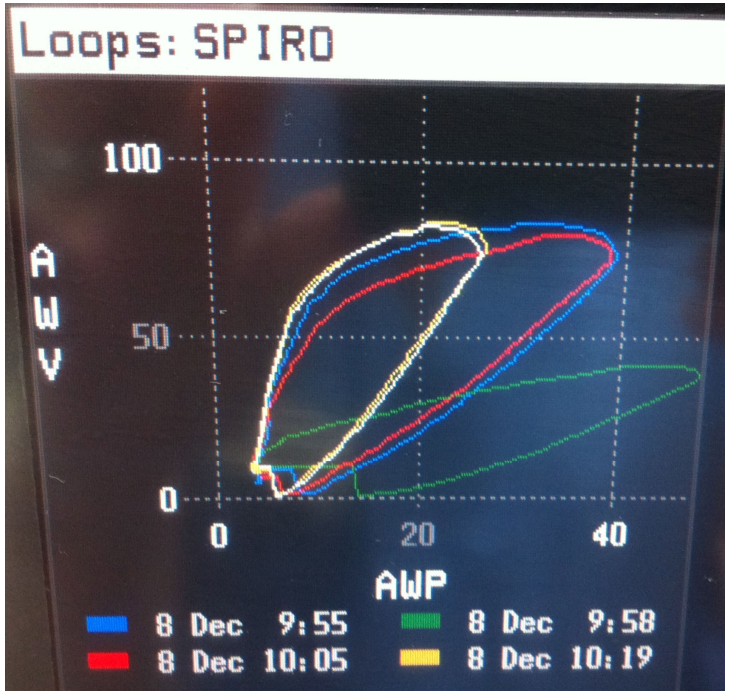
Methods

- Measurements were obtained
  - after intubation
  - before and after prior cast removal (baseline)
  - before and after spine traction
  - after cast application, and
  - out of traction after cast windows had been removed

Casting Setup

Philips M1014A Spirometry Module





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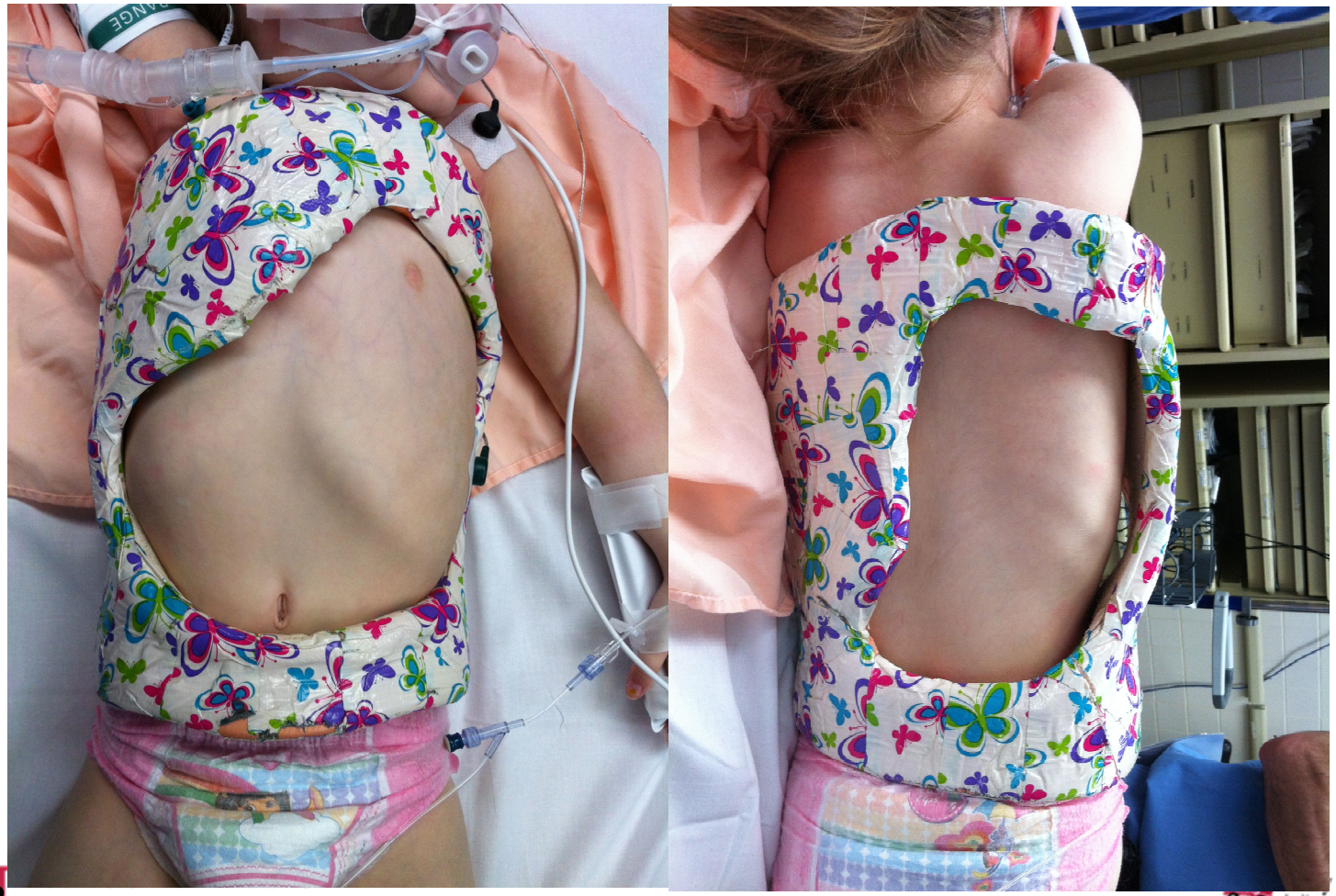
My casts……



Results

- Curves ranged from 18 to 87 degrees, with a percent curve correction from 25% to 62% (an average of 40%)
- Results were studied as percent deviations from the baseline (defined as 100%)
- Compliance had the greatest decline, decreasing to 16% of baseline after cast application before returning to 62% of baseline after windows were cut

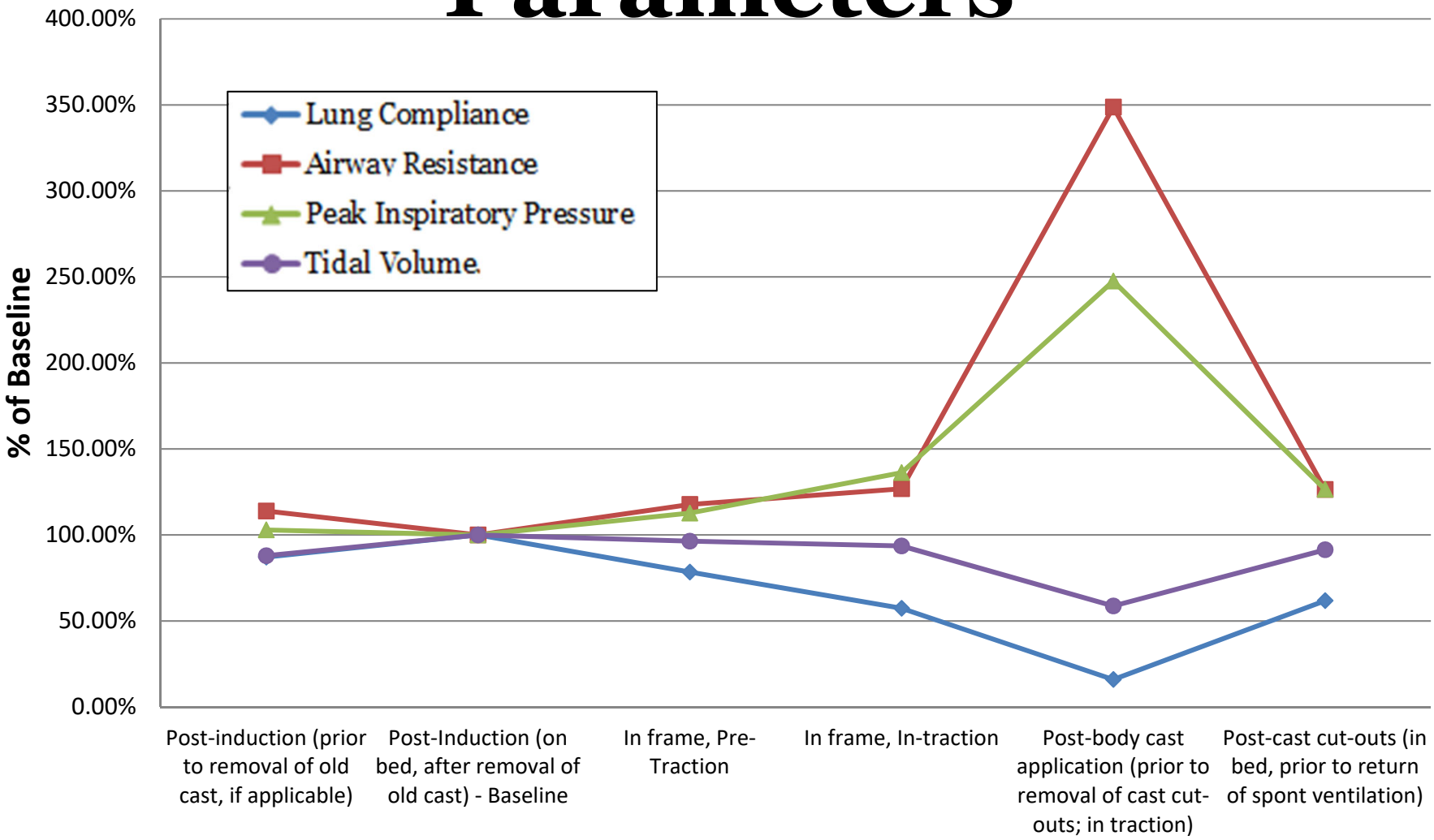
Results

- Peak inspiratory pressure increased to 247% after casting and returned to 26% above baseline after the windowing
- Airway resistance increased to 349% with cast application before improving to 26% above baseline following cast cutouts
- Tidal volume decreased by 42% with casting, improving to 91% of baseline with windowing

Pulmonary Function Parameters

	Lung Compliance		Airway Resistance		Peak Inspiratory Pressure		Tidal Volume	
	(ml/cm H_2O)	% of baseline	(cmH_2O/L/s)	% of baseline	(cmH_2O)	% of baseline	(ml)	% of baseline
Post-induction (prior to removal of old cast, if applicable)	16.15	87.10%	30.08	113.89%	17.31	102.91%	126.54	87.93%
Post-Induction (on bed, after removal of old cast) - **Baseline**	18.55	100.00%	26.41	100.00%	16.82	100.00%	143.91	100.00%
In frame, Pre-Traction	14.55	78.43%	31.09	117.73%	18.95	112.70%	138.73	96.40%
In frame, In-traction	10.64	57.35%	33.50	126.85%	22.91	136.22%	134.68	93.59%
Post-body cast application (prior to removal of cast cut-outs; in traction)	2.95	15.93%	92.09	348.71 %	41.64	247.57%	84.50	58.72%
Post-cast cut-outs (in bed, prior to return of spontaneous ventilation)	11.45	61.76%	33.38	126.40 %	21.27	126.49%	131.5 0	91.38%

Pulmonary Function Parameters



Conclusions

- Decreases in compliance and tidal volume, as well as the increases in peak inspiratory pressure and airway resistance, while intuitive, have been reported earlier this year in a smaller cohort of patients
- This is the largest series of patients to date reporting on these changes
- Interestingly, in six patients who returned for casting, these parameters measured at the second casting had returned to normal/improved
- The long-term effects of these transient abnormal pulmonary parameters is unknown at this time, but further study with longitudinal follow-up of these patients is under way

Thank you!