



School of Medicine

Cerebral Palsy and 90-Day Respiratory and Airway Complications After Pediatric Scoliosis Fusion: A TriNetX Cohort Study

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Background

- Cerebral palsy (CP) is a common neurodevelopmental disorder often associated with neuromuscular scoliosis, particularly in patients with severe motor impairment.
- Progressive scoliosis in CP often requires spinal arthrodesis to improve posture, seating tolerance, comfort, and quality of life.
- Children with CP have baseline pulmonary vulnerability, including reduced ventilatory reserve, impaired airway clearance, abnormal respiratory mechanics, and increased aspiration risk.
- These respiratory limitations, combined with the physiologic stress of spinal arthrodesis, place CP patients at higher risk for perioperative pulmonary complications.
- Prior studies suggest increased complications in CP but are often limited by small sample size or single-center design.
- Large-scale comparative data evaluating postoperative respiratory and critical care outcomes in scoliosis patients with vs. without CP remain limited, highlighting the need for improved risk characterization and perioperative planning.

Study Objective

To compare 90-day postoperative respiratory complications after spinal arthrodesis for scoliosis in pediatric patients with vs. without cerebral palsy.

Methods

- Design: Retrospective cohort study
- Data source: TriNetX federated electronic health record network
- Population: Pediatric patients undergoing spinal arthrodesis for scoliosis
- Cohorts: CP with scoliosis vs. scoliosis without CP
- Index event: Spinal arthrodesis procedure
- Outcomes (90 days): Prolonged mechanical ventilation (>96 hrs), pneumonia, atelectasis, tracheostomy
- Analysis: Event rates, absolute risk differences, p-values
- IRB: UC Riverside IRB exempt

Results

	Prolonged Mechanical Ventilation	Postoperative Pneumonia	Atelectasis	Tracheostomy Placement
CP Patients	4.021%	7.507%	8.311%	9.562%
Non-CP Patients	0.812%	1.431%	2.520%	2.307%
Risk Difference	3.209 points	6.076 points	5.791 points	7.255 points
P-value	<0.0001	<0.0001	<0.0001	<0.0001

Table 1. Perioperative outcomes in scoliosis patients with vs. without cerebral palsy. Patients with CP had significantly higher rates of prolonged mechanical ventilation, pneumonia, atelectasis, and tracheostomy ($p < 0.05$).

Conclusions and Limitations

- Cerebral palsy is associated with a significantly increased risk of postoperative respiratory and critical care complications after scoliosis surgery.
- CP patients represent a high-risk subgroup requiring targeted perioperative planning.
- Findings suggest need for:
 - Planned ICU monitoring
 - Early pulmonary optimization
 - Opioid-sparing multimodal analgesia to reduce ventilatory compromise
- Future studies should evaluate standardized perioperative pathways to reduce pulmonary morbidity and tracheostomy rates.
- **Limitations:** Retrospective EHR design limits causal inference and lacks detailed clinical variables (e.g., CP severity, scoliosis severity, pulmonary function).

Contact

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