Risk of UPROR Increases with Increased Curve Correction After Fusion in Severe Syndromic and Neuromuscular Early Onset Scoliosis

Alondra Concepcion-Gonzalez BA, Christina C. Rymond BA, Kevin Lu MA, Rishi Sinha MD, Theodore Quan MD, Hiroko Matsumoto PhD, Afrain Z. Boby MS, Prakash Gorroochurn PhD, Amer Samdani MD, Lindsay Andras MD, Mark Erickson MD, Purnendu Gupta MD, Joshua Pahys MD, Michael G. Vitale MD MPH, Benjamin D. Roye MD MPH, Pediatric Spine Study Group

1 Background & Research Gap

- Maximal intraoperative correction ≠ best outcomes clinically
- Anecdotally → greater intraoperative correction in severe syndromic & neuromuscular (NM) patients yields greater complications

J Pediatr Orthop. 2022 Aug 1;42(7):372-375. doi: 10.1097/BPO.0000000000002155. Epub 2022 Jun 17.

Degree of Postoperative Curve Correction Decreases Risks of Postoperative Pneumonia in Patients Undergoing Both Fusion and Growth-friendly Surgical Treatment of Neuromuscular Scoliosis

Sonya B Levine [1], Michael W Fields, Afrain Z Boby, Hiroko Matsumoto, Kira F Skaggs, Benjamin D Roye, Michael G Vitale

- Curve correction ≥50% in NM EOS patients had decreased risk of post-op pneumonia
- *Do greater intraoperative corrections yield greater complications?*
- *Is there a threshold for optimal correction?*

2 Study Purpose

- Investigate association between amount of surgical correction and risk of Unplanned Return to the OR (UPROR) in Syndromic or Neuromuscular Scoliosis Patients with Curves ≥90°

3 Study Design

Retrospective cohort → syndromic or neuromuscular scoliosis patients with preoperative Major curves ≥90°

↓

% correction from pre- to post-fusion

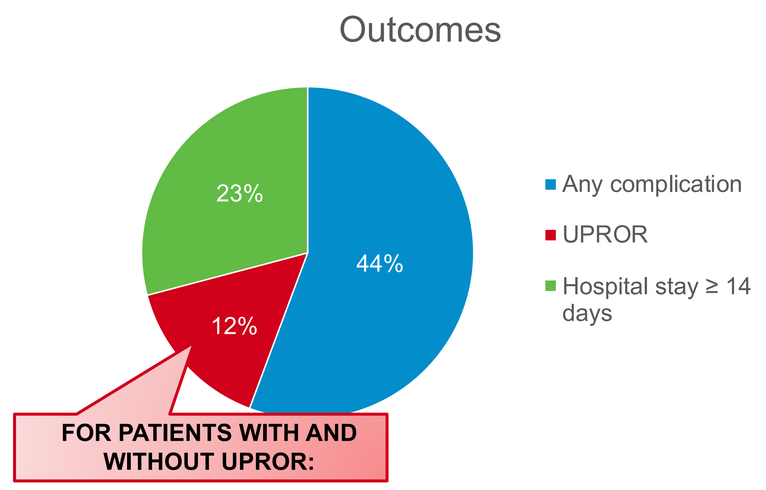
↓

OUTCOMES: UPROR + hospital length of stay ≥2 weeks + postoperative complications

4 Results

102 patients

12% UPROR
23% hospital LOS ≥2 weeks
44% any postoperative complication



Preoperatively no associations in…
Age (*p*=0.872)
Major Cobb (*p*=0.237)
T1-S1 height (*p*=0.882)
Sagittal kyphosis (*p*=0.789)

Operatively no associations in…
Procedure time (*p*=0.126)
Estimated blood loss (*p*=0.478)
Transfusion status (*p*=1.00)

Postoperatively no associations in…
% major Cobb correction (*p*=0.932)
% sagittal kyphosis correction (*p*=0.767)
ICU LOS (*p*=0.552)
Hospital LOS (*p*=0.961)

Significant differences in…

1) BMI (p=0.029)
- 77% of patients with UPROR were either overweight or obese
- 90% of patients without UPROR were either underweight or normal

2) Post-fusion complication (p<0.043)
- 100% of patients with UPROR had complications
- 37% of patients without UPROR had complications

Conducted threshold analysis on % curve correction → **65% curve correction determined to be key threshold for this study**

102 patients
12% UPROR
23% hospital LOS ≥2 weeks
44% had any complication

PREDICTING UPROR WITH GENERAL LINEAR MODELING

Overall Model of Fit		
Our statistically significant model accounts for 45.9% of variances (R^2=0.459, p<0.001)		
Main Effects		
Variable	**P-Value (α<0.05)**	**Conclusion**
BMI	= 0.042*	Significant Predictor
Post-Fusion Complication (PFC)	< 0.001**	Significant Predictor
65% Cobb Correction	= 0.087	Non-Significant Predictor
Interactive Effects		
65% Correction & BMI	= 0.026*	Significant Predictors
65% Correction & PFC	= 0.03*	Significant Predictors
BMI & PFC	= 0.6	Non-Significant Predictors

102 patients
12% UPROR
23% hospital LOS ≥2 weeks
44% had any complication

PREDICTING HOSPITAL LOS USING GENERAL LINEAR MODELING

Overall Model of Fit		
Our statistically significant model accounts for 44.4% of variances (R^2=0.444, p<0.001)		
Main Effects		
Variable	**P-Value (α<0.05)**	**Conclusion**
Prior Surgical Treatment	= 0.023*	Significant Predictor
BMI	= 0.47	Non-Significant Predictor
65% Cobb Correction	= 0.132	Non-Significant Predictor
Interactive Effects		
Prior Surgical Treatment & BMI	= 0.036*	Significant Predictors
65% Cobb Correction & Prior Surgical Treatment	= 0.858	Non-Significant Predictors
65% Cobb Correction & BMI	= 0.308	Non-Significant Predictors

102 patients
12% UPROR
23% hospital LOS ≥2 weeks
44% had any complication

PREDICTING POST-FUSION COMPLICATIONS WITH GENERAL LINEAR MODELING

Overall Model of Fit		
Our statistically significant model accounts for 23.9% of variances (R^2=0.459, p<0.003)		
Main Effects		
Variable	**P-Value (α<0.05)**	**Conclusion**
Weight	0.023*	Significant Predictor
65% Cobb Correction	0.136	Non-Significant Predictor

5 Conclusion

Based on univariate predictive modeling…
for patients with UPROR, significant predictors were BMI & postoperative complications individually AND 65% correction + BMI / 65% correction + post-op complications combined
for patients with hospital LOS ≥2 weeks, significant predictors were prior surgery individually AND prior surgery + BMI combined
for patients with any complication, significant predictor was weight individually

Key limitations → small sample size, only 12 patients with UPROR

COLUMBIA | COLUMBIA UNIVERSITY IRVING MEDICAL CENTER

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC