

Predicting Critical Care Unit-Level Complications After Long-Segment Fusion Procedures for Adult Spinal Deformity

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Introduction

Adult spinal deformity (ASD) surgery carries the risk of major postoperative complications. The purpose of this study is to identify predictive factors for critical care unit-level complications (CCU complication) after long-segment fusions for ASD.

Methods

The United States Nationwide Inpatient Sample (2002 – 2011) was reviewed. Only adult patients who underwent fusion of 8 or more spinal levels for ASD were included. CCU complications included spinal cord/nerve root injury, reintubation, pulmonary insufficiency requiring mechanical ventilation, continuous invasive mechanical ventilation, postoperative shock, acute renal failure necessitating dialysis, iatrogenic stroke, pulmonary embolism, cardiac arrest, new heart failure, and/or myocardial infarction. A stepwise multivariate regression was used to identify independent predictors of CCU complications, with results presented as odds ratios (OR) with 95% confidence intervals (CI).

Scoring system for predicting CCU complications after long-segment fusion procedures for adult spinal deformity

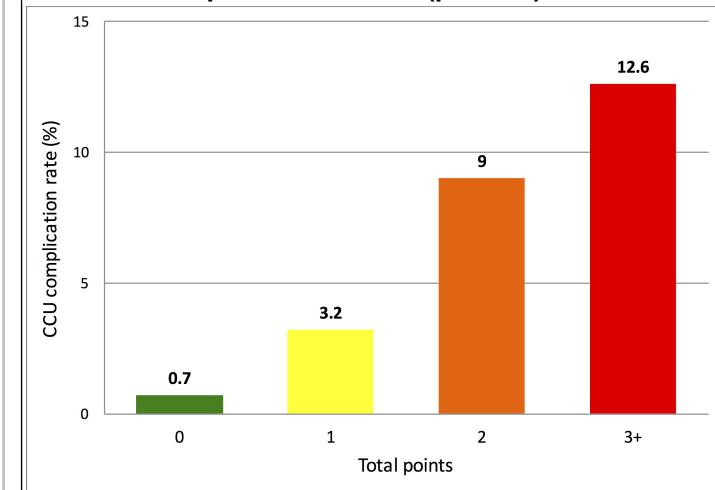
Component	Points
Dependent functional status	2 points if yes
Age	0 points if age <50 1 point if age 50 – 70 2 points if age >=70
Diabetes	1 point if yes
Combined approach	1 point if yes
Surgery > 8 hours	1 point if yes

Score ranges from 0 to 7

Results

Among 2,095 patients, the rate of CCU complications was 10.5%. On multivariate regression analysis, increasing age (OR 1.02; 95% CI, 1.01 – 1.03; $p < 0.001$), coagulopathy (OR 2.61; 95% CI, 1.90 – 3.59; $p < 0.001$), pulmonary circulation disorders (OR 4.22; 95% CI, 2.21 – 8.07; $p < 0.001$), and motor weakness (OR 4.18; 95% CI, 2.30 – 7.58; $p < 0.001$) were independent predictors of CCU complications. A scoring system was developed to predict complications with 0 points for patients aged <55, 1 point for patients between 56 – 74, 2 points for patients 75 or over, 1 point for coagulopathy, 2 points for pulmonary circulation disorders, and 2 points for weakness. The rates of CCU complications was 4.3%, 7.4%, 14.6%, 26.4%, and 36.2% for patients with 0, 1, 2, 3, and 4+ points, respectively ($p < 0.001$).

Complication rates based on total points in the predictive model ($p < 0.001$)



Conclusions

The findings in this study suggest that older patients, patients with coagulopathy, pulmonary circulation disorders, or preoperative motor weakness are at a significantly increased risk of developing a CCU-level complication after adult scoliosis surgery.

Learning Objectives

1. Learn the estimated rate of critical care unit-level complications after adult deformity surgery
2. Identify factors associated with complication occurrence