

Impact of Iron Deficiency Anemia on Postoperative Outcomes of Thoracolumbar Spinal Fusion (≥2-level) on Patients with Adult Spinal Deformity with Minimum 2-Year Follow-Up Surveillance

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INTRODUCTION: Iron deficiency anemia (IDA) is a common hematological disorder and cause of low hemoglobin. Preoperative anemia has been shown to increase the risk of adverse outcomes after posterior cervical fusion and other spinal surgery. The need for a transfusion during lumbar fusion has been shown to increase length of stay. The impact of IDA on outcomes after spinal fusion for adult spinal deformity (ASD) is unknown. This retrospective review study sought to compare outcomes and complication rates between ASD patients with and without IDA undergoing 2+ level spinal fusion.

METHODS: NY SPARCS was queried from 2009-11 to identify all patients undergoing ≥2-level thoracolumbar spinal fusion (primary and revision) for ASD with 2-year follow up. Patients were then stratified by the presence (IDA) or absence (no-IDA) of IDA. IDA and no-IDA were 1:1 propensity score-matched based on age, sex, and obesity. Univariate analysis compared demographics, hospital parameters, and rates of adverse outcomes. Multivariate binary logistic regression was used to identify independent predictors of adverse outcomes.

RESULTS: A total of 524 patients (262 IDA and 262 no-IDA) were identified. There was no difference in age (56.8 vs. 56.8 years), sex (79.8% vs. 79.8% female), or obesity (13.0% vs. 13.0%), all p=1.0. IDA patients had higher hospital cost (\$95,673 ± 69,060 vs. \$59,537 ± 39,753) and LOS (6.0 ± 4.4 vs. 4.0 ± 4.3 days), all p<0.001. IDA patients experienced higher rates of overall surgical complications (50.4% vs. 23.7%, p<0.001), wound complications (3.4% vs. 0.4%, p=0.011), and blood transfusion (10.3% vs. 6.5%, p<0.001) (Table 1). There was no difference in the rate of overall medical complications. IDA and no-IDA had comparable rates of readmission (8.0% vs. 13.0%, p=0.064), though IDA had lower rates of reoperation (7.6% vs. 13.0%, p=0.044). There was no mortality in either cohort. IDA independently was associated with wound complications (OR=10.6 [1.3 – 86.5], p=0.028), blood transfusion (OR=3.9 [1.3 – 86.5], p<0.001), and surgical complications (OR=3.5 [2.4 – 5.2], p<0.001) (Table 2).

DISCUSSION AND CONCLUSION: Baseline IDA was predictive of increased wound complications, postoperative blood transfusion, and overall surgical complications following ASD surgery. This data can be used to better optimize and risk stratify patients prior to surgery.

Postoperative Outcome	No IDA N (%)	Yes IDA N (%)	P-Value
Surgical Complications (any)	62 (23.7%)	132 (50.4%)	< 0.001
Wound	1 (0.4%)	9 (3.4%)	0.011
CNS	0 (0.0%)	1 (0.4%)	0.317
Dural Tear	1 (0.4%)	1 (0.4%)	1.000
Transfusion of blood	50 (19.1%)	120 (45.8%)	< 0.001
Medical Complications (any)	17 (6.5%)	27 (10.3%)	0.115
Acute myocardial infarction	2 (0.8%)	8 (3.1%)	0.055
Pneumonia	4 (1.5%)	3 (1.1%)	0.704
Gastrointestinal	2 (0.8%)	3 (1.1%)	0.653
Urinary tract infection	1 (0.4%)	3 (1.1%)	0.315
Acute renal failure	7 (2.7%)	8 (3.1%)	0.793
Sepsis	0 (0.0%)	1 (0.4%)	0.317
Pulmonary embolism	1 (0.4%)	2 (0.8%)	0.563
Deep venous thrombosis	1 (0.4%)	1 (0.4%)	1.000
Cerebrovascular event	2 (0.8%)	0 (0.0%)	0.157
Reoperation	34 (13.0%)	20 (7.6%)	0.044
Readmission any	34 (13.0%)	21 (8.0%)	0.064
Mortality (Hospitalization)	0 (0.0%)	0 (0.0%)	-

Table 1. Impact of IDA on Rate of Postoperative Outcomes on ASD Patients Undergoing Thoracolumbar Spinal Fusion (≥2-level)

Variables	OR [CI] (Crude)	P	OR [CI] (Adjusted)	P
Surgical Complications	3.3 [2.3 – 4.8]	< 0.001	3.5 [2.4 – 5.2]	< 0.001
Wound	9.3 [1.2 – 73.8]	0.035	10.6 [1.3 – 86.5]	0.028
CNS	-	0.995	-	0.992
Dural Tear	1.0 [0.1 – 16.1]	1.000	1.2 [0.1 – 20.4]	0.893
Transfusion of blood	3.6 [2.4 – 5.3]	< 0.001	3.9 [2.6 – 6.0]	< 0.001
Medical Complications	1.7 [0.9 – 3.1]	0.118	1.5 [0.8 – 3.0]	0.200
Acute myocardial infarction	4.1 [0.9 – 19.5]	0.076	4.0 [0.8 – 19.7]	0.086
Pneumonia	0.7 [0.2 – 3.4]	0.705	0.3 [0.1 – 2.0]	0.229
Gastrointestinal	1.5 [0.3 – 9.1]	0.655	1.4 [0.2 – 9.3]	0.731
Urinary tract infection	3.0 [0.3 – 29.3]	0.339	4.0 [0.4 – 39.1]	0.239
Acute renal failure	1.1 [0.4 – 3.2]	0.793	1.1 [0.3 – 3.4]	0.884
Sepsis	-	0.995	-	0.995
Pulmonary embolism	2.008 [0.181 – 22.277]	0.570	2.7 [0.2 – 30.9]	0.424
Deep venous thrombosis	1.0 [0.1 – 16.1]	1.000	4.4 [0.1 – 142.4]	0.409
Cerebrovascular event	-	0.995	-	0.993
Reoperation	0.6 [0.3 – 1.0]	0.047	0.5 [0.3 – 1.0]	0.046
Readmission any	0.6 [0.3 – 1.0]	0.1	0.541 [0.3 – 1.0]	0.045
Mortality (Hospitalization)	-	-	-	-

Table 2. Impact of IDA on Risk of Postoperative Outcomes on ASD Patients Undergoing Thoracolumbar Spinal Fusion (≥2-level)