# A Novel Clinical Calculator to Identify Patients at Risk for Ileus after Short-Segment Lumbar Fusion

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INTRODUCTION:

Short-segment lumbar fusion is an increasingly common operation. Post-operative ileus is a common complication that can increase length of stay and hinder recovery. This study aimed to identify risk factors for ileus after short-segment lumbar fusion and create a clinical calculator for risk stratification. This study aimed to identify risk factors for ileus after short-segment lumbar fusion and create a clinical calculator for risk stratification.

METHODS:

584 patients who underwent primary, 1- or 2-level primary lumbar fusion utilizing any approach (anterior, lateral, posterior) or technique (open, minimally invasive, hybrid) were included. Ileus was defined as the presence of an abdominal XR or administration of methylnaltrexone. Univariate analyses were performed via Pearson's Chi-squared or Fisher's exact tests. Machine learning model with best fit and features applied to this cohort to identify predictive risk factors. Outcomes of interest from this model then utilized to create a binary nomogram for clinical risk stratification.

RESULTS:

Using our novel marker for low-grade ileus, we identified 25 (4.3%) patients with ileus. Univariate analysis identified numerous risk factors for ileus. Upon multivariable analysis, surgical technique (open vs. MIS) was found to be a colinear variable but not an independent risk factor. Our machine learning model identified 7 binary patient characteristics that were predictive of ileus: 1) BMI <29 or >41, 2) anterior approach, 3) operative time >127 minutes, 4) EBL >110mL, 5) pre-operative SF-12 mental score ≤41, 6) VAS-Back score 5-9, and 7) CCI >3. Together this model predicted ileus with a high degree of accuracy (AUC:0.85, Sensitivity:0.72, Specificity:0.85, McNemar's P-Value:2.31e-21).

DISCUSSION AND CONCLUSION:

This study created a novel clinical calculator that accurately predicts post-operative ileus after short-segment lumbar fusion. We recommend utilization of this calculator peri-operatively to identify high risk patients so that prophylactic intervention can be taken to prevent development of ileus. These low-cost interventions can decrease the incidence of ileus, decrease LOS, and improve outcomes after short-segment lumbar fusion.
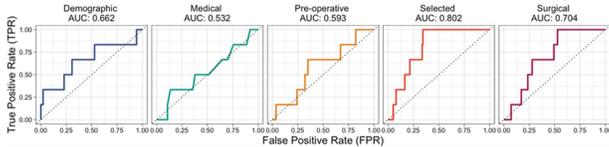


| Clinical Calculator for Risk of Ileus | |
|---|---|
| **BMI:** | |
| 29-41 | +0 |
| <29 or >41 | +10 |
| **Surgical Approach:** | |
| Posterior/Lateral | +0 |
| Anterior | +10 |
| **Operative Time:** | |
| ≤127 min | +0 |
| >127 min | +8 |
| **Pre-op SF-12 Mental Score** | |
| >41 | +0 |
| ≤41 | +4 |
| **EBL** | |
| ≤110 | +0 |
| >110 | +4 |
| **Pre-op VAS-Back Score** | |
| <5, 10 | +0 |
| 5-9 | +3 |
| **CCI Score** | |
| ≤3 | +0 |
| >3 | +1 |
| **Total:** | |
| *If Total ≥25, High Risk for Ileus | |