

Intraoperative Neuromonitoring in Transforaminal Lumbar Interbody Fusion Increases Costs without Protecting Against Adverse Outcomes in a Propensity Score Matched National Sample

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INTRODUCTION: Intraoperative neuromonitoring (IONM) is sometimes used during transforaminal lumbar interbody fusion (TLIF) to limit the risk of neurological damage. While IONM is common in TLIF, the literature is inconclusive on the protective effect of IONM against complications. Additionally, there is a paucity of literature on the true costs of IONM in TLIF. This study uses a national cohort to compare the costs and outcomes between patients undergoing TLIF with or without IONM.

METHODS: Using the Premier Healthcare database, patients undergoing TLIF between January 2016 and December 2020 with and without IONM were included. Patients who received IONM during TLIF were 1:1 propensity score matched with patients who did not based on demographics, Elixhauser comorbidities, indications for surgery, multilevel surgery, surgery length of stay, and inpatient/outpatient status. Hospital costs were categorized (implants, labor, room/board) and adjusted to 2023 dollars. Yearly average costs over the study period were assessed in IONM and non-IONM groups. Two-year revision rates, 30-day readmissions, two-year post-operative neurological complication, and two-year post-operative hemi/paraplegia were evaluated using Kaplan-Meier and multivariate Cox-Proportional Hazard (CoxPH) models. A subgroup analysis of these outcomes were performed for patients presenting with radiculopathy or myelopathy.

RESULTS: 26,074 patients underwent TLIF performed with IONM in the study period. After 1:1 matching, age, gender, inpatient %, elixhauser comorbidities, and indications for surgery did not differ significantly. Average surgical encounter costs were greater in the IONM group (\$43,841.20 vs \$40,033.80), driven by \$1,319 spent on IONM and 8.6% (\$697.13) more spent on operating room time (Figure 1). Between 2016 and 2022, IONM and non-IONM prices have diverged significantly (Figure 2). In 2016, prices between each group were not significantly different, but have steadily increased in IONM group while falling in the non-IONM group (Figure 2). In the CoxPH models, IONM usage does not significantly change the hazard of 2-year revision ($p = 0.773$), 30-day readmission ($p=0.277$), 2-year post-neurosurgical complication ($p=0.377$), or 2-year post-operative hemi/paraplegia ($p=0.253$) (Figure 3). In radiculopathy and myelopathy patients, there is also a lack of statistically significant protective effect.

DISCUSSION AND CONCLUSION:

IONM usage in TLIF is associated with greater costs and no difference in outcomes in this large, propensity score matched, national analysis. The growing costs of IONM over time shown in this study is concerning and requires further investigation into the drivers of expense.

Figure 1:

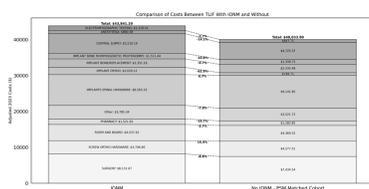


Figure 2: IONM vs matched non-IONM costs over time

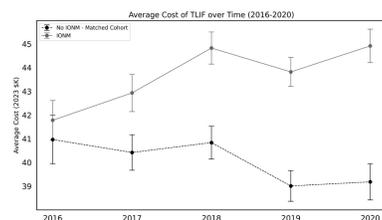


Figure 3: Kaplan Meier Curves and Cox Proportionate Hazard models of 2-year revision, 30-day readmission, 2-year post-operative neurological complication, and 2-year hemi/paraplegia

