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Intraoperative Neuromonitoring | *Research*

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Neurologic Outcome Following Intraoperative Neurophysiological Signal Change in Cervical, Thoracic, Lumbar, and Multiregional Spine Surgery

INTRODUCTION

Intraoperative neurophysiological monitoring (IONM) provides real-time feedback on evolving injury during spine surgery, affording opportunity for the surgeon to intervene and potentially avoid or mitigate postoperative neurologic deficit.

The purpose of this study was to quantify the relationship between intraoperative reversal of identified neurophysiologic change and neurologic outcome following cervical, thoracic, lumbar, and multiregional spine surgery.

The findings suggest that the degree of resolution of adverse neurophysiologic change is quantitatively predictive of postoperative neurologic outcome. The majority of neurophysiologic changes detected by neuromonitoring in the present series of procedures were reversed successfully and were associated with positive outcomes, supporting the conclusion that prompt intervention during spine surgery can reduce postoperative neurologic injury.

Prompt identification and reversal of evolving neurologic compromise during spine surgery can benefit patients by decreasing postoperative complications, such as paralysis, and by decreasing the personal and financial costs associated with length of hospital stay, neurorehabilitation, and ongoing care for chronic conditions.

RESEARCH ABSTRACT

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Background
Intraoperative neurophysiological monitoring (IONM) provides real-time feedback on evolving injury during spine surgery, affording opportunity for the surgeon to intervene and potentially avoid or mitigate postoperative neurologic deficit. Little is known about

the relationship between intraoperative reversal of identified neurophysiologic change during surgery and neurologic outcome following surgery in different regions of the spine.

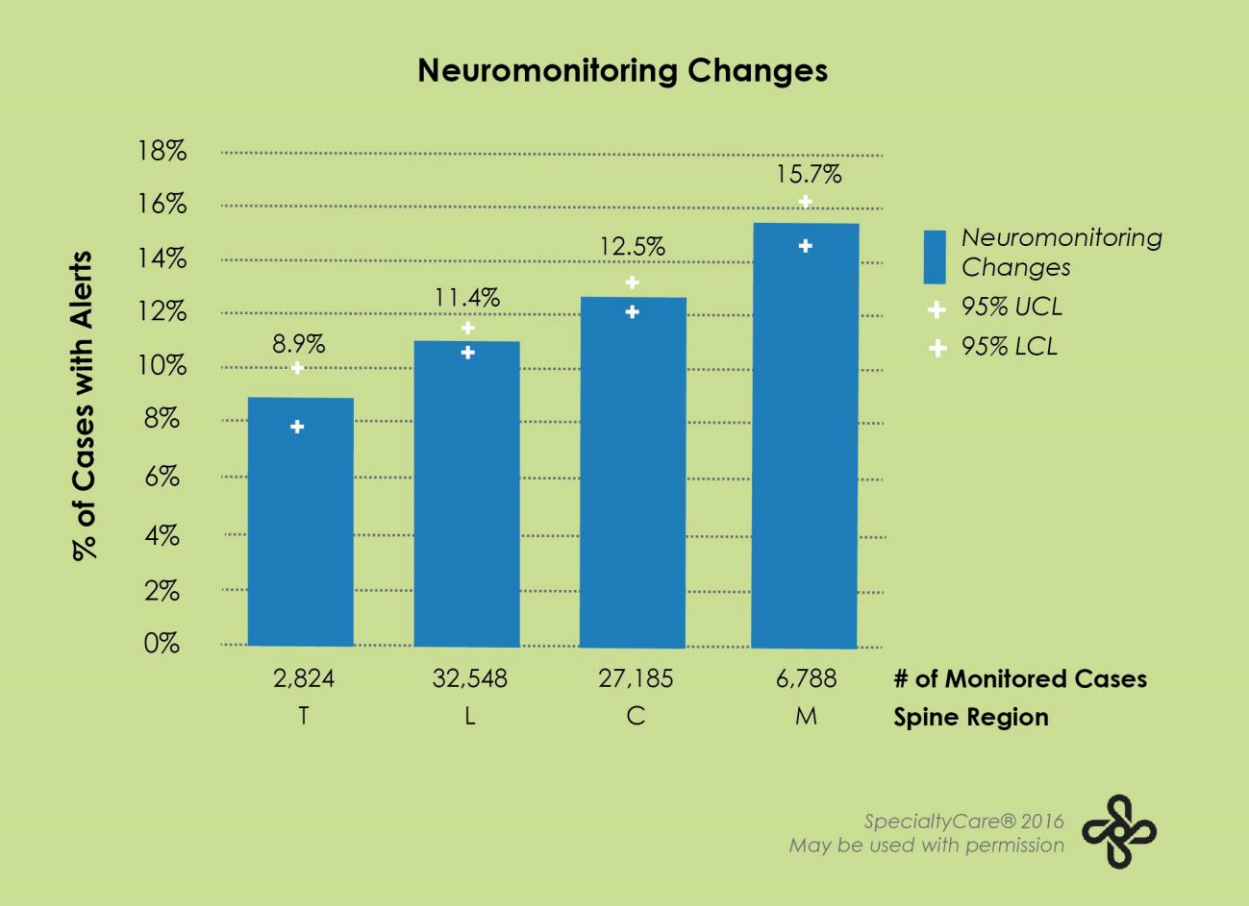
Purpose
Quantify the relationship between intraoperative reversal of identified neurophysiologic change during surgery and neurologic outcome following cervical, thoracic, lumbar and multiregional spine surgery.

Study Design/Setting
Retrospective review of records

Patient Sample
Patients having undergone extradural spine surgery

Outcome Measures
Postop neurologic status

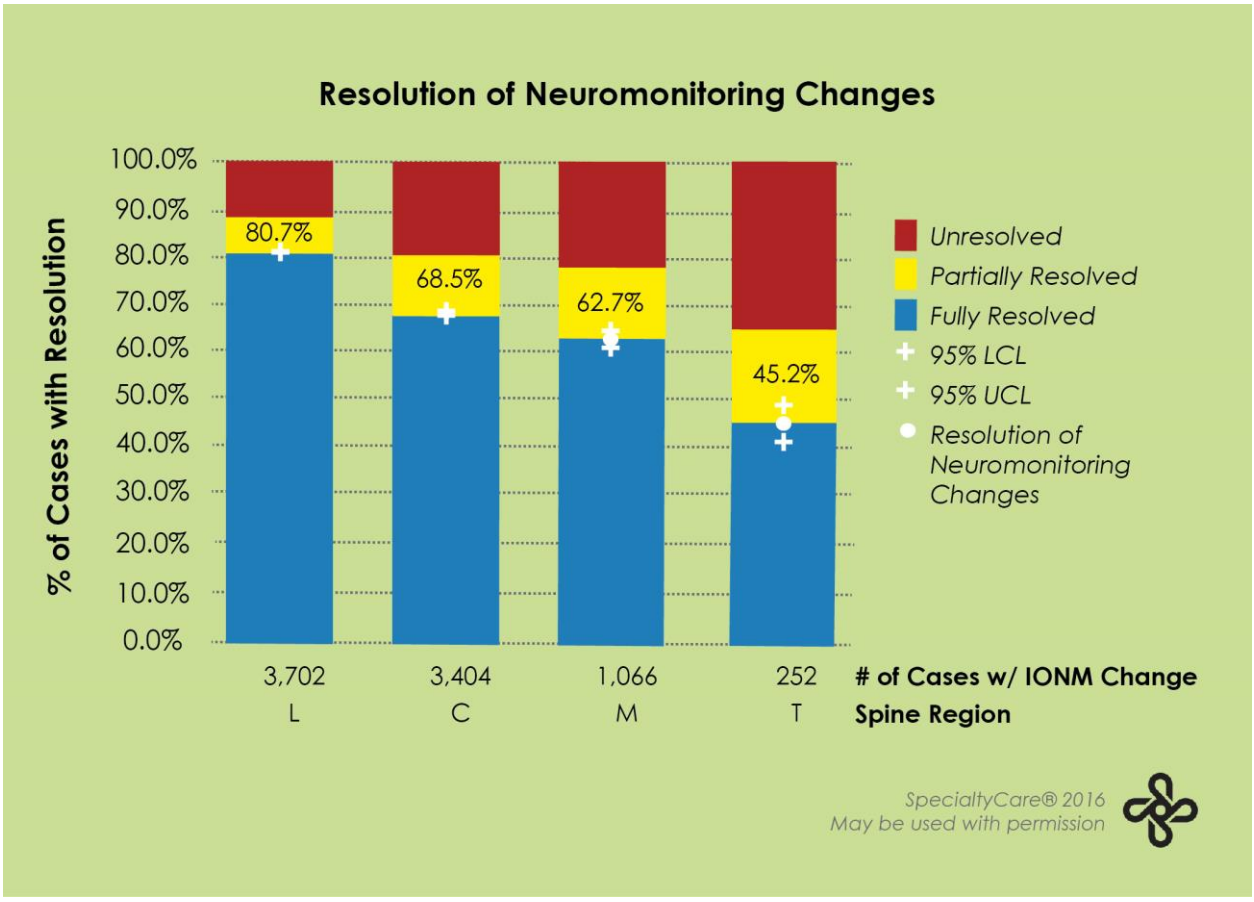
Methods
A retrospective review of a multi-institutional database of 69,345 consecutive extradural spine procedures monitored from May 2013 through January 31, 2016 was performed.



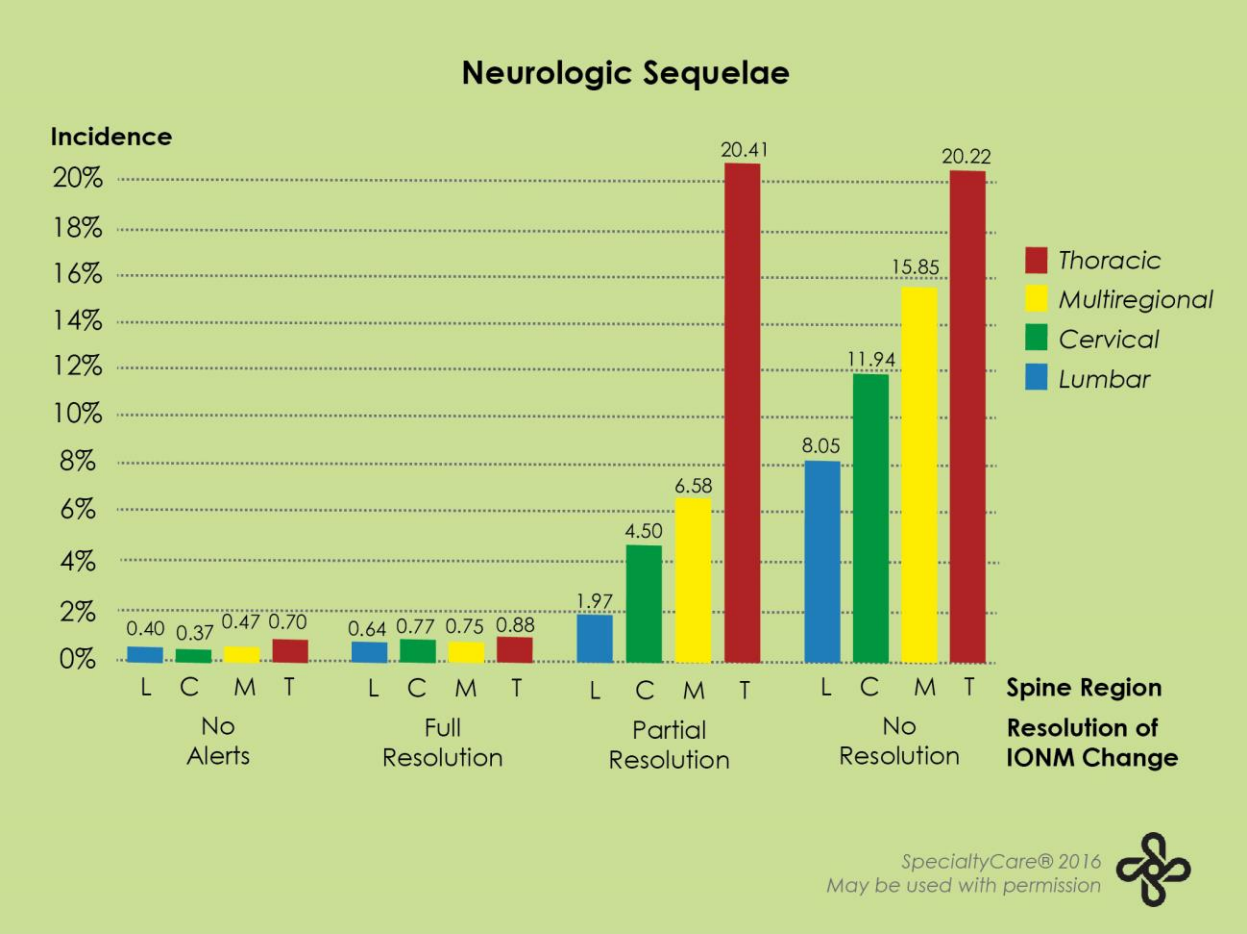
The association between presence of IONM alerts, intraoperative resolution of detected neurophysiologic change (Full vs Partial vs No Resolution) and immediate postoperative neurologic outcome was examined for cervical (C), thoracic (T), lumbar (L) and multiregional (C,T and/or L) spine procedures. Statistical analyses included multiple comparisons of deficit rates using logistic regression and post-hoc Tukey HSD contrasts.

Results

Neuromonitoring changes occurred in 8424 (12.1%) procedures, which resolved fully in 6100 (72.4%), partially in 884 (10.5%) and not at all in 1440 (17.1%). The incidence of new postoperative neurologic deficits was highest in thoracic procedures with unresolved or partially resolved neuromonitoring changes (20.2% and 20.4%, respectively). By comparison, deficit rates trended lower in multiregional, cervical and lumbar procedures, both when there was no resolution of IONM changes (15.5%, 11.9% and 8.1%, respectively) and when there was partial resolution (6.58%, 4.5% and 1.97%, respectively). Postoperative deficit rates were lower in cases with full resolution of IONM changes than those in cases with no resolution in multiregional, cervical and lumbar procedures (all comparisons significant at $p<0.01$). Deficit rates also were lower in cases with partial resolution of IONM changes than those in cases with no resolution in cervical procedures ($p<0.01$). Postoperative deficit rates did not vary significantly for surgery in different regions of the spine when IONM changes were fully resolved (average = 0.7%), or when there were no neuromonitoring changes (average = 0.4%).



Conclusions
The degree of resolution of IONM change during extradural spine surgery is quantitatively predictive of postoperative neurologic outcome. There is a greater degree of predicted neurologic risk for surgical procedures that address the thoracic spine. Intraoperative neuromonitoring will support additional vigilance and prompt intervention during spine surgery.



LEARN MORE

We invite you to read the related blog post from Dr. Sestokas and access more SpecialtyCare research in the Resource Library on our website.