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Neurologic Outcomes Following Differential Resolution of Neuromonitoring Alerts during Extradural Spine Surgery

RESEARCH ABSTRACT

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Introduction

Intraoperative neuromonitoring (IONM) detects negative changes in neurophysiologic function, affording opportunity to potentially reverse evolving injury during surgery. The relationship between reversal of intraoperative neurophysiologic change and neurologic outcome following segmental spine surgery is examined.

Methods

A retrospective review of a multi-institutional database of 54,001 consecutive extradural spine procedures monitored from May 2013 through August 2015 was performed. The association between the presence of alerts, postoperative deficits and intraoperative resolution of the detected neurophysiologic change (Full vs Partial vs No Resolution) was examined.

Results

Surgical alerts occurred in 6,742 (12.5%) of procedures. Following an alert, monitoring changes fully resolved in 73.6% of procedures, partially resolved in 10%, and 16.4% of patients had no resolution. Overall incidence of new postoperative neurologic deficits was 0.74%. The incidence of neurologic deficits during procedures without any IONM changes was 0.44%. Following IONM alerts that fully resolved, 0.71% of patients experienced a postoperative neurologic deficit. Following partial resolution of changes, 5.2% of patients had a neurologic deficit and when there was no resolution 10.7% of patients experienced an intraoperative neurologic deficit. Multiple comparison of deficit rates using logistic regression and post-hoc Tukey contrasts showed that all group differences were significant at $p < .001$, save for the difference between procedures with no alerts and those with full resolution, which was significant at $p = .048$.

Conclusion

The degree of resolution of IONM changes during extradural spine surgery is quantitatively predictive of postoperative neurologic outcome. Detected IONM changes during surgery may allow for intraoperative modification that improves neurophysiologic function immediately following the procedure.

