

## Neuromonitoring Changes and Neurologic Outcome by Approach and Number of Levels in Extradural Cervical Spine Surgery

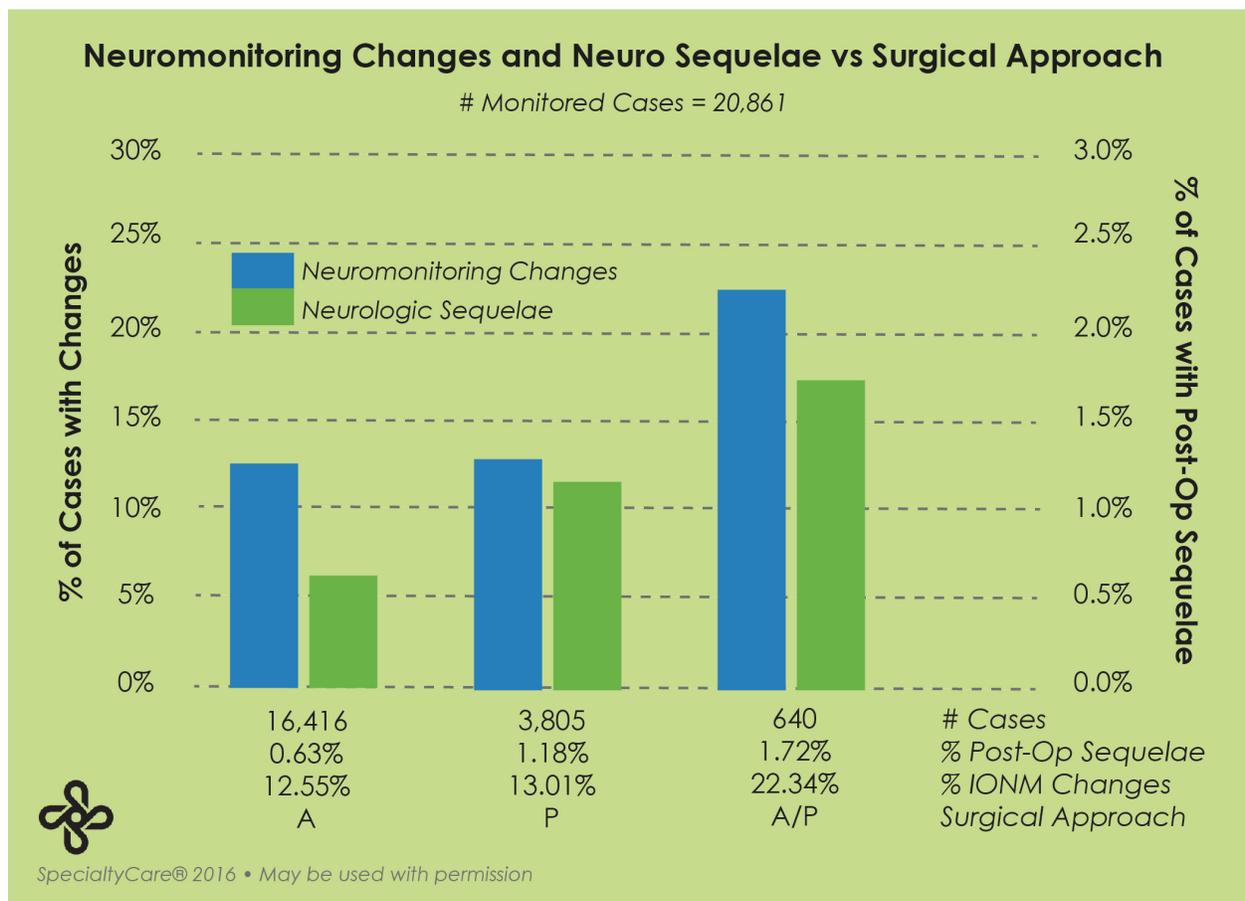
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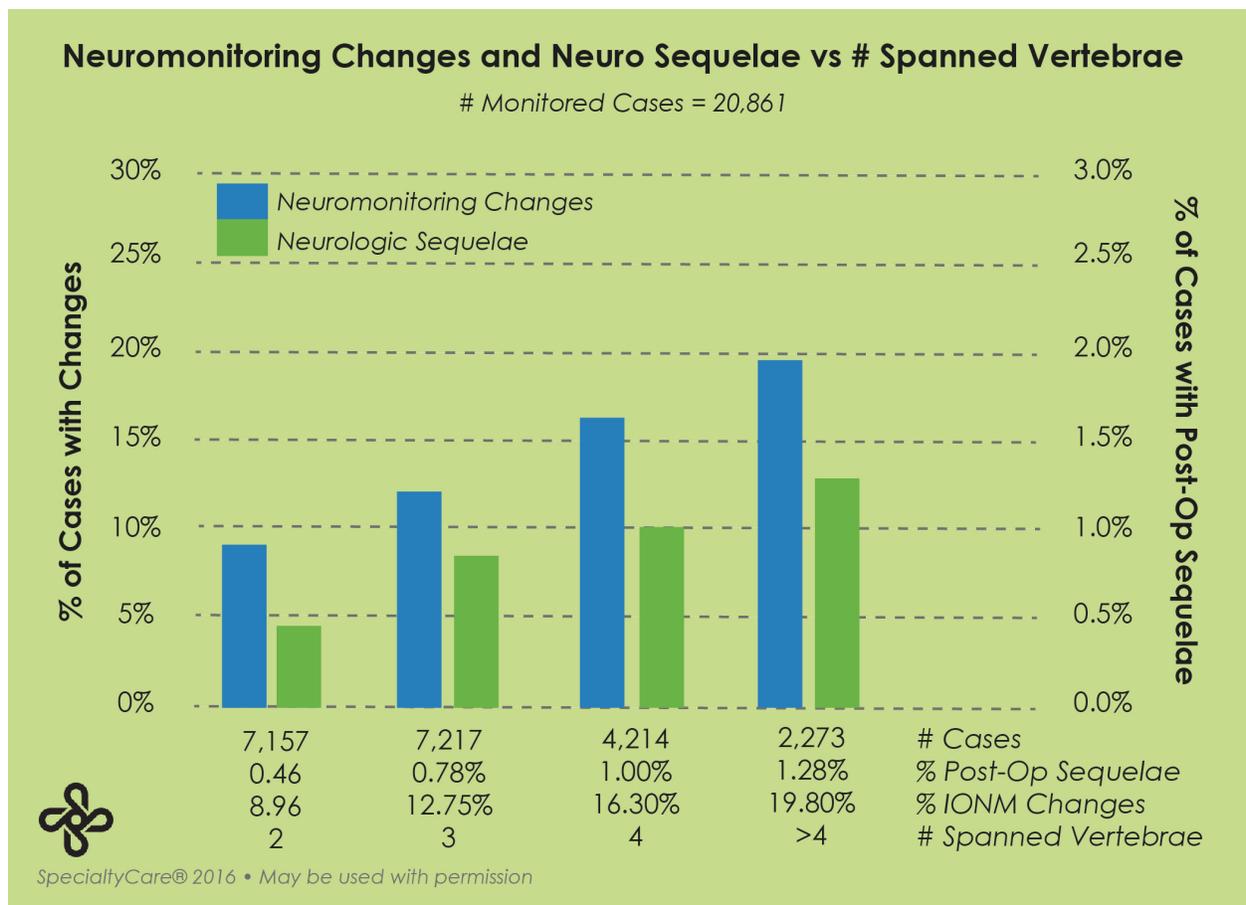


**Introduction:** Intraoperative neuromonitoring (IONM) helps the surgeon reduce the incidence of neurological deficits (ND) during extradural cervical spine surgery. We determined the incidence of neuromonitoring (NM) changes and NDs as a function of surgical approach and number of intervertebral levels.

**Methods:** NM changes and NDs were retrospectively reviewed for 20,861 consecutive cervical spine procedures (CSPs) from the SpecialtyCare Multi-Institutional IONM database between May 2013 and August 2015. Procedures were categorized according to approach and number of levels. NM changes and NDs in the immediate post-op period were recorded. Incidence rate differences were analyzed using binary logistic regression and post-hoc Tukey tests.



**Results:** Overall incidence of NM changes and NDs in CSPs was 13.0% and 0.77% respectively. NM changes were more common in combined anterior/posterior (A/P) approaches (22.3%) vs. anterior (A) (12.6%) or posterior (P) (13.0%) approaches (all  $p < 0.001$ ). There was no difference in NM changes between the A and P approach. NDs were more common in A/P approach (1.72%) and P approach (1.18%) vs. the A approach (0.63%) (each  $p < 0.005$ ). NDs did not differ between A/P and P approaches. Collapsing approaches, the incidence of NM changes increased with number of levels (1 = 8.96%, 2 = 12.75%, 3 = 16.30%, >3 = 19.80%; all  $p < .001$ ). While there was a trend for more NDs with number of levels (1 = 0.46%, 2 = 0.78%, 3 = 1.00%, > 3 = 1.28%), statistical significance was found between 1 and 3 ( $p < .005$ ), and 1 and > 3 ( $p < .001$ ) levels only.



**Conclusion:** NM changes are common in extradural cervical spine surgery. Combined A/P approaches have higher rates of NM changes than either A or P approaches. NM changes and NDs increase by the number of levels in the procedure. These data suggest that IONM yields a particular benefit in more complex and combined approach procedures.