

Variation in 90-Day Neurological Complications across Increasing Fusion Levels for Posterior Cervical Fusion: A Five-Year Analysis

Introduction: Posterior cervical fusion (PCF) is associated with various postoperative neurologic complications (NC) and few studies with sufficient power have evaluated differences in neurological outcomes as PCF invasiveness increases.

Methods: Utilizing the NYS SPARCS database, we evaluated the impact of increasing levels fused on neurological outcomes following PCF. Patients who underwent ≥ 2 -level PCF from 2009 to 2013 with ≤ 90 -day follow-up were retrospectively identified and stratified by levels fused: short cervical/SC (2-3), long cervical/LC (4-8), and long cervicothoracic/LCT (≥ 9). Data on demographics, hospital-related parameters, and 90-day neurological and other complications, readmissions, and revisions were collected. Multivariate regression analysis identified independent predictors of neurologic and overall complications.

Results: A total of 6,981 patients were included. LC patients were older than SC and LCT, while LCT patients were more often female with higher total charges and length of stay. LC patients had the highest C5-C7 nerve palsy and overall NC rates than SC and LCT patients. Phrenic and recurrent laryngeal nerve NCs were comparable across all groups ($p > 0.05$). Implant infection, dural tear, and total complication rates increased with the number of levels fused (all, $p \leq 0.017$). 90-day readmissions and revisions were comparable across all cohorts ($p > 0.05$). Only LC was a predictor of sustaining 90-day NCs, while both LCT and LC predicted 90-day medical (OR=1.35 and 3.50), and total (OR=1.17 and 2.74) complications (all, $p < 0.01$). In comparison to 2-3-level fusion, longer posterior spinal fusion had higher rates of C5-C7 nerve palsy (3.3%, $p = 0.001$) and 70% increased odds of sustaining at least one NC.

Discussion: Compared to 2-3-level fusions, longer posterior spinal fusion had higher rates of C5-C7 nerve palsies, providing spine surgeons data to guide patient-counseling for postoperative expectations when considering a posterior approach.