Intraoperative neuromonitoring in single level spinal procedures: A retrospective propensity score-matched analysis in a national longitudinal database.

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Introduction

Intraoperative neurophysiologic monitoring is a technique that is both sensitive and specific for nervous injury during spine surgery. In procedures involving trauma or with an otherwise high risk of significant nervous injury, intraoperative neuromonitoring can be helpful in improving long-term outcomes. However, it is unclear if all patients undergoing spine surgery benefit from neuromonitoring.

Methods

We performed a retrospective analysis on a national database (Thomson Reuters MarketScan). Between 2006 and 2010, an identified 85,640 patients underwent single level spinal procedures including anterior cervical discectomy and fusion (ACDF), lumbar fusion, lumbar laminectomy, or lumbar discectomy. Concurrent neuromonitoring was identified with the CPT codes 95940, 95941, or 95920. Cohorts for each of the four procedural categories were balanced on baseline comorbidities and procedure characteristics using propensity score matching.

Results

Overall, 10,844 (12.66%) patients received neuromonitoring intraoperatively. Regardless of neuromonitoring status, the 30-day overall complication rates did not significantly differ among monitored and unmonitored patients. When neurological complications were examined specifically, only lumbar laminectomies had reduced 30 -day neurological complication rate with neuromonitoring (0.0% vs 1.18%, $p < 0.0024$). Neuromonitoring did not correlate significantly with reduced intraoperative neurological complications in ACDFs (0.09% vs 0.13%), lumbar fusions (0.32% vs 0.58%), or lumbar discectomy (1.24% vs. 0.91%). The 30-day readmission rate was higher for patients undergoing lumbar discectomies with neuromonitoring than those without (4.29% vs 3.34%, OR 1.29, $p < 0.0451$). For patients who underwent lumbar fusion, reoperation was more frequent when neuromonitoring was involved (6.52% vs 4.85%, OR 1.13, $p < .0015$), but did not differ among other procedures. With the addition of neuromonitoring, payments for ACDFs increased 16.24% ($17,244 vs $16,105), lumbar fusions 7.84% ($28,678 vs $29,009), lumbar laminectomies 24.33% ($16,729 vs $19,199), and lumbar discectomies 22.54% ($10,549 vs $12,449).

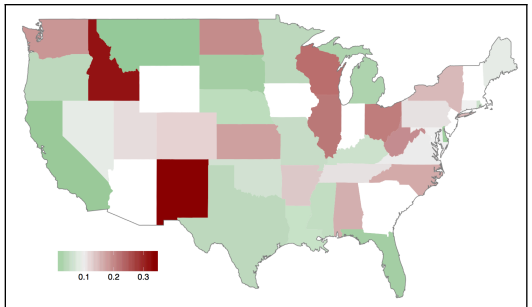

Figure 1. Overall neurmonitoringrates among all single levelspine procedures, by state

	No neuromonitoring		Neuromonitoring		
	N	%	*N*	%	*P*
ACDF	23	0.13	5	0.09	0.5134
Lumbar fusion	43	0.58	8	0.32	0.1449
Lumbar laminectomy	35	1.18	0	0.00	0.0024
Lumbar discectomy	59	0.91	27	1.24	0.1706

Figure 2. 30-day post operativeneurological complication rates

Conclusions

In a national database study of propensity score matched patients undergoing single level spinal procedures without and without intraoperative neuromonitoring, intraoperative neurological complications were only noted to be decreased among lumbar laminectomies. Among all procedures, there was a significant increase in total payments associated with the index procedure and subsequent hospitalization.

	No neuromonitoring	Neuromonitoring	
	Mean	Mean	Difference
ACDF	$23,662	$27,504	$3,842
Lumbar fusion	$45,140	$48,680	$3,540
Lumbar laminectomy	$15,224	$18,928	$3,704
Lumbar discectomy	$12,686	$15,545	$2,859

Figure 3. Comparative procedurepayments with and withoutneuromonitoring

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the overall rates of neuromonitoring usage in single level spinal procedures 2) Describe the comparative neurological complication rates in single level procedures with and without neuromonitoring 3) Identify the increased payment amounts associated with neuromonitoring.

References

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