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Cervical Cord, Root, and Spine Injury: A Closed Claims Analysis

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Introduction: Intubation in the presence of cervical spine instability is considered to place patients at risk of cervical cord injury. Nevertheless, there are only a few ([start_en]003C;10) reported cases of such complications. The aim of this study was to characterize the clinical characteristics of cervical injury claims in the ASA Closed Claims database to develop hypotheses regarding circumstances and mechanisms of cervical cord, root, and spine injury.

Methods: All general anesthesia (GA) claims in the Closed Claims Database from 1970 through 2007 were searched to identify cervical spinal cord, roots, or bony spine injuries. Three independent teams (anesthesiologist and neurosurgeon) used a standardized review form to extract data from claim summaries regarding patient characteristics, intraoperative management, and injury presentation. Each team also judged probable contributors to injury, with affirmative responses requiring agreement between two of three teams. Cervical injury claims were compared to other GA claims and cord injuries compared to root/spine injury using Fisher's Exact test, Mann Whitney U Test, and Kolmogorov Smirnov test.

Results: Cervical injury claims (n=48, age=47±15 years, 73% males) comprised less than 1% of all GA claims (n=5231). Cervical injury claims were more often permanent and disabling (69%) than other GA claims (19%), but were less frequently fatal (8% vs. 36%; P<0.001). Cord injuries (n=37), were more severe than root/spine injuries (n=10), (P<0.001), and typically resulted in quadriplegia (n=33, 89%). Cord injuries usually occurred in the absence of traumatic injury (81%) or cervical spine instability (76%), although anatomic abnormalities were present in almost all (n=35, 95%), primarily spondylosis/stenosis and/or disc disease. Direct laryngoscopy was used in most cord injury claims (83%). Fiberoptic intubation was used in 8% (n=3) of cord injury claims and in 33% of 9 claims with cervical spine instability. Only 8% of cord injury claims had any apparent airway management difficulty. Cord injury occurred with cervical spine procedures (n=24, 65%) and non-cervical spine procedures (n=13, 35%) with 9 cord claims (24%) associated with the sitting position. Cord injury symptoms were usually totally new (n=30, 81%) and were detected immediately after the procedure (n=26, 87%). Factors considered as probable contributors to cord injury were anatomic abnormalities (81%), direct surgical complications (24% [cervical spine procedures only]), pre-procedure symptoms (19%), intraoperative head/neck position (19%), and airway management (11%), with the latter two factors contributing more often in non-cervical spine procedures (n=6, 46%, P=0.002 and n=3, 23%, P=0.044, respectively). Standard of anesthesia care in cervical injury claims was less likely to be substandard (10%) than

Scientific Abstracts

other GA claims (45%, $p < 0.001$) although likelihood and amount of payment did not differ between the groups.

Conclusion: The majority of cervical cord injuries occurred in the absence of traumatic injury, cervical instability, or airway difficulties. Cervical spine procedures and/or sitting procedures appear to predominate. Airway management was the least common factor contributing to cord injury. In the absence of instability, degenerative disease of the spine was common and appeared to be the factor underlying cord injury.

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