

## Abstract

Complications and Outcomes for Neuraxial Anesthesia for Surgery: A Closed Claims Analysis

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**BACKGROUND:** Neuraxial anesthesia for surgery in the non-obstetric setting is associated with improved perioperative pulmonary function, hemodynamics, and pain control. However, complications associated with neuraxial anesthesia can be life threatening and severely debilitating.(1) We reviewed the ASA Closed Claims Database for claims associated with neuraxial anesthesia to determine the pattern of injuries and outcomes over the last 20 years.

**METHODS:** We reviewed closed medicolegal claims associated with epidural and spinal neuraxial anesthesia in the non-obstetric surgical setting from the ASA Closed Claims Database from 1990 onwards. Demographics, patterns of injury, outcomes, and associated factors were examined. Block-related damaging events included high block, unintentional intravascular injection of local anesthetic, epidural catheter breakage, inadequate analgesia, dural puncture, needle trauma, neuraxial cardiac arrest, block technique (including specific nerve damage), and epidural hematoma or abscess.

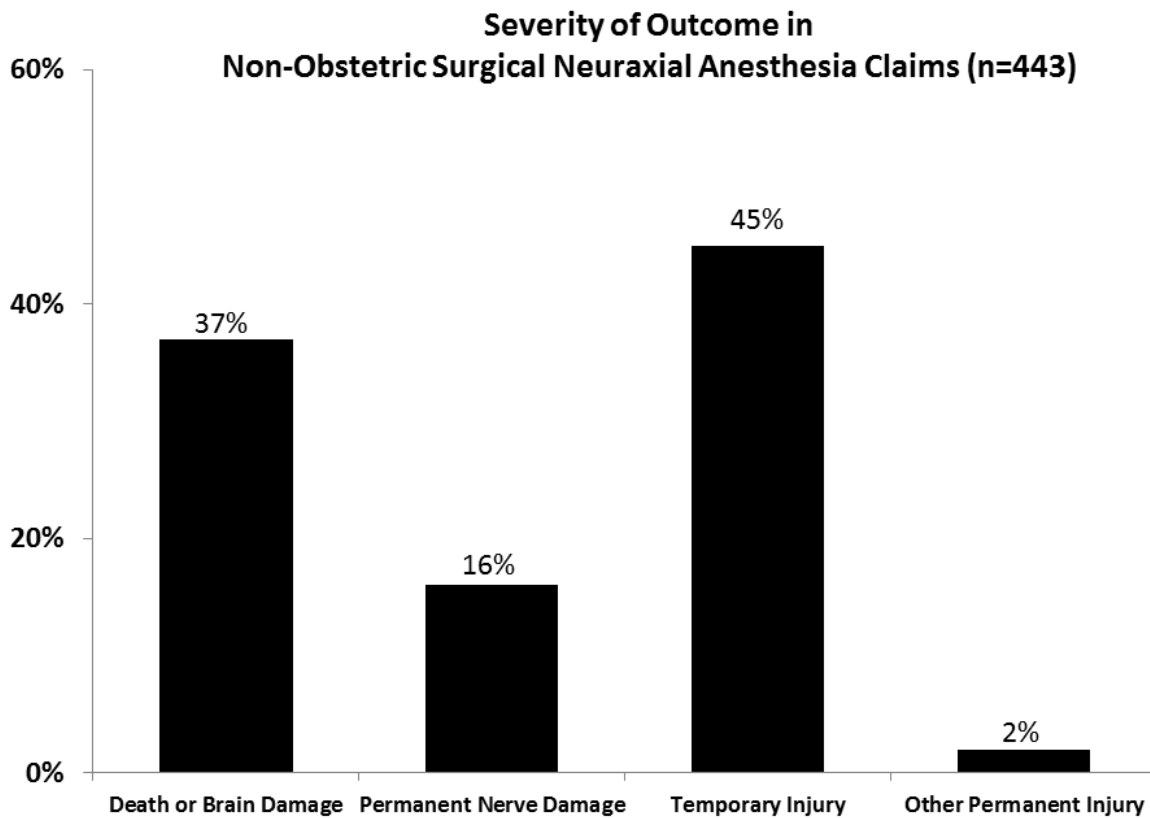
**RESULTS:** From a database of 6894 claims, 443 claims were associated with spinal or epidural anesthesia in the surgical setting. Mean age was 57 yrs (range 0.25-94 years), half were ASA 3-4 (52%), and half were men (51%). The types of neuraxial approaches were spinal (45%), lumbar epidural (45%), thoracic epidural (5%), combined spinal-epidural (2%), caudal (1%), and unknown (2%). Injuries were predominately temporary (45%), but 37% were associated with death and brain damage, and 16% with permanent nerve injury (**Fig.1**). For all injuries, a block-related mechanism was associated with 41% of claims and the 4 most common causes were block technique, primarily with nerve damage (50%), neuraxial cardiac arrest (21%), dural puncture (9%) and high spinal-epidural block (8%, **Fig. 2**). For high severity claims with death or brain damage (n=163), block-related damaging events accounted for 29% of claims, with neuraxial cardiac arrest (21%) and high block (7%) as the top primary damaging events. Non-block-related mechanisms of injury (71%) were primarily cardiovascular (33%) and respiratory (20%) events.

High blocks (n=14) were all associated with spinal block or inadvertent intrathecal block after attempted epidural placement, and 79% resulted in death or brain damage. Hematoma (n=27) was the most common cause of block-related permanent nerve damage to the neuraxis.

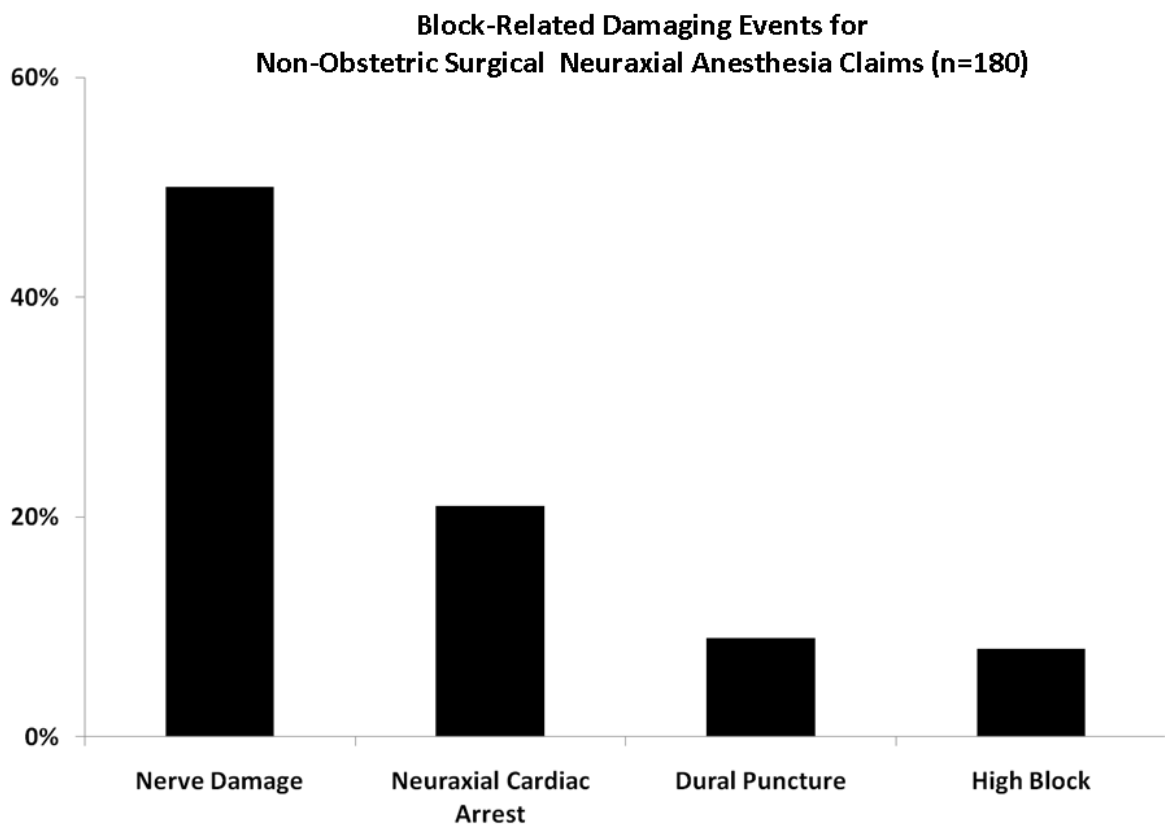
**CONCLUSIONS:** Claims associated with neuraxial anesthesia are relatively equally divided between temporary and permanent injuries, and almost half of these claims are associated with a block-related mechanism of injury. Over one third of claims are associated with death or brain damage, and block-related damaging events were primarily from neuraxial cardiac arrest and high block. Increased vigilance for hemodynamics and ventilatory changes may improve outcomes associated with these complications.

References: (1) Caplan RA, Ward RJ, Posner K, Cheney FW: Unexpected cardiac arrest during spinal anesthesia: a closed claims analysis of predisposing factors. *Anesthesiology* 1988; 68: 5-11.

**Figure 1**



**Figure 2**



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