The Effects of Anesthetic Agents on Dementia and Post-Operative Cognitive Decline

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Abstract

Background: Anesthesia is generally considered safe, but studies have shown the potential relationship between anesthetic agents and dementia after surgery. Several studies have pointed out how the commonly used anesthetic drugs induce cytotoxicity, ultimately leading to neurodegeneration and even Alzheimer’s Disease (AD). Specifically, inhaled anesthetics such as isoflurane, sevoflurane, and desflurane have been shown to impact the neurophysiology of the brain. However, there is no established relationship between anesthetics and long-term postoperative cognitive decline.

Objective: The objective of this study is to explore the available research on anesthetic agents and the potential role that they have played in post-operative cognitive decline.

Methods: Following PRISMA guidelines, a comprehensive electronic search was conducted to identify articles discussing long-term cognitive decline with anesthesia using PubMed, Medline, and CINAHL Complete. We restricted the search to (1) articles published between 2010 and 2023, (2) full texts in English, (3) articles discussing long-term cognitive decline with anesthesia, (4) humans 19+ years of age, and (5) clinically relevant data. The initial search yielded 108 articles, 7 of which were filtered out for duplicates. The remaining papers underwent a quality assessment procedure following the screening process. A total of six final studies were identified that focused on the long-term cognitive effects of anesthesia.

Results: Of the six studies, three recognized inhaled halogenated anesthesia to cause increased cognitive decline as opposed to a control group with intravenous anesthesia or without general anesthesia. Of particular note, none of the studies associated a correlation with an increased risk of Alzheimer’s disease. Nitrous oxide used in adjunct to general anesthesia showed no difference in long-term cognitive decline compared to general anesthesia without nitrous oxide. Anesthesia without surgery in healthy participants showed no long-term change in cognitive status from baseline. Also, regional anesthesia was not associated with an increased risk of dementia.

Conclusion: Although half of the studies showed that exposure to inhaled halogenated anesthetics under surgery was associated with an increased risk of long-term cognitive decline, the results were inconclusive regarding whether anesthesia alone influenced this outcome. A study that had healthy volunteers undergo anesthesia without surgery showed that anesthesia had no long-term cognitive impacts. This study shows that surgery with or without chronic health conditions may play a role in this long-term cognitive decline. Limitations of the included studies included: limited studies done in this specific field, different screening tests to determine cognitive decline, and variable health conditions among participants. Overall, results showed contradictory evidence regarding the relationship between anesthesia and postoperative cognitive outcomes. These results demonstrate the need for further research to elucidate a stronger link between anesthesia and long-term postoperative cognitive outcomes.