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Does Anesthesia Cause Postoperative Cognitive Decline?

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Dear Editor

Approximately 9.5 million people aged 65 and older undergo surgery with anesthesia in the United States every year [1]. One common complication is postoperative cognitive decline (POCD), which may occur in up to 80% of individuals after cardiac surgery and in 26% after noncardiac surgery [2, 3]. It is believed that POCD may increase the risk of Alzheimer's disease (AD), the most common cause of dementia, which is not a normal part of aging; its cause is still unknown and there is no known cure [4]. The prevention of POCD is thus clearly an important public health priority.

During the past decades, animal and molecular studies have demonstrated the association between exposure to general anesthesia and AD pathogenesis [5, 6]. Moreover, surgery itself (such as cardiac surgery) may also contribute to POCD and the subsequent AD risk, although the exact mechanism is unclear. However, the effect of exposure to anesthesia on the risk of AD is still controversial. Some of the studies in humans failed to show an association between exposure to general anesthesia and the risk of AD [7, 8]. In addition, a meta-analysis of 15 studies reported that a history of exposure to general anesthesia was not associated with an increased risk of AD, but prior studies involved in the meta-analysis were case-control designs, which were prone to the possibility of recall and information bias [9]. One limitation of using a meta-analytic approach for observational studies is that in this way studies could not establish a causal relationship, hence confounding from other risk factors remains an alternative explanation for the significant association between the history of exposure to general anesthesia and the risk of AD.

Moreover, Aiello et al. [10] in an analysis of community-dwelling members with a 7-year follow-up found that exposure to anesthesia was not associated with AD in older adults. Similar to a previous meta-analysis [9], as with all observational studies, residual confounding factors could have limited the associations between exposure to anesthesia and the risk of POCD. In addition, it did not exclude any cognitive impairment as a factor influencing the decision to schedule surgical procedures. In contrast to this cohort study, a retrospective, population-based, nested case-controlled study found no significant association between exposure to procedures requiring general anesthesia and incident dementia [11].

On the other hand, POCD has consistently been associated with poor short- and long-term outcomes, but the role of anesthesia, par-

ticularly the role of general versus other types of anesthesia (such as regional anesthesia or spinal anesthesia), remains unclear. A 2010 meta-analysis of 21 studies showed that general anesthesia, compared to others, could increase the risk of developing POCD [12].

In summary, regarding whether or not exposure to anesthesia may become a modifiable risk factor in managing the prevention of dementia or AD, the following recommendations should be considered. First of all, it is necessary to further summarize higher-quality prospective evidence about the relationship between exposure to anesthesia and POCD risk; this plays a key role in the prevention of dementia or AD. Second, patients should be warned about the potential long-term cognitive sequelae when undergoing surgical procedures, and an effort should be made to optimize the perioperative care of older adults who are at risk of POCD. Third, the decision to choose anesthetic techniques should be made on the basis of the surgical procedures and other clinical factors. Fourth, randomized controlled trials using perioperative therapies should be done in order to prevent POCD.

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