



The potential impact of inhaled anesthetics on postoperative dementia

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To the Editor:

We read with great interest the recent article by Hu et al. [1]. Their inspirational study on this important topic deserves further discussion. The authors aimed to investigate whether electroencephalography (EEG) nonlinear feature indices may be effective biomarkers for postoperative delirium (POD) and could help predict POD in elderly patients undergoing orthopedic surgery. In particular, we have some concerns in regard to their study conclusion. However, the percentages of patients in all patients who underwent inhalation anesthesia were not reported. This factor should be an important consideration in the article by Hu et al. [1].

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It was known that general inhalation anesthesia has been associated with an increased risk of dementia [2]. Inhalational anesthetics, particularly isoflurane and sevoflurane, have been shown to promote amyloid beta 42 accumulation and induce cell death in animal models [2, 3]. The effects of inhaled anesthetics can vary significantly, influencing physiological markers such as oxygen saturation and minimum alveolar concentration, which may differentially impact the brain and the development of dementia [4]. For instance, the rapid administration of desflurane is known to cause hypertension and tachycardia. Additionally, desflurane and isoflurane can provoke airway irritation and bronchospasm in patients with asthma, whereas sevoflurane is often preferred for inducing general anesthesia in such patients [5].

Moreover, the use of desflurane for inhalation anesthesia, along with intravenous agents such as midazolam, lidocaine, bupivacaine, ropivacaine, and mepivacaine, has been linked to an elevated risk of dementia over an 8-year follow-up period [2]. Several animal studies have also suggested that both inhaled and intravenous anesthetic agents may exacerbate the neurohistological features of dementia associated with degenerative brain diseases, including Alzheimer's disease [6, 7].

On the other hand, inhalation anesthesia is associated with a higher risk of dementia compared to intravenous or regional anesthesia [3, 8]. For instance, a study involving patients aged 55 years and older who underwent coronary artery bypass grafting (CABG) under general anesthesia or percutaneous transluminal coronary angioplasty (PTCA) under intravenous anesthesia assessed the incidence of Alzheimer's dementia (AD) following anesthesia [3].

So, inhaled anesthetics were an important factor in postoperative dementia. In the study by Hu et al., [1] no significant differences were observed in terms of educational level, preoperative pain scores, and anesthesia duration between the non-POD patient's group and POD patients group. And more, compared to non-POD patients, those with POD exhibited higher age, ACCI (age-adjusted charlson

comorbidity index), frailty scores, ASA classifications, and ICU admission rates, while presenting lower BMI (body mass index) and MMSE (mini mental state examination) scores and PLZC. However, the percentages of patients in these groups who received non-total intravenous anesthesia (inhalation anesthesia or inhalation anesthesia along with intravenous agents) were not specified. In addition, if the proportions of patients undergoing inhalation anesthesia or inhalation anesthesia along with intravenous agents differed significantly between the two groups, the observed effects of EEG on dementia risk could be subject to bias.

Based on the analysis, it appears that the conclusion drawn by Hu et al. [1] may require further substantiation. While the differences in the use of inhalation anesthesia between the two groups could both contribute to disparities in postoperative dementia outcomes, the current evidence does not sufficiently disentangle the effects of these factors. To strengthen the findings, it would be beneficial for the authors to provide additional details regarding the specific types of anesthesia used, including whether inhalation anesthesia was administered alone or in combination with intravenous agents. We respectfully suggest that further research is warranted to clarify the potential association between EEG and an increased risk of dementia while accounting for the potential confounding effects of anesthetic practices.

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Declarations

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