

Postoperative Cognitive Dysfunction in Elderly: A Review Comparing the Effects of Desflurane and Sevoflurane

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Purpose: *The incidence of postoperative cognitive dysfunction (POCD) remains a relatively common complication in the elderly following surgery. Use of anesthesia for surgery might precipitate certain cognitive alterations. The purpose of this review is to address the impact of two volatile anesthetic agents, desflurane and sevoflurane, on POCD.*

Design: *The focus of this review was on postoperative recovery and complications using two anesthetic agents.*

Methods: *Several databases including PubMed and Cochrane were searched from the date of inception. The search words POCD, elderly, general anesthetics, desflurane, and sevoflurane were used and the search was limited to human, randomized clinical trials, and English.*

Findings: *The findings show no difference in the emergence time between sevoflurane and desflurane and the incidence of POCD.*

Conclusions: *No definitive conclusion can be drawn about the type of anesthetic used and its relation to occurrence of POCD. However, the information presented is crucial, which can help to improve anesthetic usage and patient safety.*

Keywords: *postoperative cognitive dysfunction, desflurane, sevoflurane, inhaled anesthetics, elderly patients.*

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IN RECENT YEARS much research has been conducted regarding the impact of surgery and anesthesia on the elderly. The world population statistics report for the year 2012 states that 16% of the population of developed countries comprised elderly individuals (aged greater than 65 years), which is likely to increase to 21% by 2025.^{1,2} The advancement in medical techniques including anesthesia and surgery and better medical facilities, attributed to better economic development, are likely to increase the life

expectancy. This results in a major group of elderly patients with multiple comorbidities who eventually undergo complex surgical procedures.

Differential Diagnosis

Concern has been growing over the last decade pertaining to persistent cognitive impairments of varying severity and duration that can develop as an adverse effect of these surgical procedures after administration of anesthesia, a phenomenon that is

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Conflict of interest: None to report.

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predominantly seen in the elderly.³⁻⁵ The most common types of cognitive deterioration are postoperative delirium (POD) and postoperative cognitive dysfunction (POCD), both of which are significantly associated with morbidity and mortality, reinforcing the importance of perioperative assessment. Earlier POD and POCD were considered as manifestations of the same clinical entity, but after much research it became evident that both are different separate entities.⁶ Delirium is defined by the International Classification of Disease, Tenth Revision, as an “etiologically nonspecific cerebral syndrome characterized by concurrent disturbances of consciousness and attention, perception, thinking, memory, psychomotor behavior, emotion, and the sleep-wake scheduled. The duration is variable and the degree of severity ranges from mild to very severe.”⁷ Delirium can be either emergence delirium or POD. Emergence delirium is benign temporal disorientation that occurs during transition from anesthesia to wakefulness, may resolve within minutes or hours,⁸ whereas POD is a cognitive syndrome, which may occur during first few postoperative days.^{9,10} The differences in POCD, POD, and dementia are tabulated in [Table 1](#).

Definition

POCD is a well-known phenomenon considered as the most common type of cognitive impairments, which usually occur in the postoperative patient.¹¹⁻¹⁴ POCD is neither listed in the International Classification of Disease, Tenth Revision, nor as a diagnosis in the Diagnostic and Statistical Manual IV. However, a general description of patients who complain of impairment in memory and thought process in the postoperative period is used by clinicians.^{15,16} According to the 1995 consensus statement, POCD may be defined as “spectrum of postoperative central nervous system dysfunction both acute and persistent including stroke, cerebral death, elusive neurologic signs with neuropsychological illness.”^{17,18} POCD can occur in the immediate postoperative phase and might last for hours (early phase), but this is not always recognized as it requires elaborate neuropsychological tests.¹⁹ POCD that is lasting generally resolves within a few days or weeks (intermediate). In certain cases it can be quite severe and remain for months or years

(late follow up) after anesthesia and surgery, leading to a permanent disorder.²⁰ This late POCD can have a negative impact on quality of life, overall functional capacity, and mortality and may lead to limiting the ability of patients and increasing their dependency on society.²¹ As POCD is discrete in nature it is often recognized by the patient or his family after surgery, usually when resuming daily activities. It is distressful for patients, their loved ones, and the health systems, as it occurs at a vulnerable age, where a change in cognitive function can result in a withdrawal from work because of loss of independence and an anticipated increase in perioperative care needs and expenses. It is quite possible that these complications exist and are overlooked.²² The fact that POCD can sometimes lead to permanent deterioration of a patient’s cognitive ability is still elusive and needs more research.²³ Approximately 30% to 70% of elderly patients undergoing emergency or major surgery experience POD and nearly 10% of elderly patients after elective procedures are susceptible to develop POCD.^{6,24,25}

Incidence

POCD has been associated with cardiac surgery and is well described in this setting, but little is known about the prevalence or scope of this problem in connection with noncardiac surgery. The International Study of Post-operative Cognitive Dysfunction 1 compared cognitive outcome with age using a control group in 1,218 patients undergoing major noncardiac surgery and aged greater than 60 years. The incidence of POCD was 26% at 1 week and 10% at 3 months. Other studies reported an incidence of POCD after cardiac surgery of between 20% and 60% several months postoperatively.^{20,26,27}

There is a great variation in the actual incidence of POCD depending on the way the condition is defined and which neuropsychological tools are used in measuring cognitive function. The incidence rate of POCD is at least twice as high in the elderly aged greater than 60 years than in the middle aged or younger age groups. The average POCD incidence reported was 53% at discharge time, 30% to 80% a few weeks postoperatively, 10% to 60% 3 to 6 months postoperatively, and 30% 1 to 2 years after surgery.⁶ The incidence of POCD increases with an increase in the population of older surgical patients, which is evident from [Figure 1](#).

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