ORIGINAL RESEARCH

Evaluation of Relationship of Intraoperative Hypotension with Postoperative Cognitive Dysfunction after General Anesthesia in Elderly Population

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Received: 03 March, 2024 Accepted: 16 April, 2024

ABSTRACT

Background: Advances in modern healthcare have improved the life expectancy of the population and quality of life of the elderly. Postoperative cognitive dysfunction describes a decline in cognitive ability from a patient's baseline that starts in the days after surgery and is prevalent in 1% of elderly patients after 1 yr. Hence, the present study was conducted for assessing the effect of Intraoperative hypotension with postoperative cognitive dysfunction in elderly patients undergoing general anesthesia for surgery.**Materials &Methods:** A total of 50 patients of more than 75 years of age and scheduled to undergo elective surgical procedure (non-cardiac) under general anesthesia were enrolled. The following two research groups were randomly assigned to each patient: Patients in Group B were tailored to more lax intraoperative blood pressure control, whereas patients in Group A had a customized intraoperative blood pressure target of mean arterial pressure (MAP) > 90% of preoperative values. Before surgery and for three months following the procedure, a neuropsychologist administered a battery of approved cognition tests. Postoperative delirium and the three-month POCD incidence were evaluated.**Results:** Average MPA among no-target group and target group was 89.3 mm of Hg and 95.1 mm of Hg respectively. While comparing the results, significant results were obtained. Incidence of POCD and delirium did not differ between groups. No correlation was found between intraoperative hypotension and postoperative cognitive performance or delirium.**Conclusion:** No correlation exists between intraoperative hypotension with postoperative cognitive dysfunction in elderly patients undergoing general anesthesia for surgery.

Key words: Intraoperative Hypotension, Cognitive Dysfunction, Elderly.

INTRODUCTION

Advances in modern healthcare have improved the life expectancy of the population and quality of life of the elderly. With more number of aged people getting admitted for various surgeries, anaesthetising these patients has become a challenge and has laid the foundation to a new subspeciality. Geriatric patients represent a vulnerable group at higher perioperative risk. Hence, a standard perioperative approach needs to be adopted in the geriatric patient with the help of a multidisciplinary team.[1-3]

As the nervous system is the target for virtually every anesthetic drug, age related changes in nervous system function have compelling implications for anesthetic management. Aging results in a decrease in nervous tissue mass, neuronal density and concentration of neurotransmitters, as well as norepinephrine and dopamine receptors. Dosage requirements for local and general anesthetics are

reduced. Administration of a given volume of epidural anesthetic results in a more cephalic spread, having though a shorter duration of sensory and motor block. Elderly patients take more time to recover from general anesthesia especially if they were disoriented perioperatively.[4,5]Postoperative cognitive dysfunction describes a decline in cognitive ability from a patient's baseline that starts in the days after surgery and is prevalent in 1% of elderly patients after 1 yr. Cognitive decline may be noted across one or multiple of the cognitive domains. For the patient, this may result in difficulty writing, managing money or remembering lists, and can have a very tangible effect on their lives after discharge home.[6,7]Hence; the present study was conducted to evaluate the relationship of intraoperative hypotension with postoperative cognitive dysfunction (POCD) in elderly patients undergoing general anesthesia for surgery.

MATERIALS & METHODS

The present study was conducted to evaluate the relationship of intraoperative hypotension with postoperative cognitive dysfunction after general anesthesia in elderly population. A total of 50 patients of more than 75 years of age and scheduled to undergo elective surgical procedure (non-cardiac) under general anesthesia were enrolled. Complete demographic and clinical details of all the patients were obtained. The following two research groups were randomly assigned to each patient: Patients in Group B were tailored to more lax intraoperative blood pressure control, whereas patients in Group A had a customized intraoperative blood pressure target of mean arterial pressure (MAP) > 90% of preoperative values. Before surgery and for three months following the procedure, a neuropsychologist administered a battery of approved cognition tests. Postoperative delirium and the three-month POCD incidence were evaluated. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

Average MPA among no-target group and target group was 89.3 mm of Hg and 95.1 mm of Hg respectively. While comparing the results, significant results were obtained. Incidence of POCD and delirium did not differ between groups. No correlation was found between intraoperative hypotension and postoperative cognitive performance or delirium.

Table 1: Intraoperative variables

Variable	No-target group (n=26)	Target group (n=25)	p-value
Average MAP (mm of Hg)	89.3	95.1	0.001*
Average SBP (mm of Hg)	122.3	131.7	0.000*
Any vasoconstrictor (n)	7	13	0.001*
ICU admission (n)	5	4	0.138

*: Significant

Table 2: Outcome

Outcome	No-target group (n=26)	Target group (n=25)	p-value
POCD	2	3	0.344
Delirium (n)	4	5	0.712
Postoperative complication (n)	5	7	0.652
Mean hospital stay (days)	5.9	5.5	0.508

*: Significant

DISCUSSION

Advances in modern healthcare over the past century have significantly increased the average lifespan worldwide, and the fastest-growing population in healthcare is that of the elderly. Since 1975, the number of Americans over the age of 70 has more than doubled. More and more patients each year are undergoing anesthesia for surgery and other procedures. While advances in primary and perioperative care have increased the safety of anesthesia for geriatric patients, they are at considerable risk for severe morbidity and mortality. Age increases perioperative risks associated with anesthesia; it also correlates with many pathologic processes that further increase morbidity and mortality. Understanding typical physiologic and pathologic aging and performing a thorough preoperative exam can improve patient safety and outcomes.[7- 10]

The fluctuating changes in attention, level of consciousness and cognitive function in delirium occur acutely within hours or days. It is widely considered to be triggered by surgery and anaesthesia when presenting 24–72 h postoperatively in the absence of alternative aetiologies, although not specified by the DSM-5. It is highly prevalent in surgical patients, and can occur in 15–53% of older patients after surgery and 70–87% of those in critical care.[11] A study of patients with hip fractures concluded those who developed POCD had poorer ability to function socially and manage activities of daily living at 1 yr.[12] A Danish study of 700 patients followed-up for 8 yrs found that early POCD (at 1 week) was associated with individuals leaving the

labour market prematurely and withdrawing social benefit payments.[13]

Average MPA among no-target group and target group was 89.3 mm of Hg and 95.1 mm of Hg respectively. While comparing the results, significant results were obtained. Incidence of POCD and delirium did not differ between groups. No correlation was found between intraoperative hypotension and postoperative cognitive performance or delirium. In a previous study conducted by Hirsch J et al, authors investigated whether intraoperative hypotension was associated with postoperative delirium in older patients undergoing major non-cardiac surgery. Data from 594 patients with a mean age of 73.6 years (sd 6.2) were studied. Of these 178 (30%) developed delirium on day 1 and 176 (30%) on day 2. Patients developing delirium were older, more often female, had lower preoperative cognitive scores, and underwent longer operations. Relative hypotension (decreases by 20, 30, or 40%) or absolute hypotension [mean arterial pressure (MAP)<50 mm Hg] were not significantly associated with postoperative delirium, nor was the duration of hypotension (MAP<50 mm Hg). Conversely, intraoperative blood pressure variance was significantly associated with postoperative delirium. Their results showed that increased blood pressure fluctuation, not absolute or relative hypotension, was predictive of postoperative delirium.[14]

van Zuylen ML et al clarified whether intraoperative hypotension contributes to the development of postoperative cognitive dysfunction. Studies had to use a clear definition of hypotension, although differing definitions were accepted. Neurocognitive tests to determine postoperative cognitive dysfunction had to be done pre- and postoperatively, with a minimum follow-up of seven days postoperatively. Out of 941 studies screened, five randomized controlled trials and four cohort studies were included for qualitative analysis. Extensive methodological differences between studies were present hindering proper quantitative analysis. No studies reported statistically significant differences in incidence of postoperative cognitive dysfunction in hypo- compared to normotensive patients. Five studies reported exact incidences of postoperative cognitive dysfunction. Their systematic review showed no conclusive association between intraoperative hypotension and the development of postoperative cognitive dysfunction.[15] Zhang C et al investigated whether intraoperative mean arterial pressure variability (MAPV) was associated with POD in elderly patients after hip fracture surgery. The correlation between MAPV and POD was investigated using univariate and multivariate logistic regression. Covariate-related confounding effects were eliminated with propensity score matching (PSM) analysis. Then, a subgroup analysis was conducted to further examine the associations between MAPV and POD. Nine hundred sixty-three patients with a median age of 80 years (IQR: 73-84) were enrolled. POD occurred in 115/963 (11.9%) patients within 7 days after surgery. According to multivariate regression analysis, MAPV > 2.17 was associated with an increased risk of POD. All covariates between the two groups were well balanced after PSM adjustment. A significant correlation between MAPV and POD was found in the PSM analysis.[16]

CONCLUSION

No correlation exists between intraoperative hypotension with postoperative cognitive dysfunction in elderly patients undergoing general anesthesia for surgery.

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