Original Article

Comparison of Total Intravenous with Inhalational Anesthesia in Term of Post-Operative Delirium and Complication in Older Patients

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ABSTRACT

Introduction: *Postoperative delirium is a common complication of major surgery, occurring in up to 50% of older patients. It is associated with poorer surgical outcomes including higher morbidity and mortality. The choice of anaesthetic technique has been proposed as a modifiable risk factor.* ***Objective:*** *This study compared the evidence for total intravenous anaesthesia (TIVA) versus inhalational anaesthesia with regard to postoperative delirium and other complications.* ***Methods & Materials:*** *The study was carried out under Analgesia & Intensive Care Medicine, Jalalabad Ragib-rabeya Medical College Hospital, Sylhet, Bangladesh between July and December 2023. The patients were scheduled to undergo elective gastrectomy, colectomy, or rectectomy under general anaesthesia combined with epidural anaesthesia. Patients in Group A received inhalation anaesthesia, and those in Group B received TIVA.* ***Results:*** *Eight patients in group A and 2 in group B developed POD. The incidence of POD in group B (6.9%) was significantly less than that in group A (26.7%; P = .038). Twenty male and 10 female patients were included in group A, and 11 male and 9 female patients were included in group B. In group A, 7 of the 8 patients who developed POD were male, and in group B, both of the patients who developed POD were male.* ***Conclusion:*** *Based on the current evidence, TIVA appears superior to inhalational agents for reducing postoperative delirium. However, study quality and size*

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vary, and more research is still warranted.

Keywords: *Total intravenous anaesthesia, inhalational anaesthesia, post-operative delirium, older patients*

INTRODUCTION

The rates of delirium associated with inhalational anaesthesia and total intravenous anaesthesia (TIVA) have been compared in several studies[1-3]. Comparing TIVA versus inhalational anaesthesia, a recent meta-analysis of nine randomized controlled studies revealed considerably lower probabilities of postoperative delirium[3]. The underlying mechanism with propofol infusions is believed to be related to more accurate dosing and titration of anaesthetic depth. Furthermore, there is proof that a delirium risk may increase with an intraoperative depth of anaesthesia that is either too low or too profound[4]. Maintaining patients in a sufficient but non-excessive state of hypnosis is made easier with TIVA. This prevents overdosing as well as underdosing.

Several studies have evaluated outcomes following surgery other than delirium. Overall, the data typically indicate that there is either no difference between the TIVA and inhalational groups, or that TIVA is beneficial[5,8,9]. For instance, a recent Cochrane analysis comparing TIVA to inhaled anaesthetics revealed no statistically significant differences in mortality, respiratory, cardiovascular, or neurological problems. They did point out, nonetheless, that TIVA was linked to a lower incidence of postoperative nausea and vomiting[6].

Few research has looked into whether dexmedetomidine infusions given continuously after surgery could reduce the risk of delirium in older individuals referred to general surgical wards following non-cardiac surgery[6,7,10]. Postoperative delirium (POD) and the recovery of postoperative quality of life are two of the many complications resulting from the extensive use of total knee arthroplasty (TKA) to treat patients with knee osteoarthritis (KOA)[7-8].

The frequency and length of postoperative delirium in elderly patients undergoing surgery while under the effects of sevoflurane inhalation or propofol intravenous anaesthesia[8]. Using a method designed to assess the effects of various anaesthetics, Mei et al. hypothesised that propofol would cause postoperative delirium more frequently and for a longer period than sevoflurane[9]. Studies on POD are few, although there is conflicting evidence about the connection between anticholinergic medications and the onset of delirium[10].

METHODS & MATERIALS

Patients who were 60 years of age or older were enrolled in this prospective study after receiving approval from the hospital ethics committee and providing written informed consent.

Analgesia & Intensive Care Medicine. Jalalabad Ragib-rabeya Medical College Hospital, Sylhet, Bangladesh between July and December 2023. Under general anaesthesia and epidural anaesthesia, the patients were to have elective gastrectomy, colectomy, or rectectomy procedures. Inhalation anaesthesia was administered to patients in group A, whereas TIVA was given to those in group B.

Patients were excluded for a variety of reasons, such as (a) liver cirrhosis, dementia,

depression, or alcoholism; (b) benzodiazepine, major tranquillizer, or steroid use in the past; (c) inadequate epidural anaesthesia postoperative analgesia; and (d) allergic reactions to local anaesthetics.

Patients were moved to the intensive care unit (ICU) once the anaesthetic took effect and the tracheal tube was removed from the operating room. In addition to the peripheral infusion catheter, the patient was also using a nasogastric tube, a urinary catheter, and an epidural catheter at the time of ICU admission. On the first postoperative day following surgery, the nasogastric tube was withdrawn, and on the third postoperative day, the urine catheter was removed. When necessary, the epidural analgesia algorithm was used to continuously or intravenously deliver ropivacaine and fentanyl via the epidural catheter until the third postoperative day for postoperative analgesia. ICU nurses who were blind to the patient's group assignment used the confusion assessment method [**Table I**] to detect postoperative delirium.

Table I: Confusion assessment method

1	Acute onset and fluctuating corse	comes on abruptly over hours to days, then comes and goes over of the day
2	Inattention	reduced ability to maintain attention or shift attention
3	Disorganized thinking	disorganized or incoherent speech
4	Altered level of consciousness	Usually lethargic or stuporous

*** To diagnose delirium, the first 2 features must be present, as well as 1 of the last 2*

Data are expressed as mean ± SD. Statistical analysis was completed using Fisher exact test and Student t test. Values demonstrating a significance of P b .05 were considered statistically significant.

RESULTS

This study involved the enrollment of fifty patients. They were divided into two groups at random: group B (n = 20) and group A (n = 30). Between the two patient groups, there were no appreciable variations in terms of age, sex, operation duration, anaesthetic duration, bleeding volume, or total fentanyl dosage administered during anaesthesia. [**Table II**].

Table II: Overview of the characteristics of the study population (n=50)

Characteristics	**Group A**	**Group B**	***p***
No	30	20	
Sex (male)	20	11	0.84
Age (y)	76.5 ± 4.5	77.3 ± 4.6	0.24
Operation time (min)	211± 85.4	223.4± 55.0	0.27
Anesthetic time (min)	267.5± 85.3	281.8± 67.6	0.23
Bleeding volume (g)	206.3± 234.7	134.7± 117.8	0.074
Fentanyl (mL)	3.9± 1.9	4.8± 2.6	0.078

***Values are expressed as mean ± SD.*

To maintain appropriate sedation, patients required Sevoflurane (group A) with a minimum alveolar concentration of 1 to 1.5 and propofol (group B) with an effect site concentration of 1.5 to 3 μg/mL via a target-controlled infusion device. POD developed in two individuals in group B and eight patients in group A. Group B saw a considerably lower incidence of POD (6.9%) compared to group A (26.7%; *p*=.038).

Group A consisted of twenty male and ten female patients, while group B had eleven male and nine female patients. Seven out of the eight patients in group A and both of the patients in group B who experienced POD were male. Men were more likely than women to experience POD, although the difference was not statistically significant (*p*=.082).

Table III: Complications of postoperative delirium

Psychiatric disease	Dementia, depression, alcoholism
Metabolism	Hypoxia, hypoglycemia, renal failure
Circulation	Shock, congestive heart failure, anemia, atrial fibrillation
Drugs	Benzodiazepins, barbiturates, etomidate, atropine

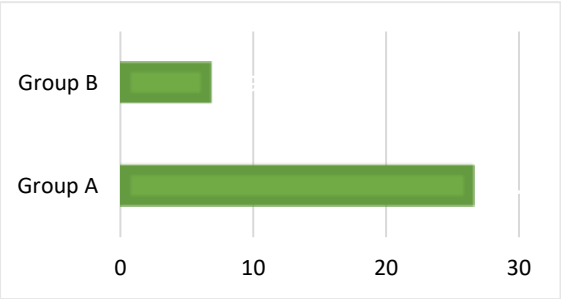

Figure 1: The Incidence Of POD

The incidence of POD in groups A and B. The incidence of POD in group B (6.9%) was significantly lower than that in group A (26.7%; P = .038). POD = postoperative delirium; groups A and B = inhalational anesthesia and total intravenous anesthesia (TIVA) [**Figure 1**].

DISCUSSION

In this study, we found that employing TIVA to maintain anaesthesia reduced the incidence of POD in older patients.

Following anaesthesia and surgery, postoperative delirium is frequently seen. Furthermore, POD lengthens hospital stays, contributes to patient functional decline, and raises morbidity and mortality rates[11,12]. POD causes, however, are likely diverse and not well understood. Numerous POD problems have been identified (Table 3)[13–16]. Elderly surgical patients typically have many risk factors for peripheral artery disease (POD), including medication history, dementia, atherosclerotic illnesses, pulmonary diseases, and sensory impairments. Moreover, becoming older is a substantial risk factor in and of itself. The physical and surgical environmental changes associated with an ICU admission, including pain, catheterization, and dehydration, are difficult for elderly people to adjust to.

In situations involving dementia, depression, drunkenness previous to surgery, a history of medication, high degrees of surgical invasiveness, insufficient postoperative pain management, and an unfamiliar setting, postoperative delirium is also closely linked to decreased cognitive function[17–18]. Not only were none of the patients taking benzodiazepines, tranquillizers, or steroids, but they also had no history of inappropriate postoperative pain con-

trol and no diagnosis of dementia, psychosis, or alcoholism[19].

Furthermore, similar to Edelstein et al., our study discovered that POD was more common in male patients[20]. Reduced intraoperative cerebral blood flow (CBF) is also highly correlated with postoperative delirium[21]. In both propofol and sevoflurane anaesthetic circumstances, CBF was reduced at a BIS value of 50, which indicates an appropriate degree of anaesthesia. On the other hand, the CBF rose with sevoflurane anaesthesia and dropped with propofol anaesthesia at deeper levels of sedation (BIS value of 35). When patients received high-dose sevoflurane anaesthesia, their cerebral auto-regulation decreased; however, when patients received propofol anaesthesia, their auto-regulation was preserved[22].

To guarantee appropriate CBF in both groups, the BIS value was kept between 40 and 60 in the current investigation, and the systemic blood pressure was kept above 90 mm Hg. The cause of group S's greater incidence of POD could not be identified by this investigation. According to Shun et al., individuals under propofol anaesthesia emerged from unconsciousness more quickly than those under sevoflurane anaesthesia[23]. Because propofol anaesthesia had fewer unpleasant side effects than sevoflurane anaesthesia, such as feeling chilly, nausea, and vomiting, Tang et al. showed that propofol anaesthesia was related to improved patient satisfaction[24].

The incidence of POD in older participants in this trial may have decreased due to a quicker emergence time and fewer side effects. Regarding neurotoxicity, propofol did not increase amyloid-β toxicity in the pheochromocytoma cells, whereas sevoflurane caused apoptosis and elevated β-amyloid protein levels in patients—two alterations that are typical of Alzheimer's disease[25]. Additionally, Saporito and Surini reported on the long-term neuroprotective impact that propofol exhibited[26]. However, it's unknown if this neurotoxicity happens often in patients because these data were obtained in an experimental setting. However, it's feasible that this toxicity will affect the prevalence of POD.

Conclusion:

Our study showed that the use of TIVA, as opposed to inhaled anaesthetics, results in lower rates of postoperative delirium. Furthermore, for some issues, TIVA does not seem to be more harmful than inhalational anaesthetic, and it might even be beneficial in certain cases, such as reduced nausea and vomiting. Still, more excellent research is required. The superior results of delirium and the ability to use TIVA for more accurate dosing and monitoring are the main topics of comparison between the two methods. Significant clinical improvements can result from both of these factors in the aftermath of surgery.

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