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ORIGINAL ARTICLE

Incidence of Post-Operative Delirium in Orthogeriatric Population: General Anaesthesia versus Spinal Anaesthesia: An Observational Study

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ABSTRACT

Background: Postoperative delirium (POD) is the acute disfunction of cognition in post-surgical period affecting older patients. Aim: To find comparison between frequencies of postoperative delirium in general versus spinal anaesthesia.
Methods: This prospective observational study was done at the Department of Anaesthesiology, The Aga Khan University Hospital, Karachi, from August 2020 to July 2021. Demographic data was collected on weight, ASA level, surgical procedure, and type of anaesthesia. Pre- and postoperative cognition level was recorded using the Confusion-Assessment-Method scale (CAM). Quantitative variables were presented as descriptive statistics with mean and standard deviation, and qualitative variables were expressed as percentages and frequency with a P value ≤0.05 as significant.
Results: A total of 151 patients were enrolled with a mean age of 65.98±6.48 years, duration of surgery 126.50±75.42 min, and weight 71.42±7.38 kg. Males constituted 95(62.9%) and 56(37.1%) were female. Out of 151 patients, 33(21.9%) patients developed postoperative delirium, of which 31(93.9%) patients received G/A and 2 (6.1%) patients received spinal anaesthesia. ASA grade ≥II being the only statistically major factor (P value=0.001) increasing risk of postsurgical delirium.
Conclusion: A sizeable number of subjects have developed postsurgical delirium in an orthogeriatric population. Patients over the age of 75 with the history of comorbidities, ASA grade ≥ II, and use of general anaesthetics have a higher incidence of developing postsurgical delirium.
Keywords: Post-operative delirium, general anaesthesia, spinal anaesthesia, orthogeriatric

INTRODUCTION

Delirium is an acute neurological disorder in patients with cognitive disfunction, awareness, and perception disturbance, and in layperson terms, it can be referred to as “acute brain failure"[1]. There are several contributing factors such as cognition loss, advanced ageing, frailty, and multiple comorbidities, and some common triggers of delirium are emergent surgeries, psychotropic drugs, and uncontrolled pain[2]. Several studies have been linking anaesthetic drugs with the development of POD[3].
Historically, delirium was once believed to be a temporary and self-restricting condition[4], but after multiple studies on this topic, the long-term sequalae POD are now coming to light. It has a significant association with higher morbidity and mortality levels, extended hospital admissions, longstanding cognition disfunction, and ultimately a poorer prognosis[5].
There are various potential mechanisms of POD, which are mostly linked with the types of anaesthesia and anaesthetic drugs. General anaesthesia (GA) is frequently the choice of anaesthesia in aged patients undergoing major surgery, as it is safe, reliable, and nvenient. GA has a higher risk for POD in a few cohort studies, including the elderly population[6,7]. According to the available studies, some of the risk factors for POD included inhaled and intravenous anaesthetic drugs, benzodiazepines, and opioids; these are difficult to avoid intra- and postoperatively as pain can increase the risk of POD[8].

However, regional anaesthesia (RA), including spinal anaesthesia (SA) along with epidural anaesthesia (EA), provides multiple benefits, including continuous analgesia, less opioid requirement, and decreased stress and inflammatory response. However, some quality research in the last few years showed no significant variations in likelihood of POD in general or regional anaesthesia[9] and yet there is very little evidence in relation to the mode of anaesthesia, anaesthetic drugs, and prevention of POD[9].

The objective of our study is the comparison between the frequencies of postoperative delirium in orthogeriatric patients following general anaesthesia versus spinal anaesthesia.

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MATERIALS AND METHODS

This was prospective observational research carried out at Section of Anaesthesiology, Aga Khan University Hospital, Karachi, from August 2020 till July 2021 after getting permission from Hospital Ethical Committee. The sample size calculation is based on the previous study[10]; the prevalence of POD is 50.46%. A sample size of 151 patients was calculated to estimate target within 8% margin of error and 95% interval of confidence. The sampling technique was non-probability, consecutive selection. Inclusion criteria were consenting patients, aged 60-95 years, undergoing any orthopaedic procedures. Exclusion criteria were patients in whom spinal anaesthesia was augmented by general anaesthesia, or epidural anaesthesia was given; patients pre-medicated with midazolam or associated sedatives; or patients already known to have psychiatric illness or depression or are using anti-psychotics, anti-depressants, neuroleptics, anti-Parkinson’s, anti-epileptic drugs, or any neurological drugs; and non-consenting patients were excluded from our study.

Data was collected prospectively using a proforma, which included patients’ demographic details, weight, ASA level, surgical procedure, type of anaesthesia, and pre-operative cognitive level, and examined using the Confusion Assessment Method Scale (CAM) (Figure 1)[11] by an anaesthesia or orthopaedic resident before shifting the patient to the operating room. CAM was used as the arbitrary standard of assessment of POD, including accurate, comprehensive assessment of cognitive functions. The choice regarding the type of anaesthesia will be made by the primary anaesthetist based on the patient's physical status, preferences, co-morbidities, and surgical demand. There was no intervention from the research investigator during the preoperative, intraoperative, and postoperative courses. Anaesthesia and orthopaedic residents completed the CAM score 6 hours after surgery.

Data analysis was done with SPSS v23. Percentage and frequency were calculated for sex, ASA level, comorbidities, mode of anaesthesia, and patients who developed POD. The mean and standard deviation were calculated for weight, age, and duration of surgery.

RESULTS

Out of 151 patients undergoing elective and emergency orthopaedic surgery, the lowest age was 60, while the highest age of the patients was 81 years, with the mean age being 65.98±6.48 years. The mean time of surgery and weight in our study were 126.50±75.42 min and 71.42±7.38 kg, respectively, as displayed in Table 1. Of 151 patients, 56(37.1%) were female and 95(62.9%) were male. Regarding ASA status, 22(14.6%), 103(68.2%), and 26(17.2%) patients were categorized as ASA I, ASA II, and ASA III, respectively. With respect to co-morbidities, 49(32.5%) patients In this study, 133(88.1%) patients received general anaesthesia and 18(11.9%) patients received spinal anaesthesia. Out of 151 patients, 33(21.9%) patients had postoperative delirium. When the data was compared (Table 2), out of 33 patients who had delirium, 31(93.9%) patients had received general anaesthesia, and 2(6.1%) patients had received spinal anaesthesia. 28(84.8%) patients were >70 years old, whereas 5(15.2%) patients were <70 years old. 21(63.6%) patients fell into the ASA II category, whereas 12(36.4%) patients fell into the ASA III category, which was found to be statistically significant. (p=0.001) have diabetes mellitus, 87(57.6%) patients have hypertension, and 02 (1.3%) patients have ischaemic heart disease.

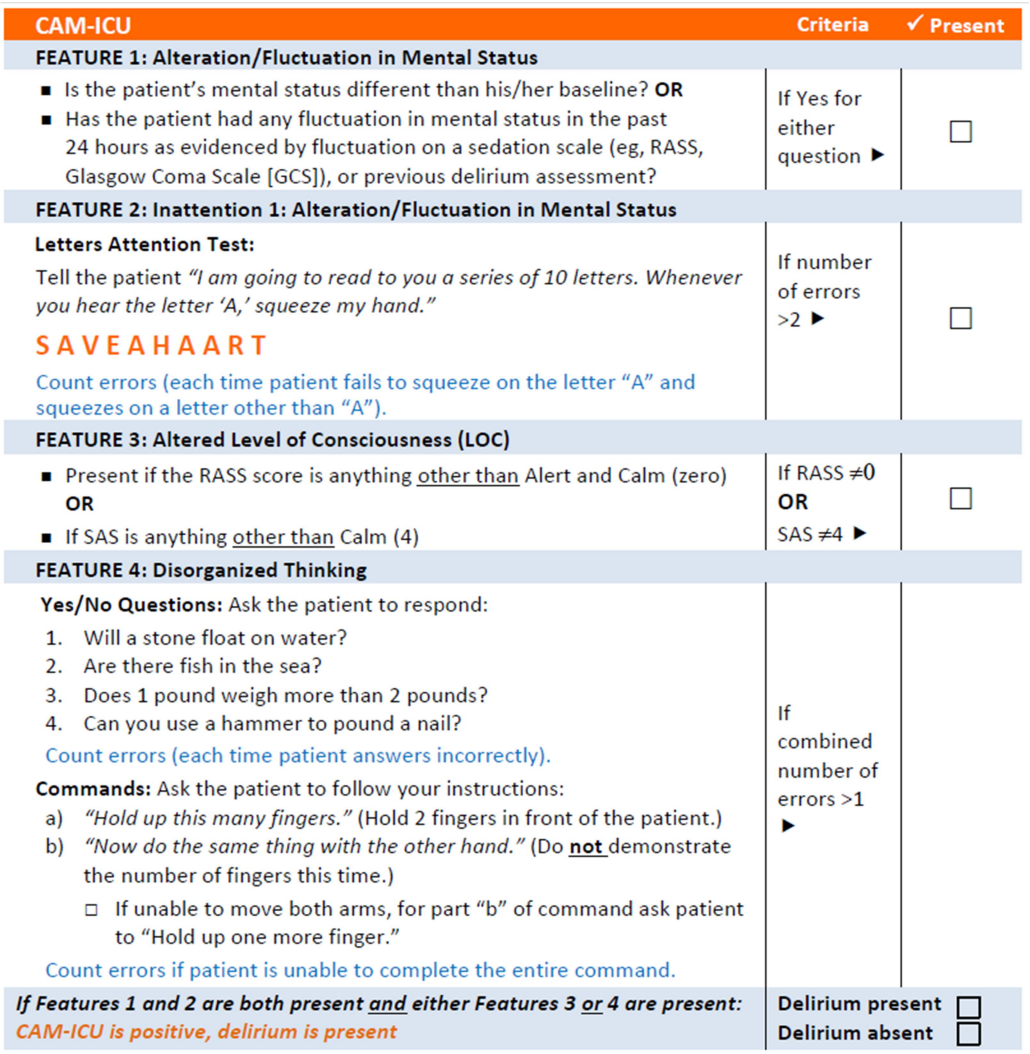
Table 1: Demographic Data

Variable	Mean	St. Deviation	Min-Max
Age (Years)	65.98	±6.48	60-81
Duration of Surgery (Min)	126.50	±75.42	50-210
Weight (Kg)	71.42	±7.38	68-90

Table 2: Comparison between variables affecting post-operative delirium.

Post-Operative Delirium	Type Of Anaesthesia		Age		ASA Grading		
	General n=133	Spinal n=18	<70 Years n=33	>70 Years n=118	ASA I n=22	ASA II n=103	ASA III n=26
Yes	31(93.9%)	2(6.1%)	05(15.2%)	28(84.8%)	0(0%)	21(63.6%)	12(36.4%)
No	102(86.4%)	16(13.6%)	28(23.7%)	90(76.3%)	22(18.6%)	82(69.5%)	14(11.9%)

Fig.1: CAM Score Template



DISCUSSION

Postoperative cognitive disorders have been documented for the last two decades and are still an area of ongoing research. Terminologies are frequently evolving; perioperative geriatric population has long been a challenge that as perioperative endeavour to address. Peri-operative cognition pathologies were initially categorised peri-operative-neurocognitive disorders (PND) and were grouped into delirium and dementia. (12) POD preventiosymptoms geriatric population has long been a challenge that anaesthetics endeavour to address. The sequalae of POD range from slight disturbances to serious-physical injury, extended hospital stays, longstanding post-surgical cognition loss, and higher one year mortality[13].

Recently, several high-quality studies have been comparing the multiple modes of anaesthesia on resulting POD; still, the idea remains controversial. A similar study[14] concluded patients who underwent spinal anaesthesia showed a decreased incidence of POD in terms of verbal communication and cognitive score. In another similar study to ours, the prevalence of POD was 17.01%, which was significantly elevated ($P < 0.001$) in the general anaesthesia group (29.7%) than the spinal anaesthesia subgroup (4.25%)[15]. In a few studies comparable to our results, incidence of POD was associated with advanced age, sex, educational level, and ASA level[16].

The link between general anaesthesia and POD is multifaceted; although the mechanism of action is not clarified, the numerous general anaesthetic medications are used to provide intraoperative sedation and analgesia and can contribute to POD. Cognitive function is also affected by the depth of intraoperative sedation; several recent meta-analyses have also concluded that depth of anaesthesia is directly proportional to increased risk of POD[17]. Various studies have shown opiate analgesia is a common cause of POD[18]. Perioperative pain also causes significant POD, and as opioids are frequently used for intraoperative analgesia, hence, both over- and under-analgesia are the causes of POD[19].

Fewer sedation-hypnotic medications are required with regional anaesthesia methods; there is also no additional need for opioid analgesics as they provide high-quality analgesia on their own. With respect to this point, a recent meta-analysis, which included 19 RCTs including 5,405 patients, found that only general anaesthesia with additional regional anaesthesia could significantly reduce the incidence of POD as compared to general anaesthesia only[20].

Regional anaesthesia offers superior, swift, targeted pain relief than intravenous analgesic drugs only. When selecting anaesthesia modality, the anaesthetic drugs, their efficacy, and safety should not be disregarded. By wisely choosing the anaesthetic drugs and using calculated doses, the incidence of postoperative delirium in geriatric subjects can be considerably decreased. The International Fragility-Fracture-Network produced a consensus and management of hip fractures in 2020 and was endorsed by the Association of Anaesthetists of Great Britain and Ireland, which considers the cautious anaesthesia dispensing may have more significance than the anaesthesia modality, and it is recommended that “anaesthesia should be administered according to agreed standards at each hospital, using age-appropriate doses, with the aims of facilitating early patient remobilization, re-enablement, and abilitation"[21].

Some limitations of this study cannot be ignored. We included only 2 modes of anaesthesia: general and spinal, although there are numerous studies that compare more modes of anaesthesia along with combinations of 2 types of anaesthesia (example GA + regional anaesthesia, epidural or spinal anaesthesia, along with nerve s). The variations in the surgical procedure types contribute to the diversity observed in this study.

CONCLUSION

In our study, one-fifth of elderly patients were found to have developed postoperative delirium following orthopaedic surgical intervention. Patients over the age of 75 years with a history of comorbidities, ASA grade ≥ II, and GA are at higher risk of POD.

Non-pharmacologic prevention approaches have shown their efficacy in decreasing the frequency of POD as pharmaceutical strategies yet have lacked trial-based evidence. Understanding the risk of POD preoperatively, implementing prevention approaches, careful anaesthesia modality selection, and initiating appropriate countermeasures and therapeutic measures when it is diagnosed is critical for the postoperative care of elderly citizens.

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1. Conception and design of or acquisition of data or analysis and interpretation of data.
2. Drafting the manuscript or revising it critically for important intellectual content.
3. Final approval of the version for publication.

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