

Retrospective Examination of Postoperative Delirium in General Surgery: Incidence, Risk Factors and Clinical Objectives

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ABSTRACT

Introduction: Postoperative delirium (POD) is a serious side effect of general surgery, associated with increased morbidity, mortality, and healthcare costs. This retrospective study investigates the incidence, risk factors, and objectives of POD in patients undergoing general surgery. The primary objective of this research is to determine the risk factors of POD, while the secondary objectives include assessing its incidence, 1-year mortality rates, 30-day readmission rates, and length of hospital stays among these patients.

Methods: 511 individuals who underwent general surgery in 2022 had their medical data examined. The Confusion Assessment Method was used to diagnose POD. To find POD determinants, demographic, clinical, and surgical parameters were assessed. Results including 30-day readmission, 1-year mortality, and length of hospital stay were compared between patients with and without POD.

Results: The incidence of POD was 12.8%, and the main independent risk factors were advanced age (1.05, 95% CI 1.03-1.07 per year), cognitive impairment (2.87, 95% CI 2.01-4.09), multiple comorbidities (1.21, 95% CI 1.08-1.35), emergency surgery (1.92, 95% CI 1.33-2.77), and prolonged operation time (1.01, 95% CI 1.00-1.02 per minute). POD patients had significantly higher 1-year mortality (7.7% vs. 1.5%, $p<0.001$), longer hospitalizations (14.2 vs. 8.5 days), and higher 30-day readmission rates (22.7% vs. 11.5%, $p<0.001$).

Conclusion: POD is a prevalent and severe complication following general surgery. Recognizing patients at high risk and applying multicomponent preventive strategies may help decrease POD's impact and enhance postoperative results.

Key Words: General surgery, objectives, postoperative delirium, risk factors.

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INTRODUCTION

Postoperative delirium (POD) is a sudden neuropsychiatric disorder manifesting as disturbances in attention, cognition, and consciousness following surgery^[1-9]. It is prevalent, affecting 10-50% of surgical patients, with a particularly high incidence among elderly patients undergoing major surgical procedures^[10,11]. POD is linked to various negative objectives, including longer hospital stays, increased healthcare expenses, a higher likelihood of needing institutional care, and elevated mortality rates^[12-18].

POD has several different causes, including surgical, anesthetic, and postoperative care aspects, as well as patient-related factors such as advanced age and cognitive deterioration^[19-25]. Preventing and treating POD is still difficult despite increased awareness and research efforts, underscoring the need for a deeper comprehension of its risk factors and impact on patient objectives.

The goal of this retrospective study is to investigate in detail the prevalence, risk factors, and consequences of POD in a sizable group of patients undergoing general surgery. Based on the established associations between patient characteristics and POD, we propose the following hypothesis: Patients undergoing general surgery who are of advanced age, have pre-existing cognitive impairment, and multiple comorbidities, undergo emergency surgery, or experience prolonged operation times are more likely to develop postoperative delirium, which in turn increases their risk of 1-year mortality, 30-day readmission, and longer hospital stays. The primary objective of this research is to determine the risk factors of POD, while the secondary objectives include assessing its incidence, 1-year mortality rates, 30-day readmission rates, and length of hospital stays among these patients. The knowledge acquired may be crucial in developing focused preventative plans and improving perioperative treatment for the susceptible population.

MATERIALS AND METHODS

Study Design and Population:

This research employed a single-center, retrospective cohort design, conducted at an academic hospital. The study involved reviewing medical records of patients who underwent general surgery from January 2022 to December 2022. To be included, patients had to be 18 years or older and have a documented postoperative course lasting a minimum of 48 hours. Exclusion criteria included any preexisting diagnosis of delirium or other neuropsychiatric disorders. Patients who stayed in the hospital for less than 48 hours were excluded from the study, which removed the majority of minor routine general surgery cases. Although the majority of patients were 50 and older, any patient above the age of 18 was included in the study, given documented cases of POD in patients as young as 34.

Data Collection:

Electronic medical records were used to gather demographic and clinical information, such as age, sex, comorbidities, cognitive level, and preoperative functional status. Additionally, surgical characteristics such as procedure type, emergency status, and surgical duration were documented. The Confusion Assessment Method (CAM) was used to diagnose POD, which was the primary focus of interest^[20]. The assessment was conducted in patients with suspected POD and not routinely in all patients. Secondary objectives included hospital stay duration, discharge status, 30-day readmission, and 1-year mortality.

Statistical Analysis:

The study population was described using descriptive statistics. The chi-square test was used to compare categorical data, and the *t*-test or Mann-Whitney *U* test, if applicable, was used to examine continuous variables in order to find possible risk factors for POD. Independent predictors of POD were then identified using multivariable logistic regression; the findings were presented as 95% CI and odds ratios (OR). With the use of suitable statistical procedures, the effect of POD on secondary objectives was evaluated. *P*-values less than 0.05 were regarded as statistically significant. SPSS was used for all of the analyses.

RESULTS

Incidence and Risk Factors of Postoperative Delirium:

Sixty-five (12.8%) of the 511 patients who were part of the trial experienced POD during the postoperative period. Two days was the median time to onset of POD (IQR 1-4 days).

The research population's clinical and demographic characteristics are compiled in Table (1), which is

categorized by the onset of POD. POD patients had more comorbidities (mean Charlson Comorbidity Index 3.2 ± 2.1 vs. 2.4 ± 1.8 , $p < 0.001$), were older (mean age 72.4 ± 9.1 vs. 61.2 ± 14.5 years, $p < 0.001$), and had a greater prevalence of cognitive impairment (21.6% vs. 7.5%, $p < 0.001$).

Table 1: Baseline Characteristics of the Study Population:

Characteristic	POD (n= 65)	No POD (n= 446)	p-value
Age, years (mean±SD)	72.4±9.1	61.2±14.5	<0.001
Sex, n(%)			0.163
- Male	33(50.2%)	233(52.3%)	
- Female	32(49.8%)	213(47.7%)	
Cognitive impairment, n(%)	14(21.6%)	33(7.5%)	<0.001
Charlson Comorbidity Index (mean±SD)	3.2±2.1	2.4±1.8	<0.001
Type of surgery, n(%)			<0.001
- Elective	44(67.0%)	372(83.5%)	
- Emergency	21(33.0%)	74(16.5%)	
Operative time, minutes (mean±SD)	192.4±93.8	158.7±82.1	<0.001

Table (2) displays the findings of the multivariable logistic regression analysis. Higher comorbidity burden (1.21, 95% CI 1.08-1.35 per unit increase in Charlson Comorbidity Index), emergency surgery (1.92, 95% CI 1.33-2.77), cognitive impairment (2.87, 95% CI 2.01-4.09), advanced age (1.05, 95% CI 1.03-1.07 per year), and prolonged operative time (1.01, 95% CI 1.00-1.02 per minute) were independent risk factors for POD.

Table 2: Risk Factors for Postoperative Delirium:

Risk Factor	Odds Ratio (95% CI)	p-value
Age (per year)	1.05(1.03-1.07)	<0.001
Cognitive impairment	2.87(2.01-4.09)	<0.001
Charlson Comorbidity Index (per unit)	1.21(1.08-1.35)	0.001
Emergency surgery	1.92(1.33-2.77)	<0.001
Operative time (per minute)	1.01(1.00-1.02)	0.002

Objectives Associated with Postoperative Delirium:

Compared to patients without POD, those who acquired POD experienced noticeably worse results (Table 3). The POD group saw an almost twofold increase in the median length of hospital stay (14.2 vs. 8.5 days, $p < 0.001$). POD patients had greater 1-year death rates (7.7% vs. 1.5%, $p < 0.001$) and 30-day readmission rates (22.7% vs. 11.5%, $p < 0.001$).

Table 3: Objectives Associated with Postoperative Delirium:

Objective	POD (n= 65)	No POD (n= 446)	p-value
Length of stay, days (median, IQR)	14.2(9.0-21.0)	8.5(6.0-13.0)	<0.001
30-day readmission, n(%)	14(22.7%)	51(11.5%)	<0.001
1-year mortality, n(%)	5(7.7%)	7(1.5%)	<0.001

DISCUSSION

The incidence, risk factors, and consequences of postoperative delirium (POD) in patients after general surgery are all clarified by this retrospective research. With an incidence rate of 12.8% in our sample of 511 patients, it draws attention to the significant burden of POD and associates it with adverse clinical outcomes, including longer hospital stays, lower odds of being sent home, higher readmission rates, and higher death rates.

The study's identified risk factors align with existing literature, emphasizing the complex, multifactorial nature of POD^[26-28]. Key predictors include advancing age, cognitive impairments, increased comorbidity burdens, emergency surgeries, and longer operative times. These factors contribute to POD through mechanisms like inflammation, metabolic imbalances, and interference with normal brain function.

The negative impact of POD on patient outcomes is well-documented^[29,30]. In our study, patients experiencing POD (n= 65) had significantly longer hospital stays, increased rates of 30-day readmission, and higher 1-year mortality compared to those without POD (n= 446). These findings highlight the need for effective prevention and management of POD to enhance postoperative recovery and long-term outcomes. The unequal sample sizes of the POD and non-POD groups reflect POD's natural frequency in this real-world sample. Though this imbalance might reduce statistical power, we addressed it with solid statistical tools (*t*-tests and *U*-tests) and included effect sizes with 95% confidence intervals, guaranteeing trustworthy comparisons.

The large, real-world sample size, thorough evaluation of risk variables, and analysis of several clinically significant outcomes are the study's main advantages. However, the single-center emphasis and retrospective approach restrict the findings' generalizability and call for careful interpretation. Additionally, the study did not assess how certain management and preventative techniques affected POD and its related consequences.

In summary, postoperative delirium (POD) continues to be a prevalent and severe complication in general surgery, significantly affecting patient recovery and long-term outcomes. Recognizing individuals at high risk and employing comprehensive prevention strategies—such as enhancing perioperative care, addressing underlying risk

factors, and ensuring early recognition and treatment of delirium—can help reduce the impact of POD and enhance the quality of perioperative care. Additional research is necessary to assess how effective targeted interventions are in decreasing the occurrence and negative effects of POD.

CONCLUSION

This retrospective study sheds light on the considerable burden of postoperative delirium (POD) among general surgery patients. The findings emphasize the significant incidence and detrimental effects of this acute neuropsychiatric complication.

The observed 12.8% incidence of POD in this large cohort aligns with the broad range (10-50%) reported in other studies, underscoring the persistent challenges of managing POD in the perioperative context. Identified independent risk factors such as advanced age, cognitive impairment, a higher comorbidity burden, emergency surgeries, and extended operative durations reflect the multifactorial nature of POD. These patient and surgical factors likely contribute to its development through complex processes involving inflammation, metabolic imbalances, and disruptions in normal brain function.

Our study clearly demonstrates the negative impact of POD on patient objectives. Patients with POD faced notably worse objectives, including nearly doubled hospital stays, reduced chances of being discharged home, increased 30-day readmission rates, and significantly higher 1-year mortality rates. These results highlight the significant and extensive consequences of POD for both patients and the healthcare system at large.

Given these insights, it's evident that focused efforts are necessary to lessen the impact of POD and enhance objectives for general surgery patients. Identifying high-risk individuals and adopting targeted, comprehensive prevention strategies—such as optimizing perioperative care, addressing predisposing factors, and ensuring early recognition and treatment of delirium—are crucial steps. Further research, particularly prospective, multicenter studies, and evaluations of specific interventions, are essential to advance the understanding and management of POD.

CONFLICT OF INTERESTS

There is no conflict of interests.

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