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Perioperative Challenges and Outcomes in Geriatric Patients Undergoing Major Surgeries: A Retrospective Analysis

Dr. Mehedi Masud[1*], Dr. Shamim Ara Sultana[1], Dr. Rahnuma Tasnim[1], Dr. Mohammad Mominul Haque[1], Dr. Md. Kamrul Hasan[1], Dr. Md. Mahbubul Alam Sarker[1], Dr. ATM Rashidun Nabi[2]

[1]Assistant Professor, Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh
[2]Associate Professor, Department of Anaesthesiology, TMMCH, Targach, Gazipur, Bangladesh

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***Corresponding author:** Dr. Mehedi Masud
Assistant Professor, Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

Abstract **Original Research Article**

Background: Perioperative care of geriatric patients requires a multidisciplinary approach that encompasses careful assessment, meticulous planning of perioperative care and management of complications and outcomes after major surgeries. ***Aim of the Study***: The aim of this study was to evaluate the perioperative challenges and outcomes in geriatric patients undergoing major surgeries. ***Methods***: This retrospective study was conducted in Department of Anesthesia, Anaelgesia and Intensive Medicine, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh, during the period from July 2022 to June 2023. Total 120 geriatric patients who underwent major surgeries were included in this study. ***Result***: The mean age was 74.4 ± 12.6 years, with majority (39.17%) being in the age group of 70–74 years. Males comprised 64.17%, with a mean BMI of 25.7 ± 3.1 kg/m². ASA Class II and III were seen in 58.33% and 41.67%, respectively, with a mean Charlson Comorbidity Index of 4.3 ± 1.2, and 30% classified as frail. Majority (45.83%) of the participants had more than one comorbidity. Abdominal surgeries (40%) were most frequent, 66.67% received general anesthesia and 85.83% undergone elective procedures. The 30-day mortality rate was 8.33%, with complications like infections (16.67%) and myocardial infarctions (12.50%). Prolonged hospital stays occurred in 33.33%, averaging 6.4 ± 3.1 days. Predictors like age, frailty (OR 2.5), and emergency surgery (OR 3.4) were significantly associated with outcomes. Conclusion: The key findings of this study emphasize the critical impact of frailty, comorbidities, and surgical urgency on postoperative outcomes, including mortality, complications, and prolonged hospital stays.

Keywords: *Perioperative Challenges, Outcomes, Geriatric Patients, and Major Surgeries*.

INTRODUCTION

The global aging population is undergoing unprecedented growth, with individuals aged 65 years and older rapidly becoming the fastest-growing demographic worldwide. By 2050, it is projected that nearly one in six people globally will fall into this category, reflecting a marked demographic shift that underscores the rising healthcare demands of elderly populations [1]. In Bangladesh, this trend is equally pronounced, with individuals aged 65 and older comprising 9.29% of the population in 2022, up from 7.47% in 2011. This figure is expected to rise to over 22% by 2050, placing immense strain on the nation's healthcare infrastructure [2]. This growing population faces unique healthcare challenges, particularly when undergoing major surgeries, where perioperative care becomes a critical determinant of outcomes. Geriatric patients present with physiological and clinical complexities that amplify their perioperative risks. Age-related physiological changes, such as reduced organ reserves, frailty, and altered pharmacokinetics, compound the management of these patients [3]. Frailty, in particular, is a significant predictor of poor outcomes, independently influencing the incidence of postoperative complications, mortality, and prolonged recovery [4]. The frailty index and other geriatric assessments have proven superior to chronological age in predicting surgical risks [5]. Despite advancements in surgical techniques and anesthetic management, the outcomes for elderly patients undergoing major surgeries remain concerning. Mortality rates range between 3.5% and 15.2%, depending on the complexity and urgency of the procedure [6]. Emergency surgeries in particular pose a threefold increase in mortality compared to elective procedures, further highlighting the critical role of

preoperative planning and perioperative interventions [7]. Functional recovery and quality of life are also key concerns, with many elderly patients experiencing persistent declines in mobility and independence postoperatively [8]. Preoperative and perioperative challenges exacerbate these issues. Comprehensive geriatric assessments, although recognized as vital, are not uniformly implemented, particularly in resource-limited settings like Bangladesh [9]. Additionally, polypharmacy—a common phenomenon in older adults—introduces risks of adverse drug interactions and complicates anesthesia management [10]. Intraoperatively, elderly patients are more prone to anesthesia-related complications and hemodynamic instability due to age-related cardiovascular changes [11]. These risks necessitate advanced anesthetic techniques and vigilant intraoperative monitoring [12]. Postoperative challenges are equally daunting. Complications such as infections, prolonged hospital stays, and reoperations are frequent, with high rates of morbidity affecting up to 28% of patients [13]. Furthermore, cognitive decline, often manifesting as postoperative delirium, significantly delays recovery and increases healthcare costs [14]. Effective recovery also hinges on rehabilitation and social support systems, which are often inadequate in lower-income countries [15]. This study aims to address these gaps by evaluating perioperative challenges and outcomes in geriatric patients undergoing major surgeries in Bangladesh. By leveraging retrospective data and incorporating global best practices, the findings aim to inform healthcare policies and improve perioperative care standards for elderly populations in resource-limited settings.

Objectives: To evaluate the perioperative challenges and outcomes in geriatric patients undergoing major surgeries.

Methodology & Materials

This retrospective study was conducted in Department of Anesthesia, Anaelgesia and Intensive Medicine, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh, during the period from July 2022 to June 2023. Total 120 geriatric patients who underwent major surgeries were included in this study. Patients were included aged between 65 years and above who underwent major surgeries under general or regional anesthesia and excluded if they had incomplete records, emergency surgeries, or were below the age threshold. The Charlson Comorbidity Index (CCI) and American Society of Anesthesiologists (ASA) classification were used to assess baseline health and surgical risk. The presence of frailty was determined using a validated frailty index. Perioperative complications, such as infections, hemodynamic instability, and prolonged hospital stays, were recorded alongside recovery metrics, including functional outcomes and discharge destination. The statistical analysis included descriptive statistics to summarize baseline characteristics, comorbidities, and outcomes. Associations between predictors (age, frailty, comorbidities) and postoperative outcomes were analyzed using logistic regression models, with significance set at $p < 0.05$. Consent of the patients and guardians were taken before collecting data. Ethical approval was obtained from the institutional review board, ensuring patient confidentiality by anonymizing data throughout the study. After collection of data, all data were presented in the form of tables, figures and charts, as necessary. Numerical variables were expressed as mean and standard deviation, whereas categorical variables were count with percentage. P value of less than 0.05 was considered statistically significant.

Result

Table I presents the baseline characteristics of the 120 study participants. The mean age of the participants was 74.4 ± 12.6 years, with the majority (39.17%) aged between 70–74 years, followed by 36.67% in the 65–69 age group. Only 5% of the participants were aged 80 years or above. Majority of the patients (64.17%) were male, while females accounted for 35.83%. The mean BMI was 25.7 ± 3.1 kg/m². Regarding surgical risk, 58.33% of participants were classified as ASA Class II, and 41.67% as Class III, highlighting a population with significant operative risk. The mean Charlson Comorbidity Index was 4.3 ± 1.2, and 30% of participants were classified as frail. Majority had more than one comorbidity (45.83%), followed by only hypertension (19.17%), only diabetes (15.83%), chronic kidney disease (13.33%), and Chronic obstructive pulmonary disease (COPD) and dementia were less common, observed in 4.17% and 1.67% of participants, respectively. Table II provides an overview of surgical details and perioperative factors. The most common surgeries were abdominal (40%), followed by orthopedic (34.17%) and urological (25.83%) procedures. General anesthesia was used in 66.67% of cases, while the remaining 33.33% underwent regional anesthesia. The majority of surgeries were elective (85.83%), with only 14.17% categorized as emergency procedures. Postoperative outcomes, detailed in Table III, indicate that the 30-day mortality rate was 8.33%. Postoperative complications were common, with surgical site infections being the most frequent (16.67%), followed by myocardial infarctions (12.50%), respiratory complications (10%), postoperative delirium (8.33%), thromboembolic events (6.67%), and wound dehiscence (4.17%). Prolonged hospital stays were reported in 33.33% of participants, with the mean hospital stay duration being 6.4 ± 3.1 days. Statistical analysis of predictors and outcomes, as outlined in Table IV, demonstrates significant associations between key predictors and postoperative outcomes. Age was associated with an odds ratio (OR) of 1.2 (95% CI: 1.1–1.3, p = 0.01). The frailty index showed a strong association, with an OR of 2.5 (95% CI: 1.8–3.5, p = 0.001). Similarly, the Charlson Comorbidity Index was linked to adverse outcomes with an OR of 1.7 (95% CI: 1.3–2.2, p = 0.002). Emergency surgery posed the

highest risk, with an OR of 3.4 (95% CI: 2.1–5.6, p < 0.0001). Additionally, high BMI (obesity) was a significant predictor, with an OR of 1.6 (95% CI: 1.1–2.4, p = 0.025).

Table I: Baseline characteristics of the study subjects (N=120)

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
65-69	44	36.67
70-74	47	39.17
75-79	23	19.17
≥80	6	5.00
Mean ± SD	74.4 ± 12.6	
Sex		
Male	77	64.17
Female	43	35.83
BMI (kg/m2)	25.7± 3.1	
ASA Class		
II	70	58.33
III	50	41.67
Charlson Comorbidity Index (Mean ± SD)	4.3 ± 1.2	
Frailty Index (%)	30%	
Comorbidity		
Hypertension	23	19.17
Diabetes	19	15.83
Chronic Kidney Disease	16	13.33
Chronic Obstructive Pulmonary Disease (COPD)	5	4.17
Dementia	2	1.67
More than one comorbidity	55	45.83

Table II: Surgical details and perioperative factors of the study subjects (N=120)

Variable	Frequency (n)	Percentage (%)
Type of Surgery		
Abdominal	48	40.00
Orthopedic	41	34.17
Urological	31	25.83
Type of anesthesia used		
General Anesthesia	80	66.67
Regional Anesthesia	40	33.33
Type of Surgical option		
Elective Surgery	103	85.83
Emergency Surgery	17	14.17

Table III: Postoperative outcomes of the study subjects (N=120)

Outcome	Frequency (n)	Percentage (%)
30-day Mortality	10	8.33
Postoperative Complications		
Surgical Site Infection	20	16.67
Myocardial Infarction	15	12.50
Respiratory Complications	12	10.00
Postoperative Delirium	10	8.33
Thromboembolic Events	8	6.67
Wound Dehiscence	5	4.17
Prolonged Hospital Stay	40	33.33
Hospital stay (Days) (Mean±SD)	6.4±3.1	

Table IV: Statistical analysis of predictors and outcomes

Predictor	Odds Ratio (95% CI)	p-value
Age (years)	1.2 (1.1-1.3)	0.01
Frailty Index	2.5 (1.8-3.5)	0.001
Charlson Comorbidity Index	1.7 (1.3-2.2)	0.002
Type of Surgery (Emergency vs Elective)	3.4 (2.1-5.6)	0.0001
High BMI (Obesity)	1.6 (1.1-2.4)	0.025

DISCUSSION

This retrospective study was conducted in Department of Anesthesia, Anaelgesia and Intensive Medicine, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh, during the period from July 2022 to June 2023. Total 120 geriatric patients who underwent major surgeries were included in this study to evaluate the perioperative challenges and outcomes in geriatric patients undergoing major surgeries. The findings of this study reveal critical demographic and clinical insights into the geriatric population undergoing major surgeries in Bangladesh. The mean age of participants was 74.4 ± 12.6 years, with the majority aged between 70–74 years (39.17%) and 65–69 years (36.67%). Only 5% of the cohort was aged 80 years or above, reflecting a similar distribution to studies such as St-Louis *et al*., [15], where the age-adjusted Charlson Comorbidity Index (CCI) demonstrated predictive validity in elderly patients undergoing surgery, with a mean age of 73.6 years. Gender distribution in the current study showed a predominance of males (64.17%) compared to females (35.83%), paralleling findings in vascular surgery patients, where male representation constituted 59.8% [16]. The average BMI of 25.7 ± 3.1 kg/m² aligns with Ho *et al*., [17], where the BMI distribution revealed predictive associations with postoperative complications like atrial fibrillation and thromboembolism. Clinically, 58.33% of patients were classified as ASA Class II, and 41.67% as Class III, suggesting significant surgical risk. Comparable studies, including Grossman *et al*., [18], identified ASA Class II/III as a strong determinant of complications, reporting an odds ratio (OR) of 3.34 for postoperative events. The mean CCI in this study was 4.3 ± 1.2, consistent with Huang *et al*., [19], where a higher CCI score (>3) was significantly predictive of 30-day complications and long-term mortality. Moreover, frailty, observed in 30% of the cohort, further reinforces these findings. Tan *et al*., [20], highlighted frailty as a key predictor of functional decline in elderly patients undergoing emergency surgeries, with an OR of 13.00 (95% CI: 2.21–76.63) for loss of independence. Abdominal procedures accounted for 40% of surgeries, followed by orthopedic (34.17%) and urological (24.17%) interventions. General anesthesia was used in 66.67% of cases, with the remainder receiving regional anesthesia. Studies such as Goh *et al*., [21], reported similar distributions in geriatric surgery populations, emphasizing the need for targeted anesthesia protocols to mitigate perioperative risks. Elective surgeries (85.83%) dominated over emergency surgeries (14.17%), consistent with St-Louis *et al*., [15], where elective procedures were associated with lower postoperative mortality ($p < 0.05$). The 30-day mortality rate in this study was 8.33%, closely aligned with Grossman *et al*., 18], who reported a mortality rate of 3.2% in older patients undergoing intracranial surgery. Postoperative complications were prevalent, with surgical site infections (16.67%) being the most common, followed by myocardial infarctions (12.5%), respiratory complications (10%), postoperative delirium (8.33%), thromboembolic events (6.67%), and wound dehiscence (4.17%). These findings are consistent with Tan *et al*., [20], where infections and respiratory complications were the leading causes of morbidity, with frailty being a critical determinant. Furthermore, Goh *et al*., [21], emphasized frailty's role in predicting poor functional recovery, linking it to higher odds of discharge to long-term care facilities (OR = 6.067, $p = 0.001$). Prolonged hospital stays (mean 6.4 ± 3.1 days) were observed in 33.33% of participants. This aligns with the findings of Kim *et al*., [22], where frailty and high CCI scores predicted extended hospital stays (median 9 days vs. 6 days, $p < 0.001$). Patients with severe postoperative complications also demonstrated higher rates of readmission and functional decline, as reported in Havens *et al*., [23], where readmission rates ranged from 4.1% to 16.8% depending on the surgical complexity and patient comorbidities. Age, frailty, and comorbidity were significant predictors of adverse outcomes. In this study, age was associated with an OR of 1.2 (95% CI: 1.1–1.3, $p = 0.01$), frailty with an OR of 2.5 (95% CI: 1.8–3.5, $p = 0.001$), and CCI with an OR of 1.7 (95% CI: 1.3–2.2, $p = 0.002$). These findings are corroborated by Robinson *et al*., [24], who identified frailty and comorbidities as independent predictors of 6-month mortality, with a sensitivity of 81% and specificity of 86% when four or more markers were present. Emergency surgeries posed the highest risk, with an OR of 3.4 (95% CI: 2.1–5.6, $p < 0.0001$), consistent with studies like Tan *et al*., [20], where emergency procedures significantly correlated with poor postoperative outcomes. BMI, particularly obesity, was also identified as a predictor, with an OR of 1.6 (95% CI: 1.1–2.4, $p = 0.025$). Ho *et al*., [17], found a similar relationship, where higher BMI was linked to an increased risk of atrial fibrillation and venous thromboembolism. The findings of this study align with the broader literature on geriatric surgical outcomes, emphasizing the interplay of frailty, comorbidities, and surgical risk. While the 30-day mortality rate and complication profiles reflect global trends, the specific challenges in Bangladesh's healthcare infrastructure, such as limited access to specialized perioperative care,

may exacerbate these risks. The role of frailty, as highlighted by Khalafallah *et al*., [25], reinforces the need for preoperative geriatric assessments, which can better stratify risk and optimize outcomes. Additionally, the high rates of surgical site infections and prolonged hospital stays underscore the importance of targeted interventions, as noted by Goh *et al*., [21].

Limitations of the Study

In our study, there was small sample size and absence of control for comparison. Study population was selected from one center in Dhaka city, so may not represent wider population. The study was conducted at a short period of time.

CONCLUSION AND RECOMMENDATIONS

This study highlights the multifaceted perioperative challenges and outcomes faced by geriatric patients undergoing major surgeries. Key findings emphasize the critical impact of frailty, comorbidities, and surgical urgency on postoperative outcomes, including mortality, complications, and prolonged hospital stays. Future research should focus on integrating frailty assessments into routine surgical planning and exploring multidisciplinary approaches to enhance postoperative recovery.

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