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Assessment of Anaesthetic Risk in Elderly Patients Undergoing Elective Surgery in the Anaesthesia and Intensive Care Department of Gabriel Touré University Hospital

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Abstract

Background: As more older adults undergo surgery globally, their multimorbidity and reduced physiological reserves heighten anaesthetic risk. Evidence from low-resource settings is scarce. This study compared the frequency and types of peri-operative and early postoperative anaesthetic adverse events in patients aged 65 or older versus younger adults at Gabriel Touré University Hospital, Mali. **Methods:** We conducted a cross-sectional, descriptive, and analytical study in the Anaesthesia-Intensive Care Department of Gabriel Touré University Hospital from 1 July to 30 September 2024. All patients ≥ 18 years scheduled for elective surgery with anaesthesia were eligible. Patients were divided into Group I (18 - 65 years) and Group II (≥65 years). Anaesthetic risk was stratified using the American Society of Anesthesiologists (ASA) physical status classification. Emergency procedures, patients < 18 years, incomplete or lost files, and pre-operative decompensation of comorbidities were excluded. Pre-operative clinical status, comorbidities, laboratory results, and ASA class were collected. Intra-operative data included types of anaesthesia, induction technique, and haemodynamic events (tachycardia, bradycardia, hypotension, hypertension). Postoperative monitoring during the first 24 h focused on blood pressure, heart rate, oxygen saturation, and destination after the post-anaesthesia care unit. Data were analysed with IBM SPSS Statistics 22.0 using Pearson's chi-square test ($p < 0.05$). **Results:** Of 389 patients, 86 were included (69 in Group I and 17 in Group II). Hypertension was more frequent in elderly

patients (47.1% vs. 10.1%), whereas absence of medical history predominated in younger adults (85.5% vs. 52.9%) (χ^2 = 13.224; p = 0.001). Other preoperative clinical, biological, and ASA characteristics were similar between groups. General anesthesia was more often used in younger patients (65.2% vs. 35.3%; χ^2 = 5.060; p = 0.024), while regional anesthesia was preferred in older adults (64.7% vs. 33.3%; χ^2 = 5.616; p = 0.018). The incidence of intraoperative hemodynamic events and postoperative instability during the first 24 h did not differ significantly between age groups, nor did postoperative destination: approximately 87% of patients in each group were transferred to standard surgical wards and 13% to intensive care. **Conclusion:** In this single-centre cohort, patients aged ≥ 65 years undergoing elective surgery did not experience a higher rate of peri- or early postoperative anaesthetic complications than younger adults, provided that pre-operative assessment was rigorous and anaesthetic techniques were adapted, with greater use of regional anaesthesia. These findings support the view that chronological age alone should not contraindicate elective surgery under anaesthesia and underline the potential value of incorporating systematic frailty screening to refine risk stratification in elderly patients.

Keywords

Elderly, Anaesthetic Risk, Elective Surgery, Frailty, Perioperative Complications

1. Introduction

The population of older adults is increasing rapidly worldwide owing to improvements in healthcare and life expectancy. In 2010, 13% (40 million) of the United States population was older than 65 years; a similar trend has been observed in South Korea, where the proportion of people over 65 years increased from 7.3% (370,000) in 2000 to 11.2% (5,400,000) in 2010, with a parallel rise in the oldest-old (age > 85 years). The ratio of very old to old individuals rose from 5.13% (173,000) to 6.67% (370,000) over the same 10-year period. As a result, more geriatric patients are admitted to the operating theatre for surgical conditions typical of older age, frequently associated with multiple comorbidities and reduced cardiopulmonary reserves, which pose important physiological and technical challenges for anaesthetists [1]. Anaesthesia in elderly patients can lead to peri- and postoperative complications such as intra-operative hypotension and tachycardia, acute kidney injury, and postoperative cognitive disorders related to comorbid conditions and age-related physiological changes [2]. The American Society of Anesthesiologists (ASA) has established a six-class physical status classification to stratify anaesthetic risk. In this context, our objective was to determine the frequency of peri- and postoperative anaesthetic adverse events in patients aged 65 years and older undergoing elective surgery at Gabriel Touré University Hospital, and to compare their risk profile with that of younger adults.

2. Patients and Methods

Study setting and period: The study was conducted in the Anaesthesia-Intensive Care Department of Gabriel Touré University Hospital in Bamako, Mali. Data were collected prospectively from 1 July to 30 September 2024.

Study design: We performed a cross-sectional, descriptive, and analytical study comparing anaesthetic risk in elderly patients with that of the general adult population undergoing elective surgery during the study period.

Lack of systematic screening for frailty: Anesthetists and nurses have not received dedicated training on frailty screening tools. The hospital does not have protocols incorporating validated tools.

Study population: The source population consisted of all patients aged 18 years or older scheduled for elective surgery requiring anaesthesia at Gabriel Touré University Hospital. According to the literature, older adults are classified as young-old (65 - 74 years), old (75 - 85 years) and oldest-old (>85 years) [3]. In our analysis, we used the ASA physical status classification (American Society of Anesthesiologists) to stratify anaesthetic risk in older patients.

Grouping of patients: Patients were divided into two age groups. Group I included adults aged 18 - 65 years, and Group II comprised patients aged 65 years and older. This allocation was carried out consecutively as patients presented for surgery. Each patient had a postoperative monitoring form completed in the surgical ward, documenting non-invasive blood pressure (NIBP), heart rate (HR), and temperature.

Inclusion criteria: We included all patients ≥ 18 years scheduled for elective surgery, seen in the routine pre-anaesthetic consultation clinic and for whom informed consent was obtained. grouped into 18 - 65 and ≥65.

Non-inclusion criteria: We excluded emergency procedures and patients younger than 18 years.

Exclusion criteria: We excluded files that were incomplete or lost, and cases in which a comorbid condition or general clinical status decompensated before surgery.

Data collection procedures: The study involved recording vital signs in the pre-operative period, continuous monitoring during surgery, and systematic observation during the first 24 postoperative hours.

Peri-operative monitoring: After completion of the safety checklist, multiparameter monitoring was instituted in the operating theatre, including non-invasive arterial blood pressure, electrocardiography, and pulse oximetry (SpO_2).

Postoperative monitoring: In the post-anaesthesia care unit (PACU), surveillance focused on non-invasive blood pressure and oxygen saturation for all cases of general anaesthesia in patients whose immediate postoperative destination was the surgical ward. Discharge from the PACU was based on an Aldrete score ≥ 9. Transfer to the intensive care unit (ICU) was planned pre-operatively for certain high-risk patients or initiated when peri-operative complications occurred.

Data management and statistical analysis: Data were collected using forms

and entered into Microsoft Word and Excel, then analyzed with IBM SPSS Statistics version 22.0. Qualitative variables were expressed as counts and percentages and compared between groups using Pearson's chi-square test. A p-value < 0.05 was considered statistically significant.

Ethical considerations: Patient anonymity was preserved throughout the study. Informed consent was obtained from all participants or their legal representatives before inclusion.

3. Results

Study population: A total of 389 patients were managed by the Anaesthesia-Intensive Care Department during the study period. Of these, 86 patients met the inclusion criteria and were analysed, while 303 were excluded for various reasons (age < 18 years, lost patient (5%), emergency procedures (5%), non-exploitable or lost files (65%), or pre-operative decompensation of comorbidities (15%)). The study population included 69 patients in Group I (18 - 65 years) and 17 patients in Group II (≥65 years) (Figure 1).

Medical and surgical history: Medical history differed significantly according to age (χ^2 = 13.224; df = 2; p = 0.001). Arterial hypertension was more frequent among patients aged ≥ 65 years (47.1% vs. 10.1%), whereas the absence of medical history was more common among patients aged 18 - 65 years (85.5% vs. 52.9%). Diabetes mellitus was rare and observed only in the younger group (Table 1). In

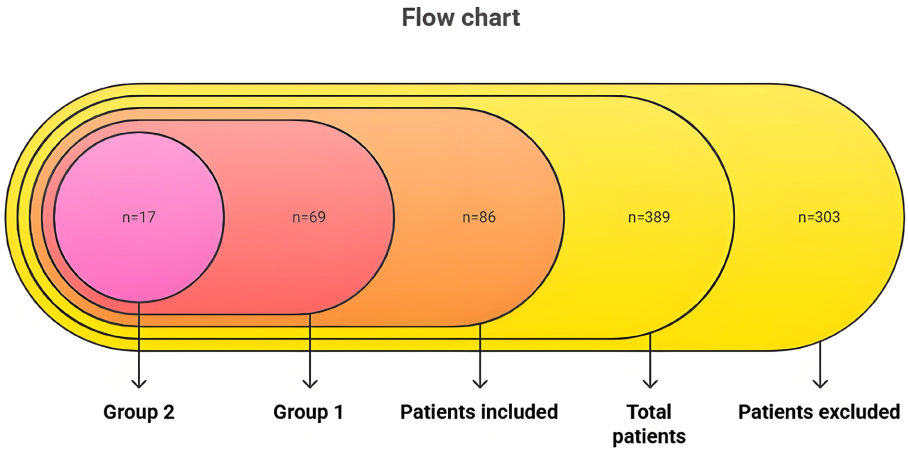

Figure 1. Flow charts.

Table 1. Comparison by age and surgical specialty.

Age	Surgical specialties						Total
	Digestive Surgery	Urologic Surgery	Orthopedic/Traumatologic Surgery	Neurosurgery	Gynecology	ENT	
Group 1 (18 - 65 years)	43.5%	8.7%	5.8%	15.9%	13%	13%	69
Group 2 (>65 years)	47.1%	41.2%	5.9%	0%	5.9%	0%	17
Total	44.2%	15.1%	5.8%	12.8%	11.6%	10.5%	86

contrast, the distribution of surgical history (emergency surgery, caesarean section, no previous surgery) did not differ significantly between groups ($\chi^2 = 2.119$; p = 0.347); most patients had no previous surgical history.

Haemodynamic and respiratory parameters: Pre-operative blood pressure profiles were comparable between age groups ($\chi^2 = 3.732$; p = 0.292). There was a trend toward systolic blood pressure values > 140 mmHg being more frequent in older patients, but the difference was not statistically significant. Heart rate was between 70 and 100 beats per minute in approximately 60% of patients in both groups, with no significant difference ($\chi^2 = 0.115$; p = 0.944). Oxygen saturation was normal (>94%) in almost all patients, regardless of age ($\chi^2 = 0.249$; p = 0.618).

Haematological assessment: Haemoglobin and haematocrit levels were similar in the two groups (Hb: $\chi^2 = 1.703$; p = 0.427; haematocrit: $\chi^2 = 1.565$; p = 0.457). A moderate degree of anaemia was present in a substantial proportion of patients but was not over-represented in either age group. Platelet counts ranged between 150,000 and 400,000/mm^3 in most patients, without a significant difference between groups ($\chi^2 = 3.589$; p = 0.166).

Renal function, blood glucose, and coagulation: Serum creatinine was < 150 μmol/L in more than 90% of patients in both groups, and marked renal insufficiency remained rare ($\chi^2 = 1.387$; p = 0.500). Preoperative blood glucose was mainly between 5 and 7 mmol/L, with only a small proportion of patients above 7 mmol/L; no significant difference was observed between age groups ($\chi^2 = 0.607$; p = 0.738). Coagulation tests (prothrombin time and activated partial thromboplastin time) were within normal limits in the majority of patients, with similar distributions in both groups (TP: $\chi^2 = 0.602$; p = 0.740; aPTT: $\chi^2 = 1.404$; p = 0.496).

ASA score: The distribution of ASA physical status classes did not differ significantly between patients younger than 65 years and those aged 65 years or older ($\chi^2 = 2.14$; p = 0.342). The low statistical power regarding ASA could be explained by the small size of our sample. Most patients in both groups were classified as ASA I or II, with a slight tendency toward a higher proportion of ASA III among elderly patients, which did not reach statistical significance.

Peri- and postoperative parameters: General anaesthesia was used significantly more frequently in patients aged 18 - 65 years (65.2%) than in those aged ≥ 65 years (35.3%) ($\chi^2 = 5.060$; p = 0.024). Conversely, regional anaesthesia was significantly more frequent in Group II (64.7% vs. 33.3%; $\chi^2 = 5.616$; p = 0.018). Classical induction was more common in elderly patients (41.2% vs. 21.7%), although this difference was not statistically significant (p = 0.100). Rapid sequence induction was used more frequently in younger adults (65.2% vs. 47.1%), again without a significant difference (p = 0.168).

Intra-operative haemodynamic changes (tachycardia, bradycardia, hypotension, hypertension) did not differ significantly between age groups ($\chi^2 = 4.911$; df = 3; p = 0.178). Tachycardia occurred in 50.7% of patients in Group I and 35.3% of those in Group II, while hypotension was observed in 15.9% and 35.3% of patients, respectively. Bradycardia and hypertension were evenly distributed. The

cross-analysis of intra-operative haemodynamic changes according to ASA class showed no significant association ($\chi^2 = 2.945$; df = 6; p = 0.816).

Postoperative hemodynamic variations during the first 24 hours did not differ significantly between age groups, regardless of ASA class. Among patients aged ≥ 65 years, hypotension appeared slightly more frequent, particularly in ASA III patients, but small numbers preclude firm conclusions. In patients aged 18 - 65 years, tachycardia was the most frequent abnormality (approximately 50% - 60%). Overall, postoperative hemodynamic instability remained moderate and relatively similar between age groups.

Postoperative destination: No significant difference was observed in postoperative orientation ($\chi^2 = 0.020$; p = 0.888). The vast majority of patients in both groups were admitted to a standard surgical ward (87%), while approximately 13% required postoperative admission to the intensive care unit. The low statistical power regarding ASA could be explained by the small size of our sample.

4. Discussion

In this study carried out at Gabriel Touré University Hospital, we compared peri- and postoperative anaesthetic risk between patients aged 65 years or older and younger adults undergoing elective surgery. Despite a greater burden of cardiovascular comorbidities in elderly patients, particularly arterial hypertension, the peri-operative haemodynamic profile and early postoperative course were broadly similar in both groups, without a significant increase in major adverse events among older patients. The adaptation of anaesthetic techniques, with more frequent use of regional anaesthesia in patients aged ≥ 65 years, appears to have helped limit immediate anaesthetic risk.

Our findings are consistent with the broader context of population ageing and the increasing demand for surgery in older adults. As highlighted by the FIT-65 study conducted in the United Kingdom [4], the proportion of patients aged over 65 years presenting for elective surgery is steadily rising, with an estimated frailty prevalence of 17% in this population. Several authors [3] [5] have reported that frail patients tend to be older, more frequently anaemic, with higher ASA classes and more electrocardiographic abnormalities, and are less likely to be discharged home after surgery. In our cohort, although frailty was not formally assessed, we observed a similar pattern: elderly patients more often had hypertension and tended to have higher ASA classes, but this did not translate into a marked increase in short-term peri- or postoperative complications.

One of the major messages of our study is the strategy of adapting anaesthetic techniques in older adults. We observed a significant reduction in the use of general anaesthesia in favour of regional techniques among patients aged 65 years and older. This approach is in line with current recommendations [2] [6] aimed at minimising exposure to general anaesthetic agents and limiting haemodynamic fluctuations in frail patients or those with cardiovascular comorbidities. Interestingly, although peri- and postoperative hypotension tended to be more frequent

in older patients, these events did not reach statistical significance and had no impact on postoperative destination, as the vast majority of patients were admitted to standard wards. This suggests that the choice of anaesthetic technique, combined with close monitoring, can effectively control haemodynamic variations.

Comparison with previously published work [3] [6]-[8] also highlights an important dimension missing from our study: systematic assessment of frailty. Harrison *et al.* [4] showed that frailty, assessed using the Reported Edmonton Frail Scale (REFS), was associated with potentially modifiable comorbidities (anaemia, cardiac disease, ECG abnormalities) and with a lower likelihood of returning home after surgery. In our study, we relied solely on the ASA classification to stratify anaesthetic risk. However, it is now widely recognised that ASA status, although useful, does not fully capture the functional, cognitive and social dimensions of frailty. The absence of significant differences in peri- and postoperative events between age groups may therefore partly reflect an implicit selection of the fittest elderly patients for elective surgery, with more frail individuals being excluded earlier in the surgical pathway. The reasons for the absence of a frailty assessment appear to be circumstantial, due to the fact that the anesthesiologist-to-patient ratio is very low, especially in public hospitals. Teams prioritize tasks considered essential (ASA stratification, blood tests, comorbidity management). Few African studies demonstrate the impact of frailty screening on postoperative complications. This limits institutional motivation to integrate these tools on a large scale.

Our results also align with the literature indicating that many risk factors can be optimized in the pre-operative period [2] [9]. In our series, hypertension was more frequent in elderly patients, but blood glucose, renal function, coagulation parameters, and pre-operative vital signs were generally comparable between groups. This may indicate a reasonable level of pre-operative optimization already achieved in our centre, but may also reflect under-representation of the frailest patients in the final sample.

This study has several strengths. It is based on the systematic collection of pre-, peri-, and postoperative data over a defined period and includes a direct comparison with a younger adult population managed in the same environment and under similar protocols. It also underscores the central role of adapting anaesthetic technique, particularly through the use of regional anaesthesia, in the management of elderly patients. However, some limitations must be acknowledged. First, the sample size, especially in the group aged ≥ 65 years, is relatively small, which limits the statistical power to detect modest but clinically relevant differences. Second, this is a single-centre, cross-sectional study, which limits generalisability and does not allow assessment of medium- or long-term outcomes such as 30-day mortality, loss of independence, or readmissions. Finally, the absence of a formal frailty assessment using a validated tool such as REFS is a major limitation in light of current recommendations.

From a practical perspective, our findings suggest that chronological age alone

should not be a barrier to undertaking elective surgery under anaesthesia, provided that pre-operative evaluation is thorough and that the anaesthetic technique is appropriately tailored. The systematic incorporation of frailty screening into the pre-operative pathway, as proposed by Harrison *et al.* [4], could represent an additional step towards identifying high-risk geriatric patients, optimising modifiable comorbidities (anaemia, cardiac disease, diabetes) and organising postoperative care (destination, rehabilitation, social support).

Future studies, ideally multicentre and involving larger samples, should include standardised frailty assessments to confirm our findings and explore more precisely the interaction between age, ASA status, frailty, and choice of anaesthetic technique. The analysis of patient-centred outcomes, such as quality of life, functional recovery, and return to independent living, would further enhance the clinical relevance of this research.

5. Conclusion

Our study shows that, with appropriate adaptation of anaesthetic techniques, patients aged 65 years and older can undergo elective surgery with peri- and early postoperative complication rates comparable to those of younger adults. Greater use of regional anaesthesia and careful peri-operative monitoring appear to mitigate the impact of increased cardiovascular comorbidity in this population.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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