Review Article

The elderly in the post-anesthesia care unit

ABSTRACT

It is increasingly conceivable that elderly patients will be treated in perioperative settings as the world's population shifts toward an older age distribution. They are more prone to a variety of unfavorable outcomes as a consequence of the physiological changes that accompany aging and the coexistence of multiple medical conditions. Postoperative complications in elderly patients are linked to a large increase in morbidity and mortality and the burden placed on the healthcare system. Our goal is to determine how elderly patients' recovery after anesthesia differs from that of younger patients. In addition, we will discuss the main postoperative complications experienced by elderly patients and the measures that are utilized to limit the risk of these complications developing.

Key words: Aging, anesthesia, delirium, elderly, geriatric, ICU, intensive care unit, myocardial infarction, PACU, post-anesthesia care unit, postoperative complications, recovery, surgery

Introduction

Aging is a natural, multifactorial phenomenon characterized by the accumulation of degenerative processes that are in turn underpinned by multiple alterations and damage within molecular pathways.[1] The alterations and damages ultimately compromise cell and tissue functions. This is associated with a progressive loss of physiological functional reserve in all body systems.[1]

The continuous growth of the older population, along with a lower birth rate, is shifting the world's demographics toward an elderly population. According to the United Nations, the number of elderly people over 65 will double by 2050.[2] The increased length of life expectancy, increased safety of anesthesia, and less invasive surgical procedures have facilitated the possibility of performing surgical procedures even in high-risk geriatric populations.[3] According to the American Society of Anesthesiologists (ASA), one in ten people who have surgery are 65 years of age or older.[4]

Since the elderly population is expected to grow substantially in the next few years, geriatric patients are more likely to be seen often in the post-anesthesia care unit (PACU). In general, the elderly population utilizes higher resources given their frailty and increased susceptibility to aging-related diseases. Therefore, our review aimed to focus on the challenges of treating an elderly patient in PACU and points to common geriatric complications postoperatively and the interventions employed to minimize them. Additionally, this review will highlight

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Abdulkareem S. Alghamdi, Hisham Almuzayyen, Tumul Chowdhury[1]

Department of Anesthesiology, Johns Hopkins Aramco Healthcare, Dhahran, Saudi Arabia, [1]Associate Professor, Staff Anesthesiologist, Toronto Western Hospital, Clinical Investigator, UHN, University of Toronto, Canada

Address for correspondence: Dr. Abdulkareem S. Alghamdi, Anesthesiology Resident, Department of Anesthesiology, King Fahad Hospital of University, Imam Abulrahman Bin Faisal University, Khobar, Saudi Arabia.
E-mail: alghamdiaks@gmail.com

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the resources frequently utilized when caring for elderly patients postoperatively.

The Trajectory of Recovery from Anesthesia in the Elderly

Recovery is defined as the return to preoperative baseline values or better. It is a multidimensional state that consists of physiological, cognitive, functional, nociceptive, and emotional domains.[5] Recovery measurement scores provide a rationale for deciding to discharge patients from the PACU. Due to the physiological changes that accompany the older population in coexistence with their susceptibility to old-age-related diseases, elderly patients perioperatively are at increased risk of impaired recovery after exposure to general anesthesia and increased postoperative complications. Most elderly patients had a higher classification of the ASA, generally ASA class II or higher.[5] In many studies addressing elderly patients, 10% or less of their study population was classified as ASA class I. Likewise, these studies exhibited that more than 70% of elderly patients were ASA class II or higher.[6] Furthermore, a high American College of Cardiology (ACC) surgical risk score was associated with advanced age.[7] This can highlight the coexisting medical state of elderly patients, leading to an increased incidence of postoperative complications, a longer length of hospital stay (LOS), a higher rate of postoperative intensive care unit (ICU) admission, extra monitoring, multidisciplinary care, and increased cost. Extreme age is a known factor for delayed emergence from general anesthesia.[8] The progressive aging-related decline in central nervous system (CNS) function and increased sensitivity to CNS-active medications such as anesthetics, opioids, and benzodiazepines account for this.[9]

Elderly patients tend to have a lower post-anesthetic recovery score than young patients after exposure to general anesthesia. Lertakyamanee *et al*.[6] compared immediate post-anesthetic recovery scores between young, middle-aged, and elderly age groups. Their study revealed that the elderly age group had a lower post-anesthetic recovery score upon arrival and at 15, 30, and 60 minutes spent in the PACU. Moreover, Cristelo *et al*.[10] observed in their study that elderly patients had inadequate early postoperative recovery due to a low Richmond Agitation and Sedation Scale (RASS) measured until 15 minutes postoperatively. In addition, elderly patients exhibit poorer psychomotor recovery postoperatively. In their study, Kubitz *et al*.[11] used recovery tests both pre- and postoperatively in very elderly patients who were 80 years of age or older. Using a critical flicker fusion frequency (CFF) and short-term memory tests, they detected a slight psychomotor impairment until two hours after anesthesia compared with the baseline values. Nevertheless, no difference in the baseline values was noted on the first day after surgery.[11] In other literature, when compared to young adults, elderly patients had a significantly prolonged psychomotor recovery after propofol sedation infusion.[12]

Elderly patients are more likely to stay longer in the PACU than the younger population. It was noted that 42% of the young patients spent less than 60 minutes in the PACU. However, only 26% of the elderly patients spent less than 60 minutes in the PACU, while the majority of them spent 90 minutes or more.[6] The LOS was directionally proportional to age; studies found that elderly patients above 70 years had a longer LOS and lower post-anesthetic recovery scores compared with those aged 65 to 70 years.[13] Additionally, very old patients had a significantly prolonged LOS.[5,14] Prolonged LOS was identified as LOS that exceeds 24 hours.[10] It was found that 10% of the elderly patients had a prolonged LOS in the PACU; this percentage increased to 24% when an elderly patient developed postoperative delirium (POD). On top of that, the development of POD was associated with increased LOS postoperatively.[10] In some studies, POD was identified as an independent predictor of increased LOS.[15]

Elderly patients are usually at a higher risk of postoperative ICU admission, either emergent or planned. The literature compared postoperative ICU admissions between young, middle-aged, and elderly groups. The rate of ICU admission was 27% in elderly patients, compared with 8% and 14.7% in the young and middle-aged groups, respectively.[6] Furthermore, the literature found that the unplanned ICU admission rate was high among the elderly.[16] Planned postoperative ICU admission is defined as the prearrangement of the ICU bed before anesthesia and surgery.[17] Unplanned postoperative ICU admission is defined as the required ICU admission being made intraoperatively or postoperatively within five days of anesthesia and surgery. Evidently, unplanned or urgent postoperative ICU admission among the elderly is associated with worse outcomes, higher mortality rates, increased complications, and a prolonged ICU stay.[18,19] Obviously, this is due to the high selectivity of older patients undergoing elective surgery and requiring planned postoperative ICU admission.[19,20] Based on the frailty assessment using the Clinical Frailty Scale (CFS), elective ICU admission was significantly lower in frail patients (frailty scale 5–9); only 28.6% of frail elderly patients were electively admitted to the ICU versus 48.1% in non-frail elderly patients. However, 46.1% of frail elderly patients were emergently admitted to the ICU versus 35.4% of non-frail elderly patients, hence supporting the high selectivity for elective surgery and planned ICU admission in elderly patients.[20] Additionally, it was noticeable

that the frailty scale is independently related and inversely proportional to 30-day survival.[20] The 30-day survival rate was less than 60% in frail patients compared with 75% in non-frail patients. Clearly, many researchers in the current literature have addressed the recovery of elderly patients from anesthesia. Thus, the elderly's trajectory of recovery from anesthesia should be acknowledged whenever dealing with a geriatric patient postoperatively.

Common Postoperative Complications of Elderly Patients

Aging is associated with a reduction in the physiological functional reserve in all body systems, and this linear decline occurs at a rate of approximately 0.5% to 1.4% per year and accelerates by the age of 40.[21] Thus, it makes the human body increasingly vulnerable many diseases such as neurological diseases, cardiovascular diseases (CVDs), and pulmonary diseases. Additionally, aging alters the pharmacodynamics and pharmacokinetics of administered medications. Hence, it can attenuate the body in how it interacts with the anesthetics and frequently used medications in anesthesia practice.[22] The elderly showed an adverse event threshold effect at a lower drug concentration than young people, demonstrating a difference in reaction to CNS-active medications between young and old people.[9]

Neurological Complications

Neurocognitive disorders and cerebrovascular diseases are among the most common neurological complications in elderly patients postoperatively.[23] After surgery, impaired neurocognitive function encompasses two entities that are transient as delirium or prolonged as postoperative cognitive dysfunction (POCD). Advanced age, preoperative brain dysfunction, and/or psychiatric illness are predisposing factors for the development of postoperative neurological disorders.[22]

Delirium is defined as an acute, fluctuating state of disturbed attention over a short period of time.[24] The fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) established the diagnostic criteria for delirium, which include disturbances in attention, cognition, and/or awareness that develop over a short period of time [Table 1].[25] It can be categorized into hyperactive, hypoactive, and mixed types of delirium. POD is significantly associated with worse patient outcomes; it has been linked to increasing the likelihood of POCD, early dementia, and exacerbation of underlying neurodegenerative disease (e.g., Alzheimer's disease).[24] Moreover, POD is associated with increased mortality, prolonged hospitalization, reduced quality of life, and healthcare costs.[10,15,23,26] Its incidence ranges from 5% to 52% after noncardiac surgery in elderly patients, yet it is usually underdiagnosed by medical professionals.[27] Delirium can be screened using the confusion assessment method (CAM), which consists of four domains: 1) acute onset and fluctuating course; 2) inattention; 3) disorganized thinking; and 4) altered level of consciousness.[28] Aside from aging and frailty, other modifiable risk factors for POD should be addressed and prevented to improve outcomes. It is important to recognize that the interplay between predisposing factors and precipitating factors will increase the incidence of POD. For example, an elderly patient with predisposing factors will likely develop POD if exposed to a few precipitating factors. However, a young patient with no predisposing factors will be less likely to develop POD when exposed to the same precipitating risk factors. Acute pain is a precipitating factor for POD[29]; however, the current literature lacks the exact mechanism by which pain contributes to POD.[30] Inadequate analgesia may worsen delirium; thus, pain should be controlled, and pain medications should be employed. However, opioids tend to increase the tendency for the development of POD and may worsen delirium.[31] Additionally, the use of benzodiazepines is associated with longer episodes of delirium.[31] Hypothetically, a subanesthetic dose of ketamine was assumed to prevent POD. Contrary to the hypothesis, the Prevention of Delirium and Complications Associated with Surgical Treatments (PODCAST) study reported no difference in delirium incidence between the ketamine group and placebo.[32] Instead, there was a notable increase in postoperative hallucinations and nightmares.[32] Elderly patients' exposure to anticholinergic medications increases the risk of POD by 2.7-fold.[33] Another perioperative risk factor for POD is high glycemic variability. Lin *et al*.[34] prospectively analyzed groups of patients postoperatively and reported that the increased mean blood glucose level was significantly higher in the delirium group on admission

Table 1: DSM-5 diagnostic criteria for delirium

A disturbance in attention (reduced ability to direct, focus, sustain, and shift attention) and awareness (reduced orientation to the environment).
The disturbance that develops over a short period (usually hours to a few days) represents a change from baseline attention and awareness and tends to fluctuate in severity during a day.
An additional disturbance in cognition (e.g., memory deficit, disorientation, language, visuospatial ability, or perception).
The disturbances in criteria A and C are not better explained by another preexisting, established, or evolving neurocognitive disorder and do not occur in the context of a severely reduced level of arousal, such as a coma.
There is evidence from the history, physical examination, or laboratory findings that the disturbance is a direct physiological consequence of another medical condition, substance intoxication or withdrawal (i.e., due to a drug of abuse or to a medication), or exposure to a toxin, or is due to multiple etiologies.

DSM-5, the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition

and postoperatively. Conversely, even mild hypoglycemia is associated with postoperative alterations in cognitive function.[35] Nevertheless, tight intraoperative glycemic control versus standard glycemic control is associated with increased episodes of hypoglycemia, which may lead to delirium and other serious adverse outcomes.[36]

POCD is defined as a transient new decline in patients' cognitive abilities that emerges after surgery and anesthesia.[37] Unlike delirium, which is developed shortly postoperatively, POCD tends to be a long-term cognitive impairment and is sometimes discovered one year after surgery.[38] Additionally, all patients with delirium have attention disturbances; however, patients with POCD manifest impairments in other domains of cognition such as memory and psychomotor ability.[39] The onset of POCD can be noticeable seven days after surgery; a cognitive impairment developed immediately after surgery is attributed to other causes such as delirium, and the presence of POCD will be unlikely.[38] The diagnosis of POCD requires psychometric testing performed pre- and postoperatively;[37] this means POCD cannot be diagnosed unless the patient has been neuropsychologically examined before the surgery. POCD may happen at any age; however, the incidence increases in patients over 60 years.[40] In one study, the incidence of POCD was measured at hospital discharge and three months after surgery. Elderly patients were more likely to develop POCD (41.4%) compared with young and middle-aged groups (36.6% and 30.4%, respectively).[40] Furthermore, three months after surgery, the incidence of POCD doubled in elderly patients compared with young and middle-aged patients.[40] The mortality rate in the first three months after surgery was higher in patients who developed POCD. Similarly, patients who developed POCD on hospital discharge and three months after surgery were more likely to die in the first year after surgery.[40] According to some literature, the incidence of developing POCD is higher in patients with preexisting neurological disorders, for example, dementia, and in patients with coronary artery disease.[37] A retrospective study found that among different cardiac surgeries, coronary artery bypass grafting (CABG) was most commonly associated with POCD, with a rate of 37.6% on day 7 and 20.8% in the third month postoperatively.[41] POCD's time frame and its effect on quality of life tend to be more severe in elderly patients.[42] Social long-term effects of POCD include increased mortality, early voluntary retirement, and decreased quality of life.[43] A rising hypothesis derived from the animal model suggests the role of neuroinflammation in POCD. It is hypothesized that neuroinflammation from surgery and exposure to anesthesia are major contributors to the development of POCD.[44] Despite the insufficient knowledge of the etiology of POCD, many researchers have attempted to prevent it, but the evidence is still scarce.[43] Ballard *et al*.[45] examined the optimized anesthesia level to reduce the rate of POCD. With a combination of bispectral index monitoring and cerebral oxygen saturation monitoring, the results show the benefits of intraoperative monitoring of the anesthetic depth and cerebral oxygenation to reduce POCD.

Perioperative stroke is a potentially devastating complication, and it is associated with an eightfold increase in mortality.[46] The Society for Neuroscience in Anesthesiology and Critical Care Consensus Statement defined a perioperative stroke as an ischemic or hemorrhagic brain infarction that happens during surgery or within 30 days after surgery, including the development of stroke after recovery from anesthesia.[47,48] With the exclusion of cardiac, carotid, neurological, and major vascular surgery, the incidence of perioperative stroke was reported as one per 1,000 cases.[46] In other literature, the incidence of perioperative stroke ranged from 0.2% to 0.7%.[49,50] Elderly patients, 65 years of age or older, are more likely to develop perioperative stroke even in non-high-risk procedures.[47] Apart from other risk factors for stroke, advanced age, history of stroke or transient ischemic attack, and renal failure were at the top of the list of the most reported risk factors in the literature.[47] A principal goal is to preserve cerebral perfusion pressure in high-risk patients for stroke. Likewise, hyperglycemia in these patients is deleterious and may exacerbate cerebral ischemia.[51]

Postoperative neurological diseases develop because of the interplay between predisposing and triggering factors. With regard to their effects on quality of life and increased mortality rate, delirium and POCD have a substantial economic impact on healthcare costs. Efforts to alleviate this burden are needed and should be directed toward mitigating the risk of these disorders.[26] Guidelines should be implemented at the institutional level and communicated to healthcare professionals caring for elderly patients perioperatively to improve neurological outcomes.

Cardiovascular Complications

Elderly patients' perioperative outcomes are mostly impacted by age-related cardiovascular alterations.[52] The overall lifetime risk for developing any CVD, including fatal and nonfatal, at the age of 45, was found to be 60.3% in men and 55.6% in women.[53] Apart from aging-related risks, other risk factors include smoking, hyperlipidemia, hypertension, and diabetes mellitus. Death from cardiovascular events occurred far less frequently in people whose risk factor profiles were optimal than those with two or more risk factors (4.7% vs.

29.6% in men and 6.4% vs. 20.5% in women), even at age 80.[54] Additionally, postoperative cardiovascular events developed in patients with preexisting CVD at a higher rate than in patients without preexisting CVD (44.6 vs. 16.3 per 1000 patients, respectively).[55] Perioperative cardiac risk stratification guidelines by the American Heart Association are an essential tool to mitigate the risk of cardiac events perioperatively.

Postoperative myocardial ischemia or infarction is a catastrophic outcome in elderly patients. In one study of a group of elderly patients following total hip arthroplasty, total knee arthroplasty, and spinal fusion surgeries, postoperative cardiac complications occurred in 31%, including arrhythmias (56%).[56] The incidence of postoperative myocardial ischemia in high-risk patients was 8.7%, but the incidence of documented myocardial infarction (MI) and serious cardiac complications was 1.2% to 2%.[56] In the event of postoperative MI, the one-year mortality rate was reported to be as high as 37%.[57] A primary goal for high-risk patients is to maintain a balance between oxygen supply and demand perioperatively.[58] Hemodynamic instability throughout the surgery is not uncommon and is associated with postoperative cardiac events and increased mortality. Intraoperative hypotension (IOH) is not uniformly defined, and depending on the definition used, the incidence varies from 5% to 99%.[59] The effect of IOH on the risk of perioperative MI was studied, and the analysis appreciated that IOH was an independent risk factor for perioperative MI.[60] The risk of MI increased linearly with increasing IOH; a reduction in systolic blood pressure of 41 to 50 mm Hg from baseline was associated with a threefold increased risk of MI.[60]

Acute postoperative hypertension (APH) in the immediate postoperative period can result in severe cerebrovascular, cardiovascular, or surgical site complications and frequently necessitates intervention. It was found to be more prevalent in elderly patients aged over 65 years than in younger patients (27.4% vs. 19.5%, respectively).[61] The overall incidence following major noncardiac surgery was 30.1%.[61] The treatment of APH should be individualized, and other causes such as pain, anxiety, hypoxemia, and hypothermia should be addressed before initiating antihypertensive agents.[62]

New-onset postoperative arrhythmias following major surgery are common in the elderly, with atrial fibrillation (AF) being the most common type. Around six percent of elderly patients have a history of AF, and this percentage increases to ten percent over the age of 80.[63] Postoperative AF (POAF) may lead to serious thromboembolic events, increased hospital LOS, increased resource utilization, and increased 30-day postoperative mortality.[64] The incidence of POAF following off-pump CABG surgery was studied; POAF developed in 48.3% of the cohort population, and 79.31% of the participants restored sinus rhythm.[65] Prophylactic strategies, such as the administration of amiodarone, beta-blockers, statins, angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), and ascorbic acid, have been shown to reduce the incidence of POAF after cardiac surgeries in the current literature.[66] The American Heart Association guidelines on perioperative evaluation and management advise the continuation of beta-blocker therapy during the perioperative period.[64] Acute withdrawal from beta-blockers is associated with adverse outcomes, including mortality.

Postoperative cardiovascular complication incidence increased with aging. Their burden on morbidity, mortality, and resource utilization is significant. The implementation of international guidelines and general consensuses for risk stratification helps reduce these events in high-risk patients.

Pulmonary Complications

Chronic obstructive pulmonary disease (COPD) and interstitial lung disorders are more common in the elderly population.[67] Approximately one-fourth of all deaths occurring within a week of surgery are due to pulmonary complications, making them the second most prevalent cause of serious morbidity after cardiovascular events.[68] The incidence of postoperative pulmonary complications (PPCs) increases with age. The incidence ranges from 1% to 23% following a major surgery.[69] PPC was reported as 7.7% in one observational study, with pleural effusion, atelectasis, and pneumonia being the most prevalent.[70]

Age above 65 years is linked to PPCs as an independent risk predictor.[68] Predictors for PPC include age >65, smoking, obesity, a history of COPD, bronchial asthma, and obstructive sleep apnea (OSA).[68] The duration of surgery is an independent risk predictor for PPC. Moreover, the type of anesthetic technique is another risk predictor. Compared to general anesthesia, regional anesthesia has been shown to reduce the risk of PPC. Adjunctive regional anesthesia techniques (such as neuraxial and peripheral nerve blocks) were associated with lower PPC in high-risk patients versus general anesthesia alone.[71]

The most prevalent form of PPC is atelectasis, leading to hypoxemia[68]; other forms include exacerbation of

preexisting lung disease, pneumonia, aspiration pneumonia, bronchospasm, respiratory failure requiring mechanical support, acute respiratory distress syndrome, and pulmonary embolism.[69]

COPD was linked to the development of pneumonia and respiratory failure postoperatively.[72] Perioperative continuation of inhalers (e.g., beta-2 agonists) in patients with COPD should be maintained.[73] It was reported that preoperative inhalation in patients with COPD significantly reduced the risk of PPC. Steroids with chronic use in COPD patients should not be stopped preoperatively, and the need for a surgical stress dose of steroids may be considered.

The prevalence of OSA is twofold higher among the elderly than the younger population. Studies estimate its range to be between 13% and 32%.[74] Suspicion of OSA should be raised when preoperatively assessing a geriatric patient with frequent falls, nocturia, psychological disorders, cognitive impairment, and a decrease in attention.[22] Vigilance in anesthetic management must be carried out when dealing with known or suspected patients with OSA.

The activity of respiratory muscles is impaired following major surgery. Pain, the use of postoperative opioids, and neuromuscular blocking agents are contributing factors to respiratory muscular dysfunction.[69] Epidural analgesia is associated with more favorable postoperative outcomes in COPD patients undergoing major abdominal surgery.[75] The 30-day mortality rate and postoperative pneumonia were lower in patients who received postoperative epidural analgesia.[75] The use of long-acting neuromuscular blocking agents results in a residual block postoperatively, which in turn increases the risk for PPC. It was found that patients who were given pancuronium were more likely to experience residual block than those who were given atracurium or vecuronium (26% vs. 5%).[76] A higher rate of PPC was found in patients with residual block who received pancuronium than those who were given atracurium or vecuronium (17% vs. 5%). A non-pharmacological approach (e.g., incentive spirometry) is frequently used postoperatively; yet, there is no current clinical evidence regarding its effectiveness in PPC prevention.[77] However, due to its usability, incentive spirometry is widely utilized.

Endotracheal reintubation after planned extubation is a major event. Although the overall rate is low,[78,79] when the incidence of reintubation in PACU was analyzed, elderly patients had a significantly higher rate; they comprised more than a third of the population and had ASA classifications III to IV. The most common cause of reintubation was respiratory insufficiency, with excessive sedation and the residual effect of muscle relaxants being the major contributing factors. Other risk factors were reported in a recent systematic review and meta-analysis; they include ASA ≥3, COPD, thoracic surgery, airway surgery, head and neck surgery, sepsis, and deep venous thrombosis.[80] The requirement for reintubation is associated with increased complications, increased mortality, prolonged LOS, and higher healthcare costs.[79]

Postoperative Pain

There are a lot of challenges to overcome while treating postoperative pain in the elderly. Although proper analgesia is required to prevent complications from preexisting systemic diseases, care must be taken when selecting pain medications to account for potential unwanted effects. Rather than relying solely on systemic opioids, the current standard of care emphasizes a multimodal approach to reduce the risk of adverse outcomes such as cognitive dysfunction and respiratory depression, the latter of which may induce Cardiovascular (CVS) events and PPC. Compared to opioids, the multimodal approach reduced hospital LOS and opioid consumption, but no difference in the mean pain score was detected.[81]

As mentioned in this article, the use of neuraxial and regional anesthetic techniques provides excellent postoperative analgesia and is associated with decreased postoperative complications. A single-center randomized clinical trial reported that lumbar erector spinae plane block for elderly patients undergoing femoral fracture fixation provided adequate postoperative analgesia, reduced opioid requirement, and reported no incidence of postoperative hemodynamic instability or respiratory complications.[82] Peripheral nerve blocks for total knee replacements offered greater intraoperative stability and improved postoperative recovery quality compared with general anesthesia, which is consistent with these findings in other literature.[83] In elderly patients, surgical stimulation and the concomitant stress response are associated with an increased risk of morbidity. Regional anesthesia has the potential to mitigate a portion of the surgical stress response and should be considered as part of a multimodal and, if feasible, the main anesthetic approach in elderly patients.[84]

The majority of commonly employed analgesic regimens in the younger population are suitable for geriatric patients. Appropriate evaluation of treatment efficacy, tolerability, and monitoring of adverse effects should be implemented.[85]

Hypothermia

The hypothalamus mediates body thermoregulation mechanisms that cause a vasomotor reflex in response to hypothermia. Decreased muscle mass affects resting heat

production by about 20% in elderly patients, thus making them more susceptible to hypothermia.[52] Shivering is less effective at correcting hypothermia in younger patients. Postoperative shivering increases oxygen consumption, heart rate, and blood pressure. In the PACU, maintaining normothermia with active warming as needed may reduce the risk of ischemic events.[22]

Postoperative Nausea and Vomiting (PONV)

PONV can result in patient dissatisfaction, prolonged PACU time, and unplanned hospital admission in ambulatory surgical patients. Because its incidence is associated with younger ages, surgical and anesthetic factors contribute significantly to PONV. The prophylaxis or treatment of PONV should be carefully chosen to reduce the risk of unwanted side effects, such as anticholinergic drugs. Opioids increase the risk of PONV, so alternatives to opioid analgesia should be considered instead of their exclusive use.[22]

Postoperative Urinary Retention (POUR)

POUR is the inability to void despite having a full bladder following a surgical procedure.[86] POUR is associated with acute and severe pain; the autonomic response to an overdistended bladder may lead to vomiting and hemodynamic instability.[86] The incidence increases by more than twofold with increasing age.[86] Anesthetic technique impacts normal micturition; poor pain control, systemic opioids, and intrathecal opioids have been linked to an increase in the incidence of POUR.[22,87] The development of POUR was associated with an increase in LOS.[86]

Recommendations for the Elderly Surgical Patient

As the development of postoperative complications may affect surgical outcomes in elderly patients, it is advised to adhere to the literature's evidence-based recommendations. Enhanced recovery after surgery (ERAS) protocols have been associated with improved postoperative outcomes. In general, the absence of a nasogastric tube, early mobilization, oral nutrition, removal of the urinary catheter, and the use of nonopioid analgesics predicted lower morbidity and shorter hospitalization.[88] The Italian intersociety consensus for the Perioperative Management of Elderly Patients (PrIME) includes multiple recommendations. All patients with delirium should receive individualized multidisciplinary care, which includes sleep–wake rhythm preservation, early mobilization, adequate hydration and nutrition, and the provision of auditory and visual aids for patients with functional impairment.[89] Effective pain management contributes to reduced postoperative morbidity. To avoid the side effects of analgesics, the analgesia strategy for elderly patients should be multimodal. Regional and neuraxial techniques can reduce the requirement for postoperative analgesics. Non-pharmaceutical analgesic modalities include acupuncture, music therapy, body positioning, and massage. Even though PONV is associated with younger age, approximately 15% of elderly patients suffer from dysphagia, and this number can rise to 50% in the presence of neurological disease.[22] The presence of dysphagia and PONV can increase the risk of aspiration pneumonia; therefore, the risk factors of PONV should be evaluated and the most effective preventive measures should be implemented to reduce this risk. Avoiding hypovolemia and dehydration requires adequate hydration and the proper administration of intravenous fluids. To prevent renal injury, it is advised to avoid hypovolemia through adequate hydration. Several studies have shown a correlation between malnutrition and adverse outcomes in elderly patients, and the literature indicates that early feeding is not harmful in certain cases. Enteral nutrition is associated with shorter hospitalization and decreased cost. Thus, nutritional support should be instituted as soon as possible after surgery to enhance recovery. Patients with signs and symptoms of dysphagia or a history of aspiration pneumonia are, however, advised to undergo a swallowing evaluation. It is recommended that the head of the bed be elevated throughout feeding, and the patient should remain erect for one hour after feeding. Additionally, until 5 days postoperatively, the evaluation of fluid status and caloric intake should be performed.[89]

Conclusion

In conclusion, the proportion of elderly patients encountered by anesthesiologists is significant and is anticipated to rise in the future. When treating elderly patients, it is essential to consider the physiological changes and coexisting medical conditions that are prevalent. Employment of the guidelines and evidence-based scope of practice should reduce the incidence of common postoperative complications in the elderly. The occurrence of these complications can result in mortality, prolonged hospitalization, and increased costs.

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