Surgery in the Elderly

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Abstract:

Geriatric age usually begins after 65, which slowly and steadily the elderly starts a decline physiologically in all his vital organs, in the heart myocyts decrease in number and fibrosis and fat replaces it, so the elderly developes conduction problems, cardiomegaly due to replacement of fat, Contraction of ventricles decreases, and atrial loose its Kick and pulmonary congestion ensues. The lungs also loose elasticity and loss of alveoli and as a result poor oxygen intake. The brain decreases its cognitive function and memory loss; and may develop delirium post operatively, the immune system gets short of B-cells and T-cells and gets prone to infection post surgery. Usually elderlies have co-morbid diseases, such as malignancy, diabetes, severe arthrosis. Cataract and heart and lungs problems; prostatism, fracturs that all together makes it a difficult postop course.

***Keywords:** geriatiric surgery, - elderly patients, - preop and postop care of elderlies*

Background and Objective

In recent decades, there has been a marked increase in life expectancy. For instance, a woman aged 65 today can anticipate an additional 20 years of life, a dramatic improvement compared to life expectancy standards from a century ago. This extension of longevity has led to a heightened prevalence of chronic diseases that historically incapacitated individuals prior to reaching old age. Presently, over 75% of individuals aged 65 and older are affected by at least one chronic condition. In the United States, one in five Medicare beneficiaries is managing five or more chronic illnesses, including a range of malignancies, degenerative

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joint diseases, cardiovascular conditions, and visual impairments—many of which may necessitate surgical intervention as part of the treatment regimen. The demographic shift is particularly noteworthy, as Americans born post-World War II, commonly referred to as Baby Boomers, have now reached retirement age. While many within this demographic are capable of managing their daily activities independently, the rapidly increasing aging population signifies an impending rise in the demand for healthcare services, a trend likely mirrored in various parts of the world, including our own nation.[1-4]

When considering surgical interventions in the elderly, healthcare providers must recognize two fundamental imperatives. Firstly, the manifestation of diseases (including history, onset, and symptoms) frequently differs between younger adults and the elderly, necessitating a recalibrated approach from medical practitioners. Secondly, the physiological, psychological, and emotional dimensions of aging diverge considerably from those of younger populations; thus, treatment decisions should be tailored to honor the elderly patient's informed consent and perspective, emphasizing interventions that prioritize their well-being.[3,4,5]

In certain circumstances, it may be prudent to prioritize comfort and pain management over aggressive treatment options, ensuring that the remaining years are spent with dignity and ease, rather than pursuing elusive curative treatments that could extend life at the expense of quality—a scenario that often culminates in extended stays in nursing homes or recovery facilities fraught with complications.[6-9]

Clinical Symptoms and Medical History

Recent data indicate that a significant proportion of trauma cases in emergency departments now involve elderly patients presenting with severe fractures resulting from falls, overshadowing the traumas typically observed in younger adults. Falls represent the leading cause of injury among individuals aged 65 and older. Although the mechanisms of injury may be less severe compared to those experienced by younger individuals, the resultant fractures can be serious and life-altering. Such injuries can incapacitate elderly individuals for prolonged periods or substantially diminish their quality of life; in some cases, they may ultimately lead to fatal outcomes.[8,9,10]

The subjective symptomatology reported by elderly trauma patients, alongside observable clinical signs, often diverges notably from those seen in younger adults. Symptoms in the elderly may be less pronounced, resulting in potential misinterpretations by medical professionals and delays in appropriate treatment. For instance, an elderly patient may present with an acute condition such as cholecystitis, often in a state of advanced complication involving common bile duct stones, whereas younger patients typically seek care at earlier stages during episodes of biliary colic, undergoing surgical intervention only when absolutely necessary. Moreover, in some instances, the conditions of elderly patients may deteriorate to the extent that open surgery becomes indispensable, particularly for those over the age of 80, leading to extended hospital stays and, at times, subsequent procedures.[10-12]

Statistical evidence suggests that while appendicitis is less frequent among the elderly, it manifests with perforation in 50% of instances, in contrast to approximately 25% in younger populations. This highlights the importance of maintaining a high level of suspicion for serious conditions in elderly patients, especially when they present with vague or minimal symptoms accompanied by signs of psychological distress.[10-12]

Decision to Perform Surgery

For general surgeons managing emergency cases, the presence of an elderly patient with multiple comorbidities poses significant challenges, particularly as decisions often must be made rapidly in the context of potentially life-threatening conditions that could arise from surgical delays. In these circumstances, surgeons frequently focus on the short-term mortality and morbidity risks inherent in surgical procedures. However, for the elderly patient, the prospect of losing physical independence and the ability to manage personal affairs may be perceived as more profoundly distressing than the risk of mortality itself. Therefore, it is imperative for surgeons to incorporate considerations of comfort and long-term quality of life into their decision-making processes. Remarkably, statistics indicate that more than one-third of

Medicare patients in the United States undergo surgical procedures in the final year of their lives. Although this figure varies globally, it is noteworthy that elderly individuals universally resist the prospect of spending their remaining years confined to hospitals or nursing facilities, even if this may come at the potential expense of their longevity. In conclusion, effective surgical care for the elderly necessitates a nuanced understanding of their unique needs and challenges, calling for an approach that balances immediate medical interventions with considerations of long-term quality of life.[1,15-17]

In surgical practice, a procedure is typically deemed successful if the patient experiences no morbidity or mortality within one month post-operation. However, this benchmark shifts when assessing outcomes for elderly patients. For older adults, the success of surgery is often defined by their ability to resume pre-operative activities and daily tasks.[18,19] In fact, for a number of very elderly individuals, undergoing a surgical procedure that does not restore their physical independence may be perceived as a fate worse than death. Many elderly patients may regard cognitive decline and functional impairment following surgery as more distressing than the prospect of mortality itself. The decision to proceed with surgical intervention is frequently influenced heavily by the treating physicians and family members, who may advocate for aggressive interventions despite the possibility of adverse outcomes. To optimize surgical results and recovery, it is advisable to direct elderly patients to specialized facilities, such as Higher Dependency Units (HDU), which are uniquely equipped to address the complexities associated with elder care.[19,20]

Palliative Care Considerations

In the later stages of life, numerous elderly patients express a preference for palliative care as opposed to aggressive treatment modalities. For patients facing a poor prognosis, discussions surrounding palliative measures become imperative. While palliative care does not aim to address the underlying disease, it plays a critical role in alleviating distressing symptoms, thereby enhancing the quality of life for frail elderly individuals and their families. Frequently, the initiation of palliative care is associated with improved emotional well-being and, in certain cases, may even prolong life, particularly when both the physician and surgeon concur that it represents the most appropriate course of action.[17-19]

Physiological Decline and Functional Impairments

Aging results in a general decline in physiological function across all organ systems; however, the extent of this deterioration varies among individuals. At rest, some physiological declines may be attenuated, enabling older patients to sustain acceptable levels of functioning.[18-20]

Conversely, during periods of illness or postoperative recovery, reliance on diminished physiological reserves can result in an accelerated decline in function. This age-related phenomenon, termed homeostenosis, necessitates that elderly individuals increasingly draw from their physiological reserves to sustain essential organ function. When confronted with illness, the depletion of these reserves frequently culminates in organ failure.

Cardiovascular System Dysfunction

Cardiovascular disease constitutes the most prevalent condition affecting the elderly, accounting for 83% of deaths among individuals aged 65 and older in the United States. Approximately 1% of elderly patients experience heart failure, rendering congestive heart failure one of the primary complications following surgery within this demographic. As individuals age, the heart undergoes degenerative changes that compromise both function and structural integrity. Morphological alterations in myocardial cells, coupled with declines in collagen and elastin levels, can lead to disturbances in nerve conduction and resultant arrhythmias.[19-21]

Additionally, valvular calcification and sclerotic changes in coronary vessels impede normal function, contributing to increased cardiac afterload. Noteworthy is the fact that while systolic pressure is generally preserved, cardiac output and ejection fraction typically remain stable in the face of rising loads from vascular sclerosis. While younger individuals' physiological responses to exertion are facilitated by increased heart rates, this compensatory mechanism is often diminished in older adults due to a relative decline in sympathetic nervous system activity.[19,20] The elderly heart's reliance on preload indicates that even minor dehydration can significantly impair function. Diastolic dysfunction becomes increasingly prevalent, with half of heart failure cases in individuals over 80 linked to issues with diastolic pressure, as this phase of cardiac activity demands a greater oxygen supply than systolic movement. Consequently, an adequate oxygen supply is vital; deficits can precipitate pulmonary congestion. Furthermore, diminished atrial contraction further compromises cardiac function. Presentation of cardiac symptoms in elderly individuals may differ from those in younger adults; for example, while chest pain is typically the primary symptom of myocardial infarction in younger patients, up to 40% of older adults may exhibit symptoms such as shortness of breath, syncope, confusion, or strokes.

Respiratory System Changes

Respiratory complications rank as the fourth leading cause of mortality among older adults, following cardiovascular disease, cancer, and stroke. Surgical outcomes are often complicated by reduced thoracic cage compliance, diminished lung elasticity, and an imbalance between ventilation and perfusion. These physiological changes result in decreased maximum pulmonary volume and weakened protective mechanisms within the airways—factors that substantially heighten the risk of aspiration.[20-22]

Renal System Changes

The aging process exerts a significant impact on renal function, characterized by a reduction in nephron numbers, decreased tubular reabsorption capacity, and diminished renal blood flow and glomerular filtration rates (GFR). Even when serum creatinine levels remain within normal ranges, creatinine clearance may be considerably reduced in elderly individuals.

Furthermore, diminished sensitivity to hydration, slower clearance of medications, and urinary tract dysfunction can lead to infections and complications associated with sodium retention and alterations in acid-base balance.[22-24]

Hepatobiliary Changes

Overall liver function in the elderly exhibits some preservation; however, changes such as alterations in liver volume and structure, reduced hepatic blood flow, and diminished drug clearance can result in various complications. The presence of gallstones is particularly concerning, as they represent a common etiological factor for abdominal surgery in older adults—statistics indicate that up to 80% of nonagenarians in nursing homes are affected by gallstones and their associated complications.[23,24]

Immune System Changes in the Elderly

The aging process induces a decline in the body's hematopoietic system, leading to a reduced number of stem cells within the bone marrow. This reduction hampers the production of essential T cells and B cells in the thymus and bone marrow. As levels of thymic hormones diminish, naive T cells transition into memory T cells, while B cells undergo notable alterations. Consequently, older adults may not exhibit the typical increase in white blood cell (WBC) counts in response to infections. While variations in the differential count may still suggest the presence of infection, the overall WBC count may remain unremarkable. Moreover, alterations in immunoglobulin levels contribute to elevated inflammatory cytokines and an increase in autoantibodies, resulting in a diminished resistance to microbial and viral infections. Consequently, older individuals become increasingly susceptible to these pathogens. Additionally, the stress associated with surgical interventions—both psychological and physical—further exacerbates immune suppression in the elderly.[24-27]

Glucose Homeostasis

Research indicates that approximately 20% of individuals over the age of 60 are diagnosed with type 2 diabetes. Furthermore, another 20% present with normal fasting blood sugar (FBS) levels yet exhibit postprandial glucose levels exceeding 140 mg/dL, although not surpassing 200 mg/dL. This state of glucose intolerance may arise from decreased insulin secretion, insulin resistance, or a combination of both factors. Age-associated declines in beta cell function impede their capacity to respond effectively to rising glucose levels under hyperglycemic conditions.

Additionally, changes in body composition complicate glucose regulation in older individuals, characterized by decreased muscle mass and increased fat mass, potentially independent of chronological age. This dynamic presents particular challenges for older individuals with comorbidities in managing hyperglycemia effectively. Surgical stress can further amplify these challenges, increasing the risk of postoperative infections due to suboptimal glucose control. Historically, patients with diabetes were maintained on insulin infusions to keep blood glucose levels within the 80 to 110 mg/dL range; however, recent studies suggest that maintaining glycemia below 180 mg/dL may be adequate.[26-29]

Preoperative Evaluations

Extensive gastrointestinal surgical procedures convey heightened mortality and morbidity risks in older adults, with these rates escalating with advancing age. Interestingly, infants and the elderly encounter analogous health challenges: while infants often present with congenital defects, the elderly frequently suffer from degenerative diseases.

Moreover, both populations may manifest atypical symptoms, necessitating careful assessments by caregivers. Homeostasis is compromised in both groups, rendering them particularly sensitive to dehydration. Infants may struggle to articulate their thirst, whereas elderly individuals frequently exhibit a diminished thirst response or may entirely lose this sensation—an occurrence referred to as homeostenosis. Psychologically, both demographics may display agitation without apparent cause and often struggle to adhere to medical recommendations from family members. To effectively prepare elderly patients for surgical interventions, healthcare providers should take into account the following thirteen key considerations:

1- Evaluate the cognitive abilities of the individual, encompassing recognition and discrimination, prior to surgery.

2- Assess the patient's level of depression.

3- Identify potential risks of hallucinations and delirium preoperatively and postoperatively.

4- Investigate possible alcohol and substance abuse.

5- Conduct a comprehensive cardiac evaluation in accordance with established guidelines.

6- Identify factors that may predispose the patient to respiratory complications post-surgery.

7- Document the patient's physical performance status and history of falls.

8- Measure frailty according to established criteria.

9- Assess the patient's nutritional status and determine the necessity of intravenous nutrition pre- and post-operatively.

10- Review current medications to avert adverse drug interactions and polypharmacy.

11- Discuss the patient's goals and expectations regarding the surgical intervention.

12- Consider the emotional and financial support available from family members.

13- Order requisite clinical and laboratory tests tailored to the patient's age, ensuring that informed consent is appropriately obtained.[28-31]

For consent to be deemed informed and valid, the following aspects should be emphasized:

1- Patients must be provided with clear treatment options following comprehensive explanations from the physician.

2- Patients should demonstrate an understanding of their medical condition based on the provided information.

3- Patients need to be receptive to the selected treatment and cognizant of its potential consequences.

4- They must also comprehend the rationale behind the recommendation of this specific treatment.[32,33]

Depression

Cognitive impairment in the elderly significantly heightens the risk of developing delirium following surgical interventions. Contributing factors include: 1- Advanced age, 2- Cognitive impairment, 3- Functional decline, 4- Malnutrition or inadequate dietary intake, 5- Comorbid conditions, 6- Alcohol abuse, 7- Administration of psychoactive medications, 8- Diminished sensory perception, 9- Nature of the surgical procedure, 10- Serious concomitant illnesses.[32-34]

Numerous factors can exacerbate the onset of delirium, including: 1- Infection 2- Polypharmacy 3- Decreased oxygen saturation levels 4- Electrolyte imbalances 5- Inadequate or excessive pain management 6- Dehydration 7- Sensory deprivation 8- Sleep disturbances 9- Presence of a urinary catheter 10- Unfamiliar environments 11- Physical stressors

Comorbidities

Conducting tests on all organ systems is neither practical nor necessary; a thorough medical history and physical examination typically provide adequate insights for follow-up assessments. It is crucial to maintain vigilance for common comorbid conditions that may arise in elderly patients.

Cardiovascular Considerations

Cardiovascular complications rank among the most prevalent postoperative issues in elderly patients, contributing significantly to increased mortality rates.[32,34]

The primary aim of preoperative evaluations for this demographic is to identify individuals who may necessitate further testing. Patients with a documented history of heart disease should undergo comprehensive evaluations. For many, tolerance to exercise testing, in conjunction with assessments of cardiac function, can yield valuable insights into their overall cardiovascular status.

Measuring Frailty in the Elderly

Frailty Score Assessment: To assess frailty, consider the following questions:

1- Do you require assistance with getting in or out of bed?

2- Do you need help with washing or bathing?

3- Have you experienced an unintentional weight change of 5 kilograms (approximately 11 pounds) in the past six months?

4- Are you contending with oral or dental issues that hinder your ability to eat properly?

5- Do you have a poor appetite and feel satiated quickly after beginning a meal?

6- Does your physical or mental health impact your social activities?

7- Do you experience fatigue easily?

8- How would you characterize your health status: good, average, or poor?

9- Have you been hospitalized in the past three months?

10- Have you visited an emergency room within the last three months?

If you do not encounter any of the aforementioned challenges, you are likely not classified as frail. A score of 1 to 3 indicates a risk of frailty, while a score of 4 or higher signifies significant frailty and vulnerability.[34-36]

Respiratory Complications in the Elderly

Respiratory complications, second only to cardiac issues, pose substantial risks for the elderly, influenced by both age and the extent of surgical procedures. Individuals aged 70 to 79 face heightened risks, which escalate significantly after the age of 80.

Patients are classified using the American Society of Anesthesiology (ASA) grading system, which ranges from I to V:

GI- A person who does not smoke and consumes minimal alcohol.

GII- A pregnant individual with mild respiratory issues, who smokes, consumes alcohol, or is overweight.

GIII- An obese individual (BMI > 40) with a history of alcohol consumption and a pacemaker.

GIV- A person with severe infections, frequent dialysis, and significant cardiac disease.

GV- A patient with a ruptured aorta or serious organ dysfunction.[37,38]

Surgical procedures associated with respiratory complications, in decreasing order of risk, include: aortic aneurysm repair, thoracic surgery, abdominal surgery, upper abdominal surgery, neurosurgery, lengthy operations, head and neck surgeries, emergency surgeries, vascular surgeries, application of general anesthesia, and preoperative transfusions. The risk of respiratory complications in aortic aneurysm cases can vary from 7% to significantly lower rates concerning blood transfusions in other surgical contexts. Elderly patients may present with comorbidities such as a history of stroke, gastroesophageal reflux disease (GERD), poor dental hygiene, and an increased risk of aspiration. Furthermore, cognitive changes and swallowing difficulties may frequently go unnoticed.[37-39]

To assess aspiration risk, an uncomplicated test can be implemented: administer 90 cc of water to the patient for uninterrupted consumption. Should the water induce choking, coughing, or a modification in vocal tone, further evaluation is warranted, although this method can yield a considerable number of false positives. To mitigate the risk of respiratory complications, conducting spirometry to enhance respiratory efficiency is advisable, and encouraging smoking cessation whenever feasible is recommended. If a nasogastric (NG) tube is deemed necessary, it should be employed judiciously and only for brief durations rather than on a routine basis.

Comprehensive preoperative assessments for elderly patients should prioritize several principles, including cognitive functioning, physiological capabilities, degree of physical frailty, polypharmacy, nutritional status, and the support network provided by family, friends, and caregivers. Although smaller medical facilities may be unable to conduct exhaustive evaluations, thorough preoperative assessments remain critical prior to surgical intervention. Key considerations include: Assessing the individual's nutritional needs and making appropriate plans. Identifying discrepancies between physiological and chronological age based on comprehensive evaluations.

Acknowledging that elderly patients may exhibit heightened sensitivity to hypothermia due to a reduced basal metabolic rate (BMR). Hypothermia can disrupt thermoregulation, leading to complications such as coagulopathy, increased bleeding during surgery, cardiac ischemia, and delayed wound healing. Administering spinal and epidural analgesia may be complicated by degenerative spinal disorders, necessitating careful positioning during these procedures to avoid potential injuries, such as disk dislocation or vertebral fractures.[39,40] Extended hospitalization can pose additional risks, including the migration of gallstones to the common bile duct (CBD), leading to jaundice, particularly in patients with prolonged immobilization. Malnutrition constitutes a significant factor contributing to prolonged recovery times and surgical complications among the elderly. Key elements that may lead to malnutrition include:

1- Recent unintentional weight loss. 2- Difficulties in accessing food resulting from factors such as immobility, loneliness, poverty, or cognitive limitations. 3- Lack of interest in food due to depression, loneliness, reduced appetite, or food aversion.[40-42] 4- Eating difficulties arising from dental problems or GERD. 5- Gastrointestinal issues, including diarrhea, constipation, or malabsorption. 6- Chronic systemic diseases, such as lung, liver, kidney, heart diseases, or cancer. 7- Misuse or overuse of medications, including alcohol, which can suppress appetite.

Common ailments such as atherosclerosis, cancer, degenerative joint diseases, cataracts, and prostate issues become increasingly prevalent with advancing age.

Rehabilitation and Recovery Challenges

Postoperative rehabilitation and recovery in older adults are frequently complicated by declines in physiological capacity, with notable reductions in functional abilities occurring within just two days of hospitalization. Prolonged hospital stays can hinder recovery, particularly for patients who relied on mobility aids prior to surgery. Individuals unable to ascend a flight of stairs with a small bag of essentials before surgery are significantly less likely to withstand surgical challenges effectively. The presence of comorbidities and polypharmacy—especially involving multiple medications—complicates recovery outcomes markedly. Additionally, previous emergency room visits correlate with poorer surgical outcomes, and patients exhibiting disorientation or delirium upon admission face further complications.[40-44]

Discussion and Conclusion

As life expectancy continues to rise, a corresponding increase in the elderly population seeking medical care is evident. However, due to diminished organ function, physiological decline, comorbidities, and potential renal insufficiency, this demographic often exhibits a lower tolerance for medications, underscoring the necessity for meticulous prescribing practices.

Their resilience during surgical procedures has also diminished, with atypical symptom presentations leading to delays in diagnosis and treatment. Comprehensive medical histories and thorough physical examinations are imperative; neglecting any exhibited symptoms may result in detrimental delays in care.

Additional diagnostic tests and consultations with specialists may be required to avert premature decisions regarding surgical interventions. Post-surgery, the compromised immunity of elderly patients, relative to younger adults, necessitates vigilant monitoring. The establishment of specialized surgical units for elderly patients, akin to those available in other countries, would represent a valuable advancement in enhancing surgical care for this vulnerable population.

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