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REVIEW ARTICLES

Management of Frailty and its Challenges in Geriatric Patients on General Abdominal Anesthesia

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Abstract

Introduction: In that material, we are doing to informed for frailty, how we can measure it, surgical outcome and its management from the anesthesiologist. Frailty is a condition of decreased physiological reserves that often increases with increasing age and decided in adverse outcomes.

Frailty in elderly surgical patients may be varied from 25,5 -56.1% and is a strong predictor for surgical outcomes.

The anesthetist needs to predict how a geriatric patient will tolerate the stress of surgery and to do what is necessary to protect and save elderly lives.

In Albania, there are almost 439 000 elderly people in 2021 and suspect to 626 000 in 2051. According to the WHO, 1 in 25 persons performed surgery, so the number of geriatric patients that done surgery will be very high.

According to deficits' in function, mobility, cognition, chronic diseases, and geriatric syndromes we can use the clinical frailty scale, the Edmonton Frailty Scale, or frailty index for calculation of frailty.

We need frailty patients to evaluated preoperative risk-classification, intra-operative care, management of general anesthesia, early immobilization as well as treatment of postoperative delirium because frailty increased intra-operative morbidity, increased postoperative complications especially delirium, extends hospitalization, non – home discharge, and mortality.

Anesthesiologists would be always aware to prepare the geriatric patients for surgery, to maintain the intra-operative functional reserve of frailty patients, to manage perfect anesthesia, to realized early mobilization, and discharge back home.

Conclusion: Many geriatric patients have multi-organ problems. Frailty is a practical, unifying concept in the care of these older people that directs attention away from organ-specific diagnoses towards a more holistic viewpoint of the patient and their medical medicament. All geriatric patients need to screen for frailty.

Keywords: Clinical frailty scale, delirium, frailty syndrome, frailty index, general anesthesia.

Introduction

People over 65 years of age have been regarded as elderly and this is still used as a social definition.

Aging is not equal disease, disability or punishment. Aging is a biological process, the progressive physiological changes in an organism that lead to aging or decline in biological functions and the body's ability to adapt to metabolic stress. [1] Getting old is like climbing a mountain; you get a little out of breath, but the view is much better! this phrase of Ingrid Bergman looked very realistic for the elderly people.

In the Albania there are currently 439 thousand people over 65 years of age. In 1979, there were 76.5 thousand people aged 65. Further increases in the number of seniors are projected at 2051, this number is expected to increase to 641 thousand, reaching 667 thousand in 2060.

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The growing number of older people is a direct result of the increased life expectancy, which has been observed over previous decades and that is thought to continue in the coming decades. Actually, is over 77.4 years old for men and over 80.5 years old for women [2]. It follows that there will be ever increasing number of elderly patients presenting for surgery.

Currently, According to World Health Organization the number of surgical operations is estimated to be 250 million a year, or 1 operation each 25 people. In Albania, about 50 000 surgical interventions are realized every year [3] and over 15% of the population are geriatric patients so the demands for surgical interventions increase. The aging a patient is on presentation for surgery, the greater is their risk of morbidity and mortality. Strategies to realize anesthesia and intensive care for reduced and improve outcomes in aging surgical patients will be the theme of this review. Comprehensive geriatric assessment (CGA) is a multidisciplinary diagnostic process that assesses the medical, functional, psychological, and social abilities to ultimately assess the status of weakness and geriatric syndromes. A consequence of age-related decline is the clinical condition of frailty. Frailty assessment and CGA can be applied in risk stratifications such as mortality or morbidity [4]. Frailty is a condition of decreased physiological and/or cognitive reserves that often increases with increasing age to external stressors [5]. However, frailty is a dynamic and not an irreversible process. Frailty in elderly surgical patients may be varied from 25,5 -56.1% and is a strong predictor for surgical outcomes in most clinical situations [6].

Many tools or criteria have been introduced to define frailty in recent years, and the definition of frailty has gradually converged into several consensuses [4-6]. Frailty is a proinflammatory state mediated by disorder and decline across multiple physiological systems. Identification of geriatric patients who are frail or at risk of becoming frail with appropriate subsequent evaluation and intervention constitutes a foundation stone of geriatric medicine [7]. A number of other definitions have also been described in the literature, including FRAIL (Fatigue, Resistance, Ambulation, Illnesses, Loss of weight) (International Academy of Nutrition and Aging) [8]. According to the cardiovascular health study that enroll 5317 geriatric patients, the prevalence of frailty was 6.9% with frailty increasing with age and female sex [9]. An important role according to a large literature for definition of frailty played potential etiologic factors as: aging (increasing with age), genetic& metabolic factor, lifestyle& environment stressor and acute or chronic diseases. It´s suggested several important multisystem path physiologic processes in the pathogenesis of the frailty syndrome, including chronic inflammation and immune activation, and those in musculoskeletal and endocrine systems.

Chronic inflammation is likely a key underlying mechanism that contributes to frailty directly and indirectly through other intermediate path physiologic processes [7].

Although no one operational definition or simple assessment tool has been agreed, a consensus has been suggested that frailty 1) is a clinical syndrome, 2) indicates increased vulnerability to stressors, leading to functional impairment and adverse health outcomes, 3) might be reversible or increased by interventions, and 4) is useful in surgery word [10].

The two main models of frailty are the phenotype model 3 and the cumulative deficit model, which forms the basis of the Canadian Study of Health and Aging (CSHA) frailty index [6,13]. The phenotypic definition of frailty as a geriatric syndrome was proposed by Fried et al as a large-cohort study of over 5,300 community-dwelling older men and women in the US. [6,9,10].

The phenotype of frailty was defined by the presence of three from the following five clinical features: unintentional weight loss (Self-reported weight loss of more than 4·5 kg or recorded weight loss of ≥5% per year), weakness (Grip strength), self-reported exhaustion (3–4 days per week or most of the time), slow walking speed and low physical activity level [6,9-11]. This phenotype was shown to be predictive for falls, hospitalizations, disability and death [9]. Others authors as *Mitnitski et al* [12], define frailty as summery of deficits (symptoms, signs, functional impairment and laboratory abnormalities) and use it to appreciate the individual's level of illness. This model regards successful aging as an efficient damage control process. Failure to do so will lead to accumulation of deficits and to increased biological age (relative to the individual's chronological age).

Study [13], was a 5-year prospective study (n=10263) designed to investigate the epidemiology and burdens of dementia in aging people in Canada (mean age 82 years). Deficits accumulation depended from function, mobility, cognition, chronic diseases and geriatric syndromes .92 baseline variables of symptoms (low mood), signs (tremor), and abnormal laboratory values, disease states, and disabilities (collectively referred to as deficits), were used to define frailty [12]. The frailty index was a summary of the presence or absence of each variable as a proportion of the total and is calculated as the number of deficits the patient has, divided by the number of deficits considered (e.g., 20 deficits present, of a possible 92 gives a frailty index of 20/92=0·22). Thus, frailty is defined as the cumulative effect of individual deficits "the more individuals have wrong with them, the more likely they are to be frail" [14]. *Velanovich and al* modified frailty index score 0-11 points, the presence of each variable was scored as1 point. This may be applicable for the national databases and clinical practice. (Table 1) [16].

This is a mathematical model for frailty because it implies that the frailty index has properties that fully support the idea of reduced homoeostatic reserve. According to Canadian study of health and aging [13,14,15]

Rockwood defined the Clinical Frailty Scale using the terminology of *Streiner and Norman*. Based in a theoretical model of fitness and frailty and the importance of function (which we reported in earlier investigations) [13] our

Functional Status	Score 0	Score 1
History of diabetes mellitus		
History of congestive heart diseases		
History of hypertension requiring medicaments		
History of either transient ischemic attack or cerebrovascular accident		
Functional Status 2 not independent		
History of myocardial infarction		
History of either peripheral vascular diseases or rest pain		
History of cerebrovascular accident with neurological deficit		
History of chronic obstructive pulmonary diseases or pneumonia		
History of percutaneous coronary intervention, prior cardiac surgery or angina		
History of impaired sensorium		

Table 1 modified frailty index score

Clinical Frailty Scale (Table 2) ranges from 1 (robust health) to 7 (complete functional dependence on others).

In order to assess frailty in the elderly, *Rolfson et al*. tested a brief and user-friendly screening interview in both the inpatient and outpatient settings. The "Edmonton Frail Scale" was a valid measure of frailty compared to the clinical impression of geriatric specialists after their more comprehensive assessment. Frailty status that can be assessed using the Edmonton Frailty Scale consists of nine domains examined are: cognition, functional performance, general health status, functional independence, social support, pharmacological condition, nutritional aspect, mental condition and continence and eleven items, each scoring 0 points (frailty absent or normal health), 1 point (minor errors or mild/moderate impairment), or 2 points (important errors or severely impaired). Total Scoring is: 0-17 point [17]. In the table below we can see the association among Edmonton Frailty Scale with multi-dimensional geriatric conditions assessed with specific screening tools (Table 3) [18].

A limitation of this study has been the lack of information considering social support and incontinence due to practical consideration for this number of patients. No appropriate scales with defined scores are known. In addition, data

Clinical Frailty Scale	
1 - Very fit	The people who are active,robust, energetic & motivated; they tend to exercise regularly and are among the fittest for their age
2- Well	Without active disease, but less fit than people in category 1
3- Wellwith treated co morbid disease	Disease symptoms are well controlled compared with those in category 4
4 -Apparently vulnerable	Although not dependent on others for daily helps, these people commonly complain of being "slowed up" or have disease symptoms
5 -Mildly frail	With limited dependence on others for instrumental activities of daily living (finances, transportation, heavy house work)
6- Moderately frail	Help is needed with both instrumental and non-instrumental activities of daily living
7- Severely frail	Completely dependent on others for activities of daily living, or terminally ill.

Table 2 Clinical Frailty Scale

Edmonton Frail Scale area	**Evaluation tools**	**β**	**CI 95%**	***p*- value**
Cognition	Mini Mental State Examination	−0.988	−0.149; −0.048	$p<0.001$
General health status	Number of diseases	0.108	−0.001; 0.217	0.052
Functional independence	Activities daily living (ADL)	−0.512	−0.674; −0.351	$p<0.001$
	Activities daily living (IADL)	−0.338	−0.491; −0.184	$p<0.001$
Social Support	No recorded			
Use of medication	Number of drugs	0.110	0.022; 0.199	$p<0.05$
Nutrition	Mini Nutritional Assessment	−0.413	−0.487; −0.338	$p<0.001$
Mood	Geriatric Depression scale	−0.314	−0.332; −0.296;	p<0.001
Continence	No recorded			
Funcional Performance	Handgrip	−0.114	−0.173; −0.055	$p<0.001$
	Barthel Index	−0.037	−0.049; −0.024	$p<0.001$

Table 3 Edmonton Frailty Scale

were collected only by the administration of the test in the interview with the patient. Functional performance or time up and go test, measured by a walking test in which measure the time (0-10s, 10-20s,>20s), it takes for the patient to get up from a chair, walk about 3 m away and return to sit, were instead represented in the statistical test of Handgrip since this was most easily detectable in immobile patients [18]. As frailty is called as a vulnerable state associated with high risk for increased morbidity and mortality when exposed to a stressor, the frailty syndrome is considered a useful clinical tool for risk stratification in elderly population. Evidence supporting this notion demonstrated that frailty predicts increased falls, hospitalization, dependence, and mortality [7]. The surgery for the frailty syndrome should aim to prevent, delay, reverse, or reduce the severity of frailty, and also prevent or reduce adverse health outcomes in those whose frailty is not reversible. Effective interventional strategies likely B.R.A.I.N (Benefits, Risk, Alternative, Intuition and Nothing) have large benefits for elderly individuals, their families, and the whole society. A decision not to operate should be made at consultant level, ideally together with other members of the interdisciplinary team and with input from the family. Where possible, the patient should be involved in any discussion. An appropriate decision not to undertake major surgery should be viewed as a positive one. However, there may still be the necessity for palliative surgery to improve the quality of life. Anesthesia should not be withheld in these instances, providing the anesthetist feels that the patient has been suitably prepared. All stages of decision-making should be documented [19]. Frail elderly people receiving inpatient comprehensive geriatric assessment on specialist elderly care wards are more likely to return home, are less likely to have cognitive or functional decline, and have lower in-hospital mortality rates than do those who are admitted to a general therapy ward [6]. Complex interventions based on comprehensive geriatric assessment delivered to elderly people in the community can increase the likelihood of continuing to live at home, mainly through a reduced need for care-home admission.

To discuss postoperative outcomes, we can divide the recovery phase of surgery into three distinctive phases [20]. 1- Early phase (first 24 h to 7 days)—the early phase is influenced mostly by pain, nausea, peri-operative medications, and delirium. 2- Intermediate phase (28 days to 60 days)—this phase is influenced mostly by pain, anxiety and depression, physical impairment, and cognitive dysfunction. 3- Late postoperative phase (6 weeks to 3 months)—problem suffered in the early and intermediate phase can persist into this phase. After preoperative care that is obligatory to achieve a good outcome, we are going to emphasize intra-operative care of frail patients or early phase. No specific intra-operative strategy exists to impact outcomes for people with frailty.

Anesthetic techniques that are appropriate for adults may be unsafe when used to anesthetize elderly patients. There should be guidelines to ensure that an anesthetist experienced in the care of the elderly is responsible for these cases. It is recommended that the choice of anesthesia (technique/ drugs/ dosage) be individualized based on the characteristics of the patient and the type of intervention, to reduce the incidence of postoperative delirium and facilitate recovery [24].

Abdominal elective surgery is difficult, but early recognition can help anesthetists to identify the need to minimize fasting time, to use personalized medicine also to reduce drugs that may precipitate acute delirium (benzodiazepines, opioids, anticholinergics, and deep anesthesia , use minimal alveolar concentration, propofol is suitable for older patients because of the rapid recovery time, and favorable adverse event profile) to think about the postoperative destination of the patient, and required flawless anesthetic technique preferring MAC (Minimal Alveolar Concentration), pay attention to hemodynamic status, lung protective ventilation, normothermia and hydration (blood transfusion) during the perioperative period[21]. Age-related changes in the cardiovascular and autonomic nervous systems reduce cardiac responsiveness to stress [24]. Intraoperative hypotension is a common side effect of general anesthesia and might lead to inadequate organ perfusion especially cerebral and myocardial. It is unclear to what extent hypotension during noncardiac surgery is associated with un-favorable outcomes. They present an overview of 42 articles on reported associations between various absolute and relative intraoperative hypotension definitions and their associations with postoperative adverse outcomes after noncardiac surgery. Elevated risks of end-organ injury were reported for prolonged exposure (≥10 min) to mean arterial pressures < 80 mm Hg and for shorter durations < 70 mm Hg. Reported risks increase with increased durations for mean arterial pressures < 65-60 mm Hg or for any exposure <55-50 mm Hg [22]. So according to guidelines in elderly anesthesia of SFAR 2019 for general anesthesia to geriatric patients will be directed hemodynamic therapy for treated intraoperative hypotension without delay. Our goal will be maintained of mean arterial pressure within 20% of the preoperative reference value and using MAC, for halogenic anesthesia to avoid hypotension and postoperative delirium. But when we used general anesthesia, we ought to realize lung protective ventilation strategies intraoperative for minimized postoperative pulmonary complications. The ventilator should initially be set to a tidal volume of 6-8 ml kg^{-1} predicted body weight and PEEP (Positive End-Expiratory Pressure) 5 cm H_2O. PEEP should be individualized thereafter. When recruitment maneuvers are performed, the lowest effective pressure and shortest effective time or the fewest number of breaths should be used. [23,24].

In the elderly, overhydration, especially in the presence of borderline or overt renal failure, can cause acute cardiac failure and pulmonary oedema. Dehydration, which can be difficult to assess in the elderly, may precipitate further renal impairment so the anesthetist must be very carefully [19]. The literature recommends adequate monitoring to maintain

a "near-zero" fluid balance [24]. Anemia and transfusion are associated with increased morbidity and mortality in surgical patients. PBM (Patient Blood Management) is a multimodal, multidisciplinary, strategy aimed at minimizing the use of blood products and improving patients' outcomes, they recommend transfusion in geriatric patients follows a restrictive transfusion strategy (red blood cell transfusion threshold: Hb < 8 g/dl) and red blood cell transfusion when symptoms of intraoperative hypoxia and/or lactic acidosis and hemorrhage are present, regardless of the severity of anemia. The standard treatment for severe perioperative anemia is transfusion of allogenic red blood cells [24]. Maintenance of body temperature pre-, intra-, and postoperatively is essential. Elderly patients may be unable to increase their metabolic rate to counteract heat loss. Shivering may increase oxygen demand above respiratory capacity. Conservation of heat by the use of active warm air systems, by warming intravenous fluids and by operating, where possible, in a warm ambient environment all help to maintain body temperature and aid recovery [19,24]. Active warming techniques to keep temp ≈ 36.2˚C should be continued in recovery. Full resources for the provision of this type of care must be enabled by management.

In postoperative period we need to used general strategies for optimizing postoperative recovery [24]. ERAS protocols aimed at reducing postoperative morbidity cover the whole perioperative period [25] Optimal postoperative pain control and use of nonopioid analgesia, absence of a nasogastric tube and prevent PONV (post-operative nausea and vomiting); early mobilization, oral nutrition, and removal of the urinary catheter, early resumption of feeding, early mobilization and walking or using physiotherapy [24,25]. Importantly, reduction in surgical stress through ERAS appears to be particularly effective in reducing complications and supporting recovery in older and frail patients and especially post-operator delirium [24]. They recommended that prevention, recognition and treatment of postoperative delirium (POD) must be an objective of the multidisciplinary team. They emphasized that patients at risk for POD be monitored with validated diagnostic tools such as the CAM or 4AT, starting when they wake from anesthesia and continuing for 5 days thereafter. POD happened 1 in every 8 patients aged > 65years. It is also important to recognize the potential role of family and caregivers in supporting the patient. Flexibility of visiting hours, and the use of investigative tools to determine the patient's needs and preferences, should be encouraged. Cognitive changes after anesthesia also include postoperative neurocognitive disorders. Specific risk factors for such disorders should be evaluated in susceptible patients [24].

Conclusions

Many elderly people have multiorgan problems. Frailty is a multidimensional syndrome and an independent factor in the care of elderly patients that directs attention away from organ-specific diagnoses towards a more holistic viewpoint of the patient and their predicament. It is a state of vulnerability to poor resolution of homoeostasis after a stressor event and is strongly associated with adverse outcomes. This means that anesthesiologists need to be familiar with frailty, its assessment, manifestations, and strategies for optimization. Distinction of frail elderly people from those who are not frail should therefore be an essential part of preoperative assessment that might result in an invasive procedure or potentially harmful medication. It allows anesthetist to calculate benefits and risks, and for patients to make properly informed choices. Failure to detect frailty potentially exposes patients to interventions from which they might not benefit and indeed could be harmed. The most evidence-based process to detect and grade frailty for severity is comprehensive geriatric assessment. However, this assessment is a resource-intensive process, including the important issue of clinical sensibility so all geriatric patients ought to screen for frailty. This aim might be achieved by development and further validation of currently available frailty-specific multidimensional questionnaires, but the usefulness of existing clinical data sets, especially in primary care. Such a simple method would help to gain a deeper insight into the complex mechanisms of frailty and aid the development and evaluation of interventions to improve outcomes. It would also have considerable clinical medical ward because it would be the basis for a shift in the care of frail elderly people towards a more appropriate goal-directed care in which individually framed clinical outcomes. Overall, 30%–50% of older patients presenting for major surgery will be living with frailty, which results in a more than 2-fold increase in risk of morbidity, mortality, and development of new patient-reported disability. The Clinical Frailty Scale appears to be the most feasible frailty instrument for use before surgery; however, evidence suggests that predictive accuracy does not differ significantly between frailty instruments such as the Fried Phenotype, Edmonton Frail Scale, and Frailty Index. With the aging patient need to integrate the expertise of surgeons, anesthetists, geriatricians, and other specialists and health care professionals. These roles might vary according to the phase and setting of care and the patient's condition.

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