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THE IMPACT OF FRAILTY ON OUTCOMES AFTER CARDIAC SURGERY

The graduate thesis of the Master’s degree study programme “Advance Nursing practice“( state code 6211GX008)

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THE IMPACT OF FRAILTY ON OUTCOMES AFTER CARDIAC SURGERY

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1. ABSTRACT

**Background.** Older adults and a significant percentage of these patients will be frail, with decreased reserve when confronted with perioperative stressors [1]. As the population ages, the rate of surgical procedures in the older population is rising. Patients of the same age do not all have the same risk [2]. Frailty has become an important topic in cardiac surgery, as the average age and complexity of patients has increased, and treatment options for cardiac disease have diversified - from medical management to minimally invasive procedures to cardiac surgery [3]. In an era that emphasizes value in medicine, identifying the most vulnerable patients, deciding an appropriate course of therapy, and targeting valuable resources are important priorities. The concept of frailty may play a key role in these processes. The issue is to disclose understanding of frailty in the perioperative period, as well as how this information might be used to improve outcomes for frail older adults, with a particular focus on cardiac surgery [1]. The identification and assessment of frailty may facilitate identification of vulnerable surgical patients so that appropriate surgical and anaesthetic management can be implemented. Frailty is increasingly recognized as a specific clinical condition associated with poorer outcomes in many areas of medicine and surgery [4]. It is important that cardiologists, anaesthesiologists and cardiothoracic surgeons are aware of how to assess frailty and of its potential impact on clinical outcomes.

**Key Words:** Frailty, Oldest Old, Cardiac Surgery, Cardiopulmonary Bypass, Postoperative Complication

**Aim and objectives.** The aim of this study is to determine the role of frailty assessment in patients undergoing cardiac procedures.. Objectives: 1. To introduce the definition of frailty. 2. To discuss the available methods of assessing frailty patient after cardiac surgery. 3. To analyze the impact of older surgical patients and potential for modification of this syndrome
**Methods.** The literature search was performed in the databases PubMed, science Direct PLOS, Google scholar, Reviewed more than 25 literature reviews, publish between 2009-2019. The analysis of case report and the method is thoroughly performed in the literature review.

**Conclusions/Summary.** This case illustrates the complexity of frailty assessment and reveals the importance of the older patient’s problem. Literary review suggests that frailty predisposes elderly to worsening outcome after surgery. That is why it is important to assess the frail patient before the surgery and determine the risk and anticipate the post-operative measures. In this situation, before cardiac surgery, a structured questionnaire and physical performance tests to measure indices of frailty should be performed [4]. Unfortunately, in our present case, it was not done, only the patient physical status by ASA was evaluated. Perhaps because is no consensus on how to assess frailty. In studies is recommended to apply The Fried score that reflects unintentional weight loss, self-reported exhaustion, weak handgrip strength, slow 5-m gait speed, and low physical activity [1]. It is important to identify frailty before operation. The preoperative period is an ideal time for baseline assessment to guide both perioperative optimization and management. There may be benefit to structured exercise programs in the preoperative period and to start early mobilization and physiotherapy treatment to improve oxygenation, pulmonary function and promote physical activity. Frail elders undergoing cardiac surgery substantially higher hospitalization costs than do their non-frail counterparts [5], as our case revealed, postoperative period was complicated by patient’s general weakness, poor muscle tone and hypoactive, due to the fact, the patient was required prolonged mechanical ventilation, that prolonged length of stay in ICU and hospital stay. Assessing weakness can help make treatment.
2. **ABBREVIATION**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>DVT</td>
<td>Deep Vein Thrombosis</td>
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<tr>
<td>6MWD</td>
<td>6 Minute Walking Distance</td>
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<tr>
<td>NYHA</td>
<td>New York Heart Association</td>
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<tr>
<td>ADL</td>
<td>Activity Of Daily Living</td>
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<tr>
<td>MLWFQ</td>
<td>Minnesota Living World Functional Questionare</td>
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<tr>
<td>CSHA</td>
<td>Canadian Study Of Health And Aging</td>
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<tr>
<td>STS</td>
<td>Society Of Thoracic Surgeon</td>
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<tr>
<td>FI</td>
<td>Frailty Index</td>
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<tr>
<td>EFS</td>
<td>Edamanton Frailty</td>
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<tr>
<td>BNP</td>
<td>Binatriuretic Peptide</td>
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<tr>
<td>PMV</td>
<td>Prolonged Mechanical Ventilation</td>
</tr>
<tr>
<td>AS-NSQIP</td>
<td>American college Of Surgeon National Surgical Quality Improvement</td>
</tr>
<tr>
<td>SPB</td>
<td>Short Physical Performance Batter</td>
</tr>
<tr>
<td>CFS</td>
<td>Clinical Frailty Scale</td>
</tr>
<tr>
<td>VARC</td>
<td>Valvular Aging Research Consortium</td>
</tr>
<tr>
<td>AHA</td>
<td>American Heart Association</td>
</tr>
<tr>
<td>ACC</td>
<td>American College of Cardiology</td>
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<tr>
<td>NYHA</td>
<td>New York Heart Association</td>
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<tr>
<td>ADL</td>
<td>Activity Of Daily Living</td>
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<tr>
<td>CSHA</td>
<td>Canadian Study Of Health And Aging</td>
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<tr>
<td>EFT</td>
<td>Essential Frailty Scale</td>
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<tr>
<td>TUG</td>
<td>Time Up Go</td>
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<tr>
<td>MMSE</td>
<td>Mini Mental State Examination</td>
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<tr>
<td>MNA</td>
<td>Mini Nutritional Assessment</td>
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<tr>
<td>BADL</td>
<td>Basic Activities Of Daily Living</td>
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<tr>
<td>VASQIP</td>
<td>Veterans Affairs Surgical Quality</td>
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<td>BMI</td>
<td>Body Mass Index</td>
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<tr>
<td>Acronym</td>
<td>Abbreviation</td>
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<tr>
<td>LAVD</td>
<td>Left Ventricular Assist Device</td>
</tr>
<tr>
<td>TPV</td>
<td>Total Psoas Volume</td>
</tr>
<tr>
<td>CVD</td>
<td>Cardiovascular Diseases</td>
</tr>
<tr>
<td>IADL</td>
<td>Instrumental Activities Of Daily Living</td>
</tr>
<tr>
<td>AVR</td>
<td>Aortic Valve Replacement</td>
</tr>
<tr>
<td>SAVR</td>
<td>Surgical Aortic Valve Replacement</td>
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<tr>
<td>CAF</td>
<td>Comprehensive Assessment Frailty</td>
</tr>
<tr>
<td>TAVR</td>
<td>Trans Catheter Aortic Valve</td>
</tr>
<tr>
<td>DT</td>
<td>Destination Therapy</td>
</tr>
<tr>
<td>CPB</td>
<td>Cardio Pulmonary Bypass</td>
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<tr>
<td>AS</td>
<td>Aortic Stenosis</td>
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<tr>
<td>NSAIDS</td>
<td>Non–Steroid Anti Inflammatory Drugs</td>
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<tr>
<td>LVF</td>
<td>Left Ventricular Function</td>
</tr>
<tr>
<td>GI</td>
<td>Gastro Intestinal Bleeding</td>
</tr>
<tr>
<td>TNF</td>
<td>Tumor Necrosis Factor</td>
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<tr>
<td>CRP</td>
<td>Creatine Rective Protien</td>
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3. INTRODUCTION

Frailty is a common and relevant geriatric syndrome that could be defined as a biological syndrome with reduced resistance to stressors resulting from cumulative defects across multiple physiologic systems and causing vulnerability to adverse outcomes (6). These elderly patients and often frail patients and are at increased risk of falls, prolonged hospitalization and mortality after surgery (1). The European system for cardiac operative risk evaluation and Society of Thoracic Risk Scores are widely used to calculate perioperative mortality and morbidity in patients undergoing surgery (1). Frailty is an umbrella term that encompasses the patient factors of malnutrition, wasting, weakness, slowness and inactivity. There has been focus on age and pre-existing comorbidities as the main predictors of adverse postoperative outcome in the older surgical population (2). The identification and assessment of frailty may facilitate identification of vulnerable surgical patients so the appropriate surgical anaesthetic management can be implemented (2). Current risk scores designed to predict mortality in cardiac procedures are mainly based clinical and angiographic factors, with limitation in the elderly because they are mainly derived from middle-aged population, do not account for frailty and do not predict the impact of the procedure on quality of life which often matters more to elderly patients than mortality (5). Frailty assessment has emerged as measure of biological age that correlates well with quality of life, hospital admissions and mortality (5). A number of frailty scores have been designed by geriatricians comprising combination of functional tests, laboratory tests, questionnaires, descriptive scales, assessments and disability, comorbidity assessments (5) comprehensive Assessment of Frailty (CAF) is a tool to assess prognosis in elderly cardiac surgery patients (5). Gait speed measured over a 5–m course is recognized as a simple yet powerful measure of frailty for risk stratification of older that may warrant further geriatric assessment (7). Before surgery, patients performed the 5-m gait speed test according to standardized instructions. Position the patient with his or her feet behind and just touching the 0–m start line; instruct to walk at your comfortable space “until a few steps past the 5-mark begins each trial on the word. “Go” starts the timer with first foot fall after the 5-m line (7). The gait speed is a pivotal first step in the evaluation of older patients referred to cardiac surgery (8).

Frailty is an emerging concept in perioperative medicine but remains a poorly recognized and poorly investigated syndrome in patients undergoing cardiac surgery (8). Frailty has also been a risk factor for mortality, major adverse cardiac and cerebrovascular events and increased length of stay in cardiac surgical patients (8). To improve risk assessment, it is important to integrate biological status of the patient (9). In geriatric medicine, many efforts have been made to describe
the condition of elderly patients. Patient show different vulnerability to external factors, a condition referred to as the geriatric syndrome of frailty (9). Several factors contribute to the frailty of patient and there is a variety of scores measuring this state (9). In the Compressive assessment frailty (CAF), all factors except the unintentional weight loss are assessed. Weakness is measured by assessing grip strength with dynamometer that measures grip strength in kilograms (kg). Self-reported exhaustion is measured by questionnaire. Slowness of gait speed is measured in meters per second by assessing the time to walk 4m in usual gait speed (9).

Activity level is assessed by asking for the instrumental activity of daily (IADL) (9). Selected laboratory test also included in the CAF Score such as serum albumin, creatinine, and brain natriuretic peptide (BNP) (9). The biological basis for the effect of frailty is fully understood and may include changes at a cellular level (e.g. oxidative damage) and systemic changes associated with co-morbidities (10). Cumulative co-morbidity may lead to poor outcome as patients may develop complications directly related to their medical condition or they may simply have reduced physiological reserve (10). It is well that age is a predictor of poorer post-operative outcomes, which in turn predict poor long term survival (10). It is important that cardiologists, anaesthesiologists and cardiothoracic surgeons are aware of how to assess frailty and its potential impact on clinical outcomes (4). Nevertheless, not all older patients have poor surgical outcomes.

The concept of frailty is a recognized syndrome in the field of elderly medicine and there is recognition of an overlap between frailty and other geriatric syndrome including sarcopenia. This lack of definition has resulted in a lack of consensus on the optimal method to determine frailty. No all elderly patient have phenotype, which suggest that frailty is not an inevitable consequence of aging and as such may be amenable to treatment. The presence of a frailty phenotype has potential significance in an elderly surgical population as perioperative frailty related interventions may improve outcomes. (10). As the aging population expands, the older patients are increasingly for surgical evaluation. Surgical decision making in this population is challenging because of the heterogeneity of health status in older adults and the paucity of tools for predicting operative risk. Commonly used predictors of postoperative complications have substantial limitations: most are based on single organ system or are subjective and non-estimate patient’s physiologic reserves. Evaluated the frailty based on a validated scoring system characterizes frailty as an age-associated decline in 5 domains: shrinking, weakness, exhaustion, low physical activity and slowed walking speed. Each domain yielded a dichotomous score of 0 or 1 based on the following criteria 1) Shrinking (weight loss) was defined (11). Table (1) the frailty phenotype was described by fried and colleagues were based on observed the two populations who were all more than 65 yrs. of age. In this model frailty was defined as a clinical syndrome in which three or more of the observed characteristics are present. Unintentional weight loss (10Ib in the past year (4kg), self-reported,
exhaustion, weakness specifically in the grip strength), slow walking speed and low physical activity. The frailty phenotype was predictive of progressive decline, resulting in falls visits to hospital and eventually death. The frailty index also known as the deficit accumulation model reflects the number of deficits has individual has accrued over number of domains such as current illness ability to manage activities of daily living and various physical signs which are used to calculate numeric frailty index. There are 70 variables including activities of daily living and physical issues such a stroke, diabetes and cardio respiratory diseases in the original Canadian Study of Health and Ageing (CSHA) which made up the original CSHA frailty index.

Anaesthetics may have important role in proactive recognition of frailty, in risk stratifying older frail patients and in identifying and optimizing modifiable factors with a view to preventing postoperative complication and improving outcomes (30). Frailty is a known risk factor for complication, prolonged hospital stay and adverse discharge disposition. The Canadian Study of Health and Aging Clinical frailty scale is validated 9-point global subjective assessment of comorbidity and function that does not require special training or entail extensive assessment. It has surpassed more complex frailty assessment (3). According to fried et al, a wealth of epidemiological or observational studies has described the presence of frailty in the generally elderly population. In this environment frailty has been defined as primary frailty a phenotype presentation involving decline in physical functioning and psychological status, without taking into consideration associated diseases or pathological conditions. Fried phenotype frailty index has been widely adopted: it was derived from an analysis of five health domains, nutrition, physical exhaustion, low energy, low energy expenditure or (inactivity status) mobility and muscular strength. Table (2) Deterioration of each of these domains was scored as 1 if present or 0 or absent giving a potential score spanning from 0 to 5. The phenotype model classified 3 categories: robust no deterioration, prefrail on one or two function deterioration or frail (three or more function deterioration). This categories was independently correlated with outcomes such as survival, falls, disability and institutionalization.

The conceptualization of frailty proposed by Rockwood et considers the accumulation of multiple deficits such as symptoms, signs, disabilities, pathological conditions and abnormal laboratory values i.e. secondary frailty (cardiac rehabilitation). Afrilalo et al evaluated the incremental prognostic value of four different frailty scales and of three disability scales compared with classic cardiac surgery risk score. Fried frailty scale study shows the expanded fried frailty scale addition of cognitive impairment and depressed mood the four–item MacArthur study of successful aging frailty scale sub dimensions (gait speed, handgrip strength, inactivity, cognitive impairment and gait speed alone. The Parsonnet score or the Society of Thoracic surgeons predicted the risk of mortality or major morbidity score (STS-PROMM). The addition of frailty and disability
provided independent incremental value and improved model discrimination for in-hospital mortality or major morbidity. Thus integration of frailty, disability and risk scores should better characterize elderly patients referred for cardiac surgery and identify those at increased risk (39). Simple measures such as gait speed, the fried score or the rockwood clinical frailty scale can be used to assess frailty as part of routine care of elderly patients with cardiovascular diseases. In 2014 AHA/ACC guideline for vascular heart diseases the Katz index and gait speed have been recommended as good assessment tool for frailty(29).

Measuring frailty in rapid using tool may be especially for surgeon who treat older patients whose risk of poor outcomes not captured by their age alone. The Canadian study of health aging and clinical frailty scale is previously validated 9-point global subjective assessment of comorbidity and function that does not require specialized training or entail extensive assessment. Adverse outcomes could result from environment or behavioural factors particularly it is extreme vulnerability to stress like surgery increase the time of return to physiologic baseline thereby predisposing frail patients to functional decline and reduced self-care capacity. Social factors may also modulate the adverse effect of frailty whereby patients of lower economic status are both likely to be classified as in frail and more likely to readmitted to hospital. On the other hand the inflammatory state associated with postoperative healing may extricate the impaired immune system of frail older patients. This may cause increasing postoperative infection rates or worsening comorbid condition leading to readmission. Elderly patients generally present with a large burden of diseases and higher potential perioperative morbidity and mortality despite advanced pharmacotherapy and aggressive surgical management.

Age has been the most important risk factor of morbidity and mortality in cardiac surgical outcomes. Frailty has been less thoroughly investigated as a risk factor of patient undergoing procedural intervention. Surgical population age is an independent risk factor for postoperative complications including mortality and major adverse clinical events. Age has been a risk factor for both mortality and morbidity in cardiac surgical outcomes. Frailty includes constellation of clinical attributes including loss of skeletal muscle mass, low activity levels and poor endurance. The Katz index of ADL as a part of frailty measure a widely accepted measure of overall dependency in elderly people (4). Frailty still plays a little formal part in most decision making process in cardiovascular diseases. Frailty is a independent risk factor for adverse outcome in cardiovascular diseases following cardiac intervention. Frailty was an independent predictor of hospital mortality, delayed discharge and mid-term survival, The presence of comorbidities is used as surrogate of frailty.

Frailty is increasingly recognized as a specific clinical condition associated with poorer outcomes in many areas of medicine and surgery(6). Physical rehabilitation for frail older people
can positively effect functional and physical capacity and this effect may be related to the level of frailty. Serum albumin level seems to have a higher prediction value and could be good screening instrument for frailty. American College of Cardiology/American Heart Association and European society of cardiology guidelines recommended the Katz index as one of the frailty assessment instruments for risk prediction before cardiac surgery. Katz index is used for functional assessment of dependency in elderly individuals in 6 functions feeding, bathing, bathing, toileting and urinary incontinence. Katz index is the frailty assessment and it is an independent risk factor for in-hospital mortality and institutional discharge in patients after cardiac surgery. AHA, VHD, and ESC guideline emphasize frailty is an important factor for heart team decision making in patients with aortic stenosis. Katz index of independence of daily living, cognitive function evaluation, nutrition assessment and functional capacity.

4. AIM AND OBJECTIVES

4.1. Aim of research

The aim of this study is to determine the role of frailty assessment undergoing cardiac surgical procedures

4.2. Objectives of research

1. To introduce the definition of frailty.
2. To discuss the available methods of assessing frailty patient after cardiac surgery.
3. To analyse the impact of older surgical patients and potential for modification of this syndrome.
5. LITERATURE REVIEW

Aging is characterized by a reduction of functional reserve. Frailty is an increased vulnerability to minor stressors that develops because of age-related decline. With frailty, this decline is accelerated and homeostatic mechanisms start to fail. Where small insults, such as minor infections or surgeries can have a disproportionate influence on health (5, 1). Frailty is a risk for postoperative complications and an independent predictor of in-hospital mortality, institutional discharge and reduced midterm survival (4). Frailty was assessed using a composite of four markers: serum albumin, dominant hand grip strength, gait speed and Katz activity of daily living (ADL) (4). Certain frail patients fail to achieve adequate functional or mortality benefit despite successful Transcatheter Aortic Valve replacement. Therefore frailty assessment methods are becoming an important tool to identify and intervene on this high patient subset for improving clinical outcomes (4). Frailty was assessed according to the criteria defined by Fried et al five (5) components of the frailty syndrome measured, and 1 point was scored for each criteria met to specification, with patient meeting at least 3 of the 5 criteria classified as frail and those meeting 1 or 2 of the 5 criteria classified as pre-frail. 1) Unintentional weight loss of < 5% of body weight or > 4.5 kg in the past year, 2) Weakness: grip strength of the dominant hand measured with jammer dynamometer and average 3 measures < 18 kg in women and < 30 kg in men, 3) Self-reported exhaustion: In the last week (during 3 days or more), 4) Slowness: walking time for separate 4.57 m walk test > 6s, and 5) Low physical activity, derived from 1 question for reasons of practicality as a modification to the original Fried score in which a physical activity questionnaire was used. “Answered as 4 or 5 (on a 6-point, Likert type scale ranging from 0= no to 5= very much). Frailty was also judged by clinically the treating physician as several pre-specified causes for denial surgery (12). Follow-up examination was assessed about 6 weeks after the initial procedure, including transthoracic echocardiography, blood tests, electrocardiography and functional assessment 6MWD, NYHA, MLWHFQ, and SF-36 Scores (12). Two main models of frailty exist: the frailty phenotype and the frailty index or deficit accumulation model. These models were derived from data taken from the Cardiovascular Health Study and the Canadian Study and Aging. Frailty Phenotype proposes the relationship between a set of criteria that define frailty (unintentional weight loss, grip strength, self-reported exhaustion, gait speed, low physical activity level) and the effect on certain outcome measures (new falls, deteriorating mobility, disability, hospitalization, death).

The deficit accumulation model of frailty reflects the number of different domains. These domains include current illness, ability to manage activities of daily living (ADL) and physical signs. This model allows for the calculation of a” frailty index “which can be thought of as” count
of an individual’s accumulated deficits (13). Older patients are at increased risk for complications. If complication occurs, it can lead to a cascade of events resulting in disability, loss of independence, diminished quality of life, high healthcare costs, and mortality. Commonly used predictors of postoperative complications have substantial limitations, most are based on a single organ system or are subjective and do not estimate a patient’s physiological reserves. For example, Lee and Eagle criteria account for cardiac function only and the popular American Society of Anaesthesiology (ASA) score is determined by subjective estimate of organ system disease and likelihood of survival. Despite the widespread adoption of their scoring systems, complications in older patients remain difficult to accurately predict. Frailty can be conceptualized as a global phenotype reserves and resistance to stressors (14). It is well recognized that age is a predictor of poorer postoperative outcomes which in turn predict poor long-term survival (10).

Outcomes of cardiac surgery in the elderly while it is increasingly understood that frailty in the older adult patient undergoing cardiac surgery is associated with an increased rate of postoperative mortality (15). Logistic European System for Cardiac Operation Risk Evaluation (EuroScore1) (EuroScore11) and Society of Thoracic Surgeon (SIS) score are commonly used risk estimation systems in cardiac surgery, do not evaluate the biological age and frailty status of patients (16). Frailty index or cumulative deficit model developed in the Canadian Study of Health and Aging (CSHA). This Rockwood model conceptualizes aging as the accumulation of deficits rather than by the nature of health problems. An Frailty index can be based on comprehensive geriatric assessment and is calculated as the number of deficits present in an individual divided by the total number of deficits measured. The deficits encompass comorbidities, physical and cognitive impairment, psychosocial risk factors, and geriatric syndromes. The FI score ranges between 0 and 1, with a higher score indicating greater degree of frailty. It represents a continuum that can also be trichotomies to indicate low, intermediate, and high level of frailty: FI ≤ 0.25, 0.25–0.4, FI > 0.4. The Canadian Study of Health and Aging clinical frailty scale. Score1 is very fit, robust, active, energetic, well motivated and fit; these people commonly exercise regularly and are in the most group of their age. Score2 is well-without active disease, but less fit than people category 1. Score3 is well with treated compared with category 1. Apparently vulnerable although not frailty dependent, these people commonly complain of being “slowed up” or have disease symptoms. Score4 is mildly frail with limited dependence on others for instrumental and non-instrumental activities of daily living. Score5 is moderately help is needed with both instrumental and non-instrumental activities of daily living. Score6 is severely frail, completely dependent on others for the activities of daily living or terminally ill (17). Velanovich et al hypothesized that perioperative evaluation of frailty including (clinical history) physical examination, physical capability and comorbidities could predict postoperative morbidity and mortality perioperative variables identified.
from the American College of Surgeons National Surgical Quality Improvement Programme (NSQIP) database were matched to variables from the Canadian study of health and aging.

Frailty index, the number of positive items divided by 11 produced a modified FR. Ability to perform activities of daily living, History of diabetes mellitus, living or respiratory problems, congestive cardiac failure, previous myocardial infarction, cardiac problems, Arterial hypertension, cognitive defect, or dysfunction, cardiovascular problems, History of stroke, peripheral pulse (18). Frailty is accepted as a general indicator of patient’s vulnerability that is highly associated with adverse health outcomes in the geriatric field. However, no consensus exists on the most appropriate definition of frailty. The CFS grading derived by the Canadian study of Health and Aging committee is 1 is the most reliable methods to assess frailty among elderly patients. Although the CFS grading tool is disadvantage by its semi quantitative classification. This study identified a positive correlation between CFS grade and several other indicators of frailty defined by the varc-2 (Valve Academic Research Consortium 2) including BMI<20 Serum Albumin<3.5 gait speed and grip strength (19). Simple frailty assessment to identify issues in individual patients that are possibly modifiable.

Frailty can be conceptualized as a phenotype of weight loss, fatigue, and weakness or a multidimensional state of vulnerability arising from complex interplay of biological, cognitive and social factors. Although easy to administer, gait speed and the 6–min walk test do not assess other critical domains associated with frailty. Freiheit et al. recently developed a frailty index in elderly patients undergoing cardiac catheterization which includes physical, cognitive and psychosocial criteria. These frail surgical patients are more likely to experience postoperative complication and require discharge to institutional care (20).

Frailty is the greatest challenge for health care professionals. The level of frailty depends on several interrelated factors and can change over time while different interventions seem to be able to influence the level of frailty. Therefore, an outcome instrument to measure frailty with sound clinic metrics properties is needed. (21). Frailty tools were identified and authors concluded at that point the frailty index seemed to be the most suitable instrument to measure frailty(21 ). Older age and frailty have been associated with mortality, extended ICU stays and extended institutional care and combined morbidity and mortality test. The proportion of frail and elderly patients has increased over time, and these patient groups have been exposed to a high risk of adverse postoperative outcomes. Special attention is required to make the decision to perform surgery and perioperative management of these patients (22).

Frailty is a term used to describe a multidimensional syndrome of loss of homeostatic reserves that gives rise to vulnerability to adverse outcomes after relatively minor stressor events. The gold standard method to diagnose frailty remains a comprehensive geriatric assessment:
however a variety of validated physical performance measures, judgment-based tools and multidimensional scales are being applied in critical care, cardiology and cardiac surgery settings, including open cardiac surgery. Routine assessment for frailty conceivably has numerous purported benefits for patients, families, healthcare providers and health administrators through better informed decision-making regarding treatments or goal of care, prognosis for survivals, expectation for recovery, risk of complication and expected resource use.

Frailty represents a state of reduced physiologic reserve associated with increased susceptibility to disability. A frail individual is highly susceptible to poor health care outcomes. Frailty characteristics were measured pre-operatively, baseline prior to an elective operation in all subjects. The seven frailty characteristics measured and their cut-off values were. The Timed up-and Go measures the time needed to stand up from a chair and sit: an abnormal score was defined ≥15 seconds. The Katz score measures independence of activities of daily living (bathing, dressing, transferring, walking, toileting and feeding) an abnormal score was defined as dependence in one or more activity of daily living. Abnormal cognition was defined as a Mini-cog score ≤3. Anaemia of chronic disease also measured disease burden: anaemia was defined as Haematocrit < 35%. Poor nutrition was defined as serum albumin level below 3.4 g/dl. The geriatric syndrome of falls was measured by asking the individual how many times they have fallen in the 6 months prior to surgery: a positive score fall was defined as ≥1 fall in the 6 months prior to operation. The average required to collect this information was around 5 minutes per patient.

Frail individual take more time to complete the Mini-cog and timed up-and-go measurements. Routine Pre-intra- and post-operative events were recorded prospectively. Post-operative complications were defined using Veterans Affairs Surgery Quality Improvement Program (VASQIP). Post-operative outcomes recorded met criteria of a moderate or more severe complication (mild complications were not included) by the Accordion Severity Classification, infections included in the analysis had to be treated with antibiotics as simply opening wound without antibiotic treatment did not qualify as a moderate complication. Other outcomes were length of hospital stay and 30-day of readmission rate. Accumulated frailty characteristics in the domain of function, cognition, and chronic disease, burden, walking speed, nutrition and geriatric syndromes predict the occurrence of one or more post-operative complications across surgical specialties. This knowledge can aid clinicians in pre-operative counselling and surgical decision making for older adults undergoing major operation. Frailty has been strongly associated with increased morbidity and mortality in patients with cardiovascular disease and that undergoing cardiac surgery. While frailty assessment has been applied to patients with a variety of medical conditions, it has never been used in patients undergoing Left Ventricular Assist Device Implantation (LVAD) as destination therapy (DT). Patient undergoing LVAD is DT often has a

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variety of comorbidities including advanced age that render them ineligible for cardiac transplantation, but may put them at increased risk for frailty. The cachexia associated with advanced heart failure may have a large impact on patients exercise capacity, ability to perform activities of daily living, and organ function. There are methods of assessing frailty and most require prospective testing of grip strength or gait speed, which limits our ability to apply these definitions of population. Deficit Index is calculated based on information assessing a patient’s ability to perform their own activities of daily living (ADLs) and comorbidities and relies on data that available in the medical record (25).

Frailty was assessed by the treating physician and implied clinically moderate or more severe frailty comparable to ≥ 6 on the Rockwood scale (24). According to the definition used by American College of Surgeons National Surgical Quality Improvement program (ACS-NSQIP a patients functional status is classified as “Independent” if they do not require assistance from another person for any activities of daily living, “Partially Dependent “if the patient requires some assistance from another person for activities of daily living or “Totally Dependent” if the patient requires total assistance for all activities of daily living. This information is prospectively obtained for the database by an ACS – trained on-site clinical reviewer and is based on the patients functional status at the time they are being considered as a candidate for surgery (which is no longer than 30 days before surgery). 30 – day postoperative mortality , 30-day postoperative major morbidity, failure-to-rescue rate (defined as the mortality rate of those patients who experienced 1 or more major complication.) 30-day postoperative minor morbidity , and 30-day reoperation rate. Patients were considered a prior to have suffered major morbidity if they sustained 1 or more complication postoperatively.

Organ/space surgical site infection, wound dehiscence, pneumonia, unplanned reintubation, prolonged post-operative mechanical ventilation ( >48 hours),pulmonary embolism , Progressive renal insufficiency acute renal failure requiring dialysis, coma, stroke ,myocardial infarction, cardiac arrest, graft, prosthetic failure ,major bleeding(defined as transfusion requirements of 5or more units of packed red blood cells in the first 72hours after operation)sepsis and or septic shock. Patients were considered to have suffered minor morbidity if they sustained one or more complications postoperatively: superficial incision surgical site infection, deep incision surgical site infection, urinary tract infection and or deep vein thrombosis (26). Measures of frailty, even after adjustments of age and comorbidity are highly predictive of worse outcomes, including death, incident disability and hospitalization in patients with heart disease. Although frailty is associated with advance age, it is not confined to older populations nor does advanced age equate to frailty. Measures of frailty inherently work to distinguish high vulnerable patients from those who
are not, even among adults. The So-called “eyeball test”, an overall assessment of the patient from the door way, is often used by clinicians to intuitively qualify this vulnerability.

Frailty may have multiple manifestations and may be difficult to identify and manage. Weakness, decreased mobility and limitation to perform routine physical activities are common in frailty patients. Performance measures represent aspects of physical function that are associated with routine daily activities that are important for maintaining independence in older adults. Early detection of frailty may be a window of opportunity for intervention and a key factor for improving clinical outcomes in elderly patients with cardiovascular diseases. These measures include multiple dimension of health aging, such as disease processes, nutritional status, cardio respiratory fitness and psychological state and provide a global assessment of physical function. Green et al designed a score to evaluate frailty in older patients with symptomatic Aortic stenosis undergoing Transaortic Valve implantation. Serum albumin, gait speed, grip strength and dependency for daily life activities were included (27). Frailty increases with age and is prevalent in the population. 4% in the 59 -65 – year- olds, 9% in the 75-79 — year-olds and 26% in the above 85-year-olds.

Frailty in older medical patients has shown to result in increased mortality, worsened functional status increased falls, hospitalization and admission to long term care facilities. Emerging in the last 5-10 years has shown that frailty also lead to increased mortality and morbidity in older surgical patients. Even though frailty is well-recognized there is no consensus on how it should be measured. Abundant scales and instruments have been researched for identifying and quantifying frailty; however there is no standard tool for screening frailty in routine clinical practice. A hospitalized older surgical patient is faced with many challenges during their journey through surgery and the recovery period. Apart from surgery itself fasting, opioid analgesics, anaesthetic agents, intra operative blood loss, postoperative pain, nausea and vomiting, the unfamiliar hospital environment, and immobility during the perioperative period can all be triggers that lead a previously balanced but frail body system to fail. The degree of insult needed to cause decomposition and subsequent adverse events is inversely related to the degree of frailty. A minor insult may be sufficient to lead to permanent functional decline post-surgery in very frail patient, whereas a robust older person may need surgery and several postoperative complications to result in a decline in function.

Cardiac failure is a risk factor for major adverse cardiac events in the preoperative period and its prevalent in up to 75 % of frail patients. Frailty is associated with geriatric syndromes, namely functional decline, mobility impairment, poly pharmacy, delirium, dementia, pressure ulcer, falls, malnutrition, and incontinence all of which have an impact on postoperative recovery (28). Gait speed is the most commonly used test to screen for frailty: however, characterization of frailty with gait speed alone lacks specificity to discriminate between complex patients who may or may
not experience poor outcomes following Trans Aortic Valve Replacement. To achieve better discrimination, multidomain, frailty scales are preferred. The Fried scale reflects strength, mobility, weight loss, fatigue and habitual activity and is predictive survival and quality of life after aortic valve procedures. The rock wood clinical frailty scale (CFS) broadly reflects the patient’s functional abilities and is predictive of survival after Trans Aortic Valve Replacement. Whereas the Short Physical Performance Battery (SPPB) narrowly reflects the patients lower – extremity muscle function. Essential Frailty Toolset in Older Adults undergoing Aortic Valve Replacement (EFTS). The Essential Frailty Tool Set is scored 0 (least frail) to 5 (most frail) based on the following 4 items: pre-procedural anaemia, hypoalbuminemia, lower extremity muscle weakness defined as the time of ≥ 0.15 s or inability to complete five sit – to stand repetitions without using arms, and cognitive impairment defined as score of <24 on the Mini –Mental State Examination (which is highly unlikely if the patient is able to correctly recall 3 out of 3 words after a distractive task and may obviate the need for further cognitive testing). Frailty was assessed during the index hospitalization using the Fried and Watson definition of frailty. The 5 criteria measured were unintended weight loss (>10b in the preceding year). Exhaustion, Physical activity time required to walk 15 feet and grip strength by Jamar hand grip dynamometer. Exhaustion was measured by the subscale of the epidemiological studies-Depression subscale in which subjects were asked two questions: how often in the past week did they feel the following (a) I felt that everything I did was an effort, and (b) I could not get going. Subjects who answered “a moderate amount of time” (3-4 days)” or “most of the time “ to either of the statements were categorized as meeting the exhaustion criteria for frailty. Physical activity was measured by the short version of Minnesota Leisure Time Activity questionnaire (29). Frailty is a state of vulnerability in which patients have decreased physiologic reserve resulting in a poor outcome when a stressor is applied. The adverse effects of frailty on outcomes including disability, dependency, falls, the need for long term care facility and mortality after cardiac surgery and procedures, such as Coronary artery bypass grafting, valve repair or replacement, TAVR or combined procedures.

Cardiac operative risk models such as the Society of Thoracic Surgeons (STS) and the European System for cardiac operative risk evaluation (Euro Score) are designed to predict surgical mortality. These risk models are not specifically developed only for patients undergoing Trans Aortic Valve Replacement, which commonly consist of the elderly population suffering from frailty (29). Frailty is essential to all – cause mortality and is now understood as a medical syndrome elderly. Loss of muscle mass or body weight, because of under nutrition and or ageing leads to muscle weakness, walking slowness and in turn physical activity known as frailty components. Although McNallan SM et al recently reported that frailty served as a prognostic factor in patients with CHF, they set most of the frailty criteria with questionnaires. The criteria with objective
measures including grip strength or walking speed would help physicians to identify the patients to fall into frailty state exactly. These frailty criteria in patients with particular disease should be considered desirable when it predicts disease-specific outcomes (31). Age-related frailty has been extensively characterized and is a clinically recognized syndrome of decreased physiological reserve. The heightened state of vulnerability in elderly frail individuals confers a greater risk of adverse outcomes after even minor stressors (31). The evaluation included measure of frailty, disability, comorbid conditions and traditional risk factors for adverse surgical outcomes. The primary outcome was a composite of postoperative mortality and major morbidity (defined according to the Society of Thoracic surgeons as stroke, renal failure, prolonged ventilation, need for reoperation or deep sternal wound infection) occurring during the index hospitalization (32). Frailty is associated with an increase in hospital costs after cardiac surgery an effect that persist after adjusting for age, comorbidities, surgery type and complications (33). The tools for frailty assessment included fried phenotype frailty index and its modification multidimensional geriatric assessment, clinical frailty scale, 5-meter walking test, serum albumin levels and Katz index of activities of daily living. Frailty assessment in cardiac rehabilitation settings should be based on functional, objective test and should have similar components as tool for risk assessment (mobility, muscle mass and strength, independence in daily living, cognitive functions, nutrition, and anxiety and depression evaluation (6). Comprehensive assessment test is designed to test physical performance. First the standing balance is tested. The patient has to stand still with both feet together, then in the so-called “semi–tandem position with one feet halfway in front of the other and finally in the “tandem “position with one foot completely in front of the other. The time the patients are able to maintain each position is measured and frailty points referring to table are added to the frailty score. In the last item of the balance test, the patient is asked to spin 360 degree as fast as possible. Again, the time is measured and according to a grading table, the corresponding points are added to the comprehensive assessment frailty. This is followed by tests to assess body control. The patient has to get up and down from a chair three times has to pick up a pen from the floor and has to put on and remove jacket. Selected laboratory tests are included in the Comprehensive Assessment Frailty. Serum albumin as a marker for nutritional state and liver function, creatinine as a marker of kidney function and brain natriuretic peptide (BNP) as a marker for heart failure were measured. To assess respiratory function, the forced expiratory volume in 1 is (FEV1) was measured. All laboratory values were included in the overall Comprehensive Assessment Frailty. Two physician (one cardiac surgeon and one experienced clinician) different from the person observing the CAF testing itself were asked to estimate frailty of the patient according to the clinical frailty Scale from the Canadian Study of Health and Aging(9).
Frailty increases susceptibility to adverse health outcomes and contributes to the difference between chronological age and psychological age. Frailty is a common syndrome described as diminished resiliency in response to stress as a result of decreased physiological reserve, increased burden of comorbidities and altered multisystem homeostasis. Emergent procedural status was ascertained from the CorHealth Ontario registry and supplemented with Ontario Health insurance plans claim data, where the anesthesia provider identified the surgery as emergent under the American Society of Anaesthesiologists physical status classification, Height, Weight, and body mass index identified from the CorHealth Ontario registry were used to define morbid obesity (weight > 159kg; or body mass index ≥ 40kg/meter square). Frailty has become a high-priority theme in cardiovascular medicine. 20 frailty assessment tools have been developed, with most tools revolving around the core phenotypic domains of frailty—slow walking, speed, weakness, inactivity, exhaustion, and shrinking measured by physical performance tests and questionnaire. Epidemiological studies have consistently demonstrated that frailty carries a relative risk of > 2 for mortality and morbidity across spectrum of stable CVD, acute coronary syndromes, heart failure and surgical and transcatheter interventions. The frail patient faces a higher risk from invasive procedures but also potential benefit from interventions such as cardiac rehabilitation to counteract the physical weakness characteristics of frailty.

A critical mass of clinicians, researchers and policy makers have embraced the concept of frailty, yet the lack of scientific road map to integrate frailty into practice has been limiting factor. The Short Physical Performance Battery encompasses slowness, weakness, and balance. This is measured by a series of 3 timed physical performance tests (gait speed, chair rises, and tandem balance) each is scored ≤ 5 of 12 is required for a diagnosis of frailty. The presence of frailty in patients undergoing surgical intervention is associated with poorer outcomes with regard to mortality and return to independence. Mini-Mental State Exam (MMSE) for cognitive function, Timed up and go test (TUG) for gait function. Mini Nutritional Assessment (MNA) for nutritional status basic activities of daily living (BADL) and Instrumental activities of daily living (IADL). MMSE at >27 points (cognitive impairment) versus ≥ 27 points (normal cognitive function, TUG at ≥ 20s (mobility impairment) versus < 20s (normal gait function) and MNA at < 12 points (at risk of malnutrition). BADL and IADL were considered abnormal, if the patient had a difficulty in performing 1 or more activities. Increased risk to elderly patients undergoing surgery with high rates of unplanned admission to intensive care units, longer duration of hospital stay and mortality. The outcomes included mortality, functional decline, prolonged length of hospitalization, and discharge to a location other than home. Frailty has been strongly associated with postoperative mortality and morbidity and thus frailty likely improves the identification of high-risk patients beyond known risk scores. In epidemiological studies baseline
Frailty has been associated with poor outcomes in both community cohorts and hospitalized patients specifically in cardiac surgery (including transcatheter aortic valve implantation procedures). However, despite the strong association of frailty and poor outcomes, there is a lack of well-designed trials that have examined preoperative interventions with a specific focus on frail patients undergoing cardiac surgery (2). In fact, the Canadian Health Measures study determined that the prevalence of frailty was 2% to 5% in those aged 18 to 34 years, 4% to 6% in those aged 18 to 34 years, 4% to 6% in those aged 35 to 49 years, 7% to 12% in those aged 50 to 64 years and 8% to 20% in those aged 65+ years. We tend to associate frailty with low body mass index because obese patients tend to have greater metabolic reserve and cope better with catabolic stimuli seen in chronically advanced heart failure and acutely in cardiac surgery. There are two broad types of frailty assessment tools: phenotypic and index-based tools. A phenotype describes a set of observable characteristics. For example, the Fried frailty phenotype defines five key domains: slow gait speed, weak hand grip strength, unintentional weight loss, and questionnaire-based assessment of low physical activity and exhaustion.

Fried and colleagues conceptualize frailty as a distinct biologic syndrome and as such does not include medical comorbid conditions. Those with impairment in 3 or more of the 5 domains considered frail. The Rockwood frailty index approach, on the other hand, conceptualizes frailty in terms of the numeric count of deficits, which can be loosely defined as age-related conditions, signs, symptoms, or disabilities that are associated with poor prognosis. The optimal frailty assessment for cardiac surgical patients should have high predictive ability, should be quick and easy to perform (or calculate) and if a performance measure, should be practical for most patients awaiting surgery. Several assessments have been shown to be predictive for clinical outcomes in patients undergoing cardiac surgery. Afilalo and colleagues found that slow preoperative gait speed had a 2-to-3 fold increased risk predictive ability beyond the Society of Thoracic Surgery-Predicted Risk of Mortality or major Morbidity and European System for Cardiac Operative Risk Evaluation (euroSCORE) (4). Risk factors (including hypertension, hypercholesterolemia, and cigarette smoking) which predispose to the development of peripheral vascular disease and aortic aneurysms also predispose to predispose frailty. It is an independent predictor of postoperative morbidity, postoperative mortality, length of stay, and institutionalization at discharge. Functional status has been reported as a predictor of adverse postoperative outcome in those with lower limb arterial disease undergoing revascularization. Numerous measures of frailty exist from scales, scores, and indices to functional measures such as “time up and go” and gait velocity.

The Edmonton Frailty Scale is validated when used in the preoperative setting for elective surgical patients, high EFS scores being associated with both postoperative complications and prolonged length of stay. It is a short tool based on 11 questions covering nine domains, scored...
from zero to 17, the maximum frailty score. Thus the EFS may be useful to identify risk profiles preoperatively, potentially enabling modification of risk and better postoperative outcomes. The Edmonton Frailty Scale assesses nine domain of frailty (cognition, general health status, functional dependence, social support, medication usage, nutrition, mood, continence, functional performance) and provides a score from 0 to 17 where 17 represent the maximum level of frailty. It incorporates the “timed up” and “go test with the option of a maximum domain score of 2 for participants unwilling or unable to perform it. Frail and non-frail participants were defined according to dichotomizing the EFS score at 0-6 and 7-17. Hand grip strength was assessed preoperatively using a jammer dynamometer adhering to the standardized protocol recommended by the American Society of Hand Therapists (34). Gait speed measured as the time required to walk a short distance usually 5m at a comfortable pace is one of the most common test to screen for frailty and identify high-risk older adults in need for further evaluation. The gait speed tests reflect impairments in lower-extremity function, and to lesser extent, neurosensory and cardio pulmonary function (37). Sundermans et al employed frailty assessment that incorporates Fried criteria with an additional 5-item physical performance, 3-item laboratory evaluation and respirator frail. Any missing value among the components of the frailty score was considered normal (15).

Frailty was associated with a 5-fold increase in 1-month mortality employed a frailty assessment that incorporates Fried criteria (1) with an additional 5-item physical performance evaluation, and respiratory function testing in a population of patients undergoing high-risk cardiac surgery. The area under the receiver-operating curve was highest when the frailty scores that included albumin, ADLs; gait speed and grip strength was added to clinical variables despite evidence for sarcopenic obesity and high prevalence of frailty in obese older adults. Clinician, often associate low body mass index (BMI) with the frailty phenotype. Severe aortic stenosis (AS) in elderly patient is a condition in which frailty has been emerging as an important arbiter of clinical decision making. Outcomes in older adults with coronary artery disease and recovery after general and cardiac surgery function testing in a population of patient undergoing high risk cardiac surgery (31). Gait speed measured as the time required to walk a short distance (usually 5m) at a comfortable pace is one of the most commonly used tests to screen for frailty and identify high-risk older adults in need for further evaluation. The gait speed tests reflect impairments in lower extremity muscle function and to a lesser extend neurosensory and cardio pulmonary function (37). In geriatric baseline assessment was performed by cardiologic examination. The consensus was based on several; parameters including underlying comorbidities, general clinical condition and perioperative risk as calculated the logistic EuroSCORE and STS score. Anaemia was defined based on a cut-off point of 122gm/dl haemoglobin concentration for women and 132 gm/dl for men based on this result EuroSCORE and STS should be calculated (38). Edmonton frail scale was a
feasible tool for the preoperative assessment of frailty. An EFS of ≥ 6.5 was predictive of longer length of hospital stay. Base line measures of frailty (Edmonton frail scale) functional status (gait velocity Time up and go, hand grip strength and cognitive function (Montreal Cognitive Assessment) are assessed preoperatively. The primary outcome measure length of stay and secondary outcome measures of postoperative morbidity (medical and surgical complications) functional status and postoperative in-hospital mortality are recorded (39). According to Patterson medical, Boling brook IL (USA) weight loss was defined as unintentional weight loss >10 pounds with in the year preceding surgery. Exhaustion was determined by self-report on two items taken from the centre for Epidemiologic Studies Depression Scale.

Physical activity was calculated as physical expenditure per week on an item-activity survey based on the short version of Minnesota Leisure Time Activity Questionnaire. For each patient 5m walk test was completed three times and averaged in time to calculate walk time in seconds. If patient normally required a cane, a walker or assistance to handrail to walk, this patient was allowed to use the assistive device while completing the walk test, finally grip strength was assessed with a jammer held hand dynamometers (40). According to Lipsitz introduce that frailty might be caused by the loss of ability of the cardiovascular and nervous system to respond appropriately stressors to age related changes. (41).

Canadian Study of Health and Aging worked with 3 approaches 1) developing a rules based definition of frailty 2) creating a method of counting a patients clinical deficits and proposing the clinical frailty scale measure of frailty based on clinical judgement. Gait speed is an independent predictor of adverse outcome after cardiac surgery with each 0.1- m/s decrease conferring an 11% relative increase in mortality. Frailty assessment is a simplicity and ability to assess frailty in a very short period of time Russo et al showed that early cardiac rehabilitation enhances independence evaluated with Barthel index mobility and functional capacity for patients after surgical or interventional aortic stenosis treatment. The six most used tools for frailty in VHD population 3 scales (fried frailty scale and its modification, multidimensional geriatric assessment and clinical frailty scale for CSHA study and 3single measures (5-meter walking test, Katz index and serum albumin levels. Frailty predictive value for higher complications rate longer length of hospital stay and mortality and morbidity after cardiac surgery or interventional treatment(5). Weigel et al presented an abstract at American Association for thoracic surgery conference geriatric frailty assessment tools in the prediction of postoperative outcomes in patients over 70 undergoing thoracic surgery for neoplasms, The Geriatric Depression Screen, Mini Mental State Examination, Fatigue Inventory Eastern Co-operative Oncology group performance and Instrumental Activities of Daily living were used as a means of determining preoperative frailty(19).
5.1 Comprehensive Frailty Assessment

In comprehensive Assessment all factors except the unintentional weight loss are assessed. Weakness is measured by assessing grip strength with a dynamometer that measures grip strength in kilograms. Self-reported exhaustion is assessed through questionnaire. Slowness in gait speed is measured in metres per second by assessing the time to walk 4m in usual gait speed. Activity level is assessed by asking for the instrumental activity of daily living (IADL). IADL that are assessed are going for walk, working in the household activities. The second part of the CAF test is designed to test physical performance. The standing balance is tested. The patient has to stand still with both feet together then its called tandem position with one foot completely infront of the other. This time the patient are able to maintain and each position is measured. This test is assessed to body control. The patient has to get up and down from a chair three times, has to pick a pen from the floor and has to put on and remove jacket. Selected laboratory tests included in the CAF score. Serum albumin as a marker for nutritional state and liver function, creatinine as a marker for kidney function and brain natriuretic peptide (BNP) as a marker for heart failure were measured.

5.2 Frailty Phenotype

Frailty phenotype the relationship between two sets of criteria that define frailty has unintentional weight loss, grip strength, self-reported exhaustion, gait speed and low physical activity level and that effects on certain outcome measures new falls, deteriorating mobility, disability, Hospitalization, death(14).

5.3 Measuring Frailty

Frailty can measured by assessing, diagnosis, screening, case – finding and predicated prognosis. Frailty assessment tool for older surgical patients has two main purposes they are preoperative identification, risk stratification and identification of factors for potential modification. The measurement tool that exists are either scoring system based on aspects of physical and functional capability. The measures of frailty based on assessment of functional status. The functional measures include for arm grip strength and gait speed(14).
5.4 Measuring of Frailty in Surgical Patients

Surgical patients have identified frailty as an independent risk factor for major morbidity, mortality, protracted length of stay (LOS) and institutional discharge. The older surgical patients the process of preoperative assessment provides an opportunity for proactive recognition of frailty syndrome. The measuring of frailty in a surgical patients lies in its utility both as a tool for preoperative risk stratification and also as a method for identifying potentially modifiable factors can be optimized preoperatively(14).

5.5 Frailty Score

Frailty is based on validated scoring system the characteristics of frailty in an age associated decline in 5 domains shrinking, weakness, exhaustion, low physical activity and slowed walking speed. Each domain yielded a dichotomous score of 0 or 1 (15).

1. Shrinking (weight loss) was defined as unintentional weight loss ≥ 10 pounds in the last year.
2. Decreased grip strength (weakness) was measured by having the patient squeeze a hand-held dynamometer. The strength measurement was adjusted by gender and body mass index.
3. Exhaustion was measured by response to questions about effort and motivation.
4. Low physical activity was ascertained by inquiring about leisure time activities.
5. Slow walking speed was measured by the speed at which patient could walk 15 feet.

5.6 Risk Indices

Frailty has evaluate 4 risk models the frailty index, American Society of Anaesthesiologists (ASA) score, Lee’s revised cardiac risk index and Eagle score. Lee score 0 to 4 was determined by the presence of specific preoperative cardiac risk factors” Eagle score (0 to 6) was similarly based on standardized criteria. An ASA score (1 to 6) was independently assigned by anesthesiologist blind to the patient score (15).
5.7 Frailty and Length of Stay

Length of stay means after minor procedure was 0.7 days for nonfrail, 1.2 days for intermediately frail and 1.5 days for frail patients. After major surgical procedures length of stay was 4.2 days for non frail patients, 6.2 days for intermediately frail patients and 7.7 to frail patients. Intermediately frail patients had 44% to 53% longer hospital stays and frail patients 65 to 89% longer hospital stays. NSQIP complication the association between frailty and length of stay remain significant P<0.001 in models where frailty was compared directly with each of other risk indices (15).

5.8 Prevalence of Frailty in Older Surgical Population

According to Judith Partridge et al studies shows that the prevalence rates of frailty in surgical patients of women is 8.5% and men is 1%. This high prevalence rate in older surgical patients compared with the prevalence rate of less than 10% observed in the community-dwelling individuals, highlights the vulnerability of this patient group (14). Frailty increase with age and its prevalent in the population 4% in the 59-65 years old, 9% in the 75-79-years-olds and 26% in the above 85-years old. The older adults found that frailty ranges between 4% and 59% within overall weighted prevalence of 10%. Frailty in the older medical patients has been shown to the result in increased mortality, worsened functional status, increased falls, hospitalization and admission to long term care facilities. Cardiac failure is a risk factor for major adverse cardiac events in the perioperative period and its prevalent in up to 75% of frail patients.

Vigorito studies shows in cardiac rehabilitation and offer mainly two instruments for frailty in this field. Edmonton frailty scale (EFS) and clinical frailty scale from the CSHA study. The EFS could be used as comprehensive instrument that has been validated after acute coronary syndrome. It has also includes two clinical performance clock test and TUG. EFS questions are developed for screening more than effect for evaluation, i.e. hospitalization per year, functional independence, social support and medication usage. Clinical frailty scale from the CSHA is popular and looks effective for screening in this patient population. It is easy to use standardized tool based on evaluation of frailty (5). Forman et al showed that significant worsening of frailty level measured by CSHA, 5MWT, MMMSE and functional capacity in 10 weeks for patients that are undergoing to cardiac procedures (5). Literature confirms frailty predictive value for higher complication rate, longer length of hospital stay, mortality and morbidity after cardiac surgery or interventional treatment. Martinez –Selles et al introduced that patients with high morbidity (Charlson comorbidity index ≥ 5) which is present in 15% of octogenarian patients with severe aortic stenosis.
have a poor prognosis in the short term, mainly related to non-cardiac death. In such patients interventional therapy was not associated with better prognosis. Also some scoring systems based on variables with prognostic impact in the short and long term have been recently developed.

Patients are accordingly classified into different risk levels entailing important differences in mortality during follow up[29]. A review of the physiological changes with aging and subsequent frailty must be considered by the preoperative team and care must be individualized for the deficits of the patients. Postoperative pulmonary complication account for 40% of deaths in the older population. Age confers the progressive loss of lung parenchyma elasticity a reduction in function alveolar surface area and reduced respiratory muscle strength. This changes cause an increased risk of both hypoxemia and atelectasis, reduction in airway reflexes particularly in the setting of residual weakness from drugs such as neuromuscular blocking agents opioids or sedatives may increase the risk of aspiration. Frailty is associated with cardiac autonomic dysfunction the impact which can result in blood pressure lability, Particularly profound, prolonged hypotension in response to the administration of anaesthesia particularly in the setting of hypovolemia which is often encountered in perioperative period. Frail patients are more likely to have pre-existing cognitive impairment with reduced cognitive reserve hence they are the most vulnerable to postoperative cognitive dysfunction and postoperative delirium. Commonly used risk prediction tool such as age, American Society of Anaesthesiologists[ ASA], physical status, Revised Lees Cardiac Risk Index. Charlson Comorbidity Index and exercise tolerance as measured by metabolic equivalent task score while good predicting organic specific complications. These traditional tools are unable to measure vulnerability and decreased reserve of an older adult which has impact on functional recovery, length of stay and need for initialization post-surgery. Assessment and identification of frailty and geriatric syndromes in the preoperative setting is important in predicting adverse outcomes in contribution in traditional risk tools[30]. Emerging evidence in the last 5-10 years has shown that frailty also leads to increased mortality and morbidity in older surgical patients[30].
6. ORGANIZATION AND METHODOLOGY OF RESEARCH

The literature search was performed in the databases PubMed, science, PLOS, Google scholar. Reviewed more than 25 literature reviews, publish between 2009-2019. The analysis of case report and the method is thoroughly performed in the literature review.

7. CASE PRESENTATION

An 85-year-old female weighing 45 kg was admitted to the hospital with aortic stenosis and LV systolic dysfunction. She had a history of syncope during the past year. Over the period of the past year she unintentional weight loss, approximately 4 kg there was decrease muscle power and walking speed, weakness and low physical activity. Comorbidities include anaemia from malnutrition. Routine blood test demonstrated the following Hb 93 g/dl. This patient was assigned (ASA) class 3 with systemic disease on the American Society of Anaesthesiologists (ASA) physical status classification system. The patient is scheduled for elective isolated aortic valve replacement (AVR) on cardiopulmonary bypass (CPB). After the operation the patient was transfer to the ICU on mechanical ventilation. Postoperative management: standardized and adopted by that clinic. Postoperative analgesia was maintained with intravenous paracetamol 15mg/kg, intravenous morphine and nonsteroidal anti-inflammatory drugs (NSAIDS) was used. The patient was hemodynamically stable, with minimal bleeding and adequate diuresis, no neurological disorder. Laboratory, results no correction necessary. However, postoperative period was complicated by patient’s general weakness, poor muscle tone and hypoactive, due to the fact the patient was required prolonged mechanical ventilation (PMV). She was extubated only on the five postoperative days.

Medical staff helps her but she was conscious, her vital function adequate. Due to the general weakness and need of care, the patient was stayed in the ICU. During this period the patient was on continued supportive care, including fluid and hemodynamic management strategy, nutritional (full enteral and parenteral) support, control of anaemia and blood glucose levels, prophylaxis against deep venous thrombosis (DVT) and gastrointestinal bleeding (GI). Postoperative rehabilitation was starting the day after extubation. The level of vital parameters slowly reduced during the next postoperative days, and the patient was discharged on 11th postoperative day.

In summary the patient required ventilator support for 5 days. The length of stay in intensive care unit was 11 days, length of hospital stay-22 days.


8. DISCUSSION OF THE RESULTS

On the review of this study to evaluate frailty as a risk factor for adverse clinical outcomes after cardiac surgery including mortality and prolonged hospital care(3). Frail patient are vulnerable in that they are more susceptible to the complexity of surgical process are at greater risk for complication after surgery are less likely to recover function postoperative outcomes[3].

The primary outcome measure was mortality both 30 day and 1 year The secondary outcomes in included length of stay >14 days , discharge to a destination other than home, readmission within 30 days, composite 30-day major morbidity was defined using the standard Surgical Thoracic Society definition and included re-operation, prolonged mechanical ventilation, acute renal failure, new onset dialysis and stroke.(16). Frailty a score consisting of 6 components. The components were (1) age>70 years (2) body mass index <18.5 kg/m square (3) anaemia (12.0 g/dL for women <13.0 g/Dl for men. (4) hypoalbuminemia (<3.5g/dL) (5) a history of stroke and a total psoas volume(TPV). Any patient with score ≥ 2 was defined as frail. Any missing value among the components of the frailty score was considered normal(15). Frailty can lead to increased vulnerability, a syndrome of decreased physiological reserve and resistance to stressors. Frailty can lead to increased adverse outcomes such a loss of mobility and independence, triggered by relatively small physical insults such as new medication or minor infection. The pathogenesis of frailty is thought to involve maladaptive response to stressors in multiple physiologic systems. The pathological process hypothesized to be responsible for the development of frailty include chronic inflammation and immune activation, sarcopenia (loss of muscle mass and strength) and age related changes to the endocrine system, such as a decrease in the sex hormones, higher levels of cortisol and vitamin D deficiency. These interact together with risk factors such as genetic and epigenetic factors, environmental and life style stressors, acute, and chronic diseases to result in the clinical manifestation of frailty and adverse health outcomes.

Frailty in older medical patients has been shown to result in increased mortality, worsened functional status, increased falls, hospitalization and admission to long term care facilities. Emerging evidence in the last 5-10 years has shown that frailty also leads to increased mortality and morbidity in older surgical patients. Even though frailty is well recognized, there is no consensus on how it should be measured. Abundant scales and instruments have been researched for identifying and quantifying frailty: however there is no standard tool for screening frailty in routine clinical practice.
Frailty is defined as the presence of three or more of the five features of slowness, weakness, exhaustion, weight loss and low physical activity. Patients who have one or two of these features are deemed “prefrail” and those with three or more are deemed “frail”. Frailty measurement tools need to be not only sensitive and specific detecting frailty but also time-efficient and brief in order to be routinely applied in preoperative assessment. Its prevalence increases with age and is estimated to be 26% in those aged above 85 years. Frailty will be increasingly seen in surgical patients receiving anaesthesia. Primary outcome parameters are overall mortality, cardiovascular mortality, quality of life, and functionality. Secondary parameters are overall complications such as myocardial infarction, stroke and transient ischemic attack, bleeding complication as well as conduction disturbances and arrhythmias following the Valve Academic Research consortium-2 consensus document criteria. Frailty is common among patients admitted to the intensive care units and correlates with an increased risk for adverse events, increased resource use and less favourable patient-centred outcomes.

The Clinical Frailty Scale (CFS) an outcome of the Canadian Study of Health and Aging, is a semiquantitative tool that provides a generally accepted clinical definition of frailty which can be easily measured even by no geriatricians. The operative risk was calculated using the Logistic European System for Cardiac Operative Risk Evaluation (logistic EuroSCORE) and the Society of Thoracic Surgeons Predictive Risk of Mortality (STS) score. Clinical data, procedural variables, length of hospital stay and in-hospital can and all-cause mortality rates prospectively recorded. Anaemia associated with frailty is likely to be related, at least in part to inflammatory changes associated with the syndrome, within the older population anaemia can also be considered a surrogate marker of nutrition. Several biomarkers and combination biomarkers have been suggested as measure of frailty. These include CRP, albumin, 11-6 and TNF-α.

Frailty is predictive of mortality, postoperative complications and institutional discharge in older patients undergoing cardiac and non-cardiac surgery. In patient with aortic stenosis there is an increasing perception that frail patients and those with comorbidities do not benefit from interventional treatment in terms of morbidity and mortality. Serum albumin, gait speed, grip strength, and dependently for daily life activities were included. Patient with worse score had worse prognosis. Impaired gait speed showed to be associated with dependence also entailing higher 30-day mortality after Transcatheter Aortic Valve Replacement. Frailty is associated with a marked in increase hospitalization costs after cardiac surgery can affect that persists after adjusting for age, sex, surgery type and surgical risk score. Further efforts are needed to optimize care and resource use in this vulnerable population. Frailty is common among patients admitted to intensive care units and correlates with an increased risk for adverse events, increased resource use and less favourable patient-centred outcomes. Routine assessment for frailty conceivably has
numerous purported benefits for patients, families, healthcare providers and health administrators through better informed decision making regarding treatment or goal of care (24). Frailty was associated with increased mortality, postoperative complication, prolonged length of stay and discharge to residential care facility (19). Sundermans et al employed frailty assessment that incorporates fried criteria with an additional 5-item physical performance, 3-item laboratory evaluation and respiratory function testing in a population of patients undergoing high risk cardiac surgery (19). In the 2014 AHA/ACC guideline for valvular heart diseases the Katz index and gait speed have recommended as good assessment tool for frailty. Although there is no standardized criteria for measuring frailty. There were statistical difference in age body sex and characteristics the prevalence of NYHA class I or IV B type natriuretic peptide value (BNP) and other comorbidities. CFS is a useful predictor of short-term and midterm mortality in patients undergo transaortic valve replacement (42). Increased prevalence of frailty with aging and growing utilization of critical care by older individuals there is likely to be an increased number of frail patients being admitted to intensive care unit. Frailty status has important implication for individuals developing critical illness. Frailty has increasingly recognized as a risk factor for poor outcomes across many diseases state and health care intervention. Frailty as a marker of risk is important may lead to better advanced care planning (1).

The frailty phenotype specifically centres around dysfunction in energy metabolism and muscle activity while the process of aging may be widespread. Transition in frailty may occur in the perioperative period and this has important implication for the decision to proceed to surgery (1). Frailty may identify patients at high risk for the important patient – centred outcome on disability (1). Based on data from the Cardiovascular Health Study about 25% older patients shows sign of frailty without either multiple comorbidities or disabilities. When cardiac surgery is the treatment of choice, this real world study reaffirms that older adults have potential for excellent outcomes with low overall rates of mortality and major morbidity. Gait speed can play an influential role in defining the appropriate treatment plan for older patient). The high risk perspective surgery was selected because frailty would be most likely to have an impact on decision making under these circumstances. Frailty detection might also provide opportunities for rehabilitation through exercise, nutritional and behavioural interventions to better prepare patients and perhaps to decrease risk when procedure can be delayed but not avoided (43). The syndrome frailty is important from cardiac rehabilitation perspective because cardiac rehabilitation programs can help to increase normal functional abilities as well as improve psycho social well-being and exercise capacity Elderly patients participating in cardiac rehabilitation programme can improve there level of independence as well as decrease there mortality which leads to speculation that frailty is reversible process. Frailty status according to the CFS score ≥ 4 could be an indication
that clinician should be applied the treatment. The geriatric depression screening Mental State Examination, fatigue inventory, Eastern co-operative oncology, Group performance Scale and Instrumental activities of daily living are used as determining the preoperative frailty(19). Intervention through social work and homecare to improve functional independence, social support, medication compliance and nutrition. Such interventions are demonstrated for elderly patient in Heart failure. Cardiac rehabilitation programs are improved in elderly patients(21). Frailty as a risk factor for the development and progression of cardiovascular diseases while CVD can leads to frailty. ACE inhibitors a standard treatment to improve morbidity and mortality in heart failure, also improve functional status and exercise capacity in elderly patients with no history of lv systolic function.

Frailty has been identified as a major predictor of mortality in elderly patients with heart failure. Treating an elderly patient often involves high-risk, high-gain treatments. Incorporation of frailty in risk stratification may help distinguish older patients who may benefit from intervention from those who gain little benefit or may even be harmed by aggressive intervention. Frailty assessment has emerged as a measure of biological age that correlates well with quality of life. Frailty is associated with adverse health outcomes in many clinical scenarios such heart failure, cardiac surgery and cardiovascular intervention. Frailty may occur ≥ 75 years they have many comorbidities including advanced cardiac diseases frailty is more common in these patients and might effect clinical outcomes. Frailty measure comprises relevant health dimension beyond heart failure severity. This is the major relevance when considering frailty a independent risk factor in patient undergoing cardiac surgery. Frailty assessed by validated score is a strong prognostic marker with additive information compared with traditional risk markers in cardiac surgery. This procedure is safely and effectively functional short term benefit in frail patients(13). Frailty is diagnosed to gold standard method, comprehensive geriatric assessment, variety of validated physical performance measures, judgement-based tools and multidimensional scales are used in critical care. The screening and diagnosing is used to the optimal method of frailty(35). Long term mortality was considerably lower in patients < 60 years than in patients > 60 in patients with mortality rate of young patients undergoing cardiac surgery. Systemic morbidities usually associated with severe cardiovascular diseases such as chronic pulmonary disease, diabetes and extra-cardiac arteriopathy the patient aged <60 to the lower postoperative and long-term morbidity of these patients.

All classic clinical cardiac conditions and systemic morbidities (severely depressed left ventricular function, history of previous myocardial infraction, NYHA class I-IV, Chronic renal failure, diabetes, chronic pulmonary disease, extra-cardiac arteriopathy, previous CABG with off-
pump technique and left –main coronary disease are independent risk factors of mortality(23). The pathophysiology of frailty as it accompanies aging and to assess the effect of exercise and nutrition to reduce to improve frailty and outcomes among patients undergo cardiovascular intervention. It is well rooted starting point to test for frailty patients in further geriatric assessment should be considered to confirm the diagnosis of sarcopenia, malnutrition, dementia and depression or disability(31) beyond its predictive value and it is easily to perform it does not require specialized equipment and importantly its components have high interobserver reliability and are actionable. Frailty add incremental value existing risk models to predict midterm mortality and progressive disability after an aortic valve procedure. EFT outperformed other frailty scales to identify vulnerable older adults those are at higher risk at poor outcomes(31).

Epidemiological studies suggest that regular physical activity is associated with decreased risk of ADL disability in older adults which is adverse outcome. As a result the science of this vulnerability has not been advanced. Validating scoring system is using a characterisation of frailty predicted surgical outcomes and augment other risk models. Frailty might help why some older patients recover better than expected and other than fare worse than expected. This phenomenon is believed to be a phenotype that identifies those with decreased physiologic reserves in multiple organ systems. Frailty had a stronger influence on surgical outcomes after major surgical procedures compared with minor procedures. Currently approximately half of all operation in the united states are performed in patients older than 65 years of age. It is estimated that a surgeon’s average volume will increase by 14% to 47% from the year 2000 to 2020 because of elderly patients. This patient are at high risk morbidity, mortality and increased costs. Khuri and colleagues demonstrated that postoperative complications were more predicative than preoperative risk factor than determining survival(15).

Literature confirms frailty predictive value for higher complication rate, longer length of hospital stay, mortality and morbidity after cardiac surgery or interventional treatment. Identification of frailty has a important role in promoting enhanced perioperative risk stratification, risk modification and the timely involvement of geriatric medical teams to reduce adverse postoperative outcomes and length of stay. Frailty are associated with adverse postoperative outcomes such as wound infection, composite measures of postoperative infections, postoperative complications, adverse function outcomes and GI bleeding frailty was predictive of longer LOS ≥ (12days). There is an association between weaker grip strength and adverse postoperative outcomes in terms of complication and longer LOS. Lower grip strength is independently associated with in hospital morbidity in patient ventilated on ICU. In patients undergoing cardiac surgery slower preoperative gait velocity was independently associated with composite end point of in-hospital mortality and major morbidity(40). Frailty and comorbidity are the clinical manifestation of two
distinct aging related - process involving diminished functional reserve and accumulation pathological process. Moreover frailty and comorbidity often overlap in the elderly and lead to impairment in quality of life and functional status also the worse prognosis. It is the impact of health care resources and prevalence is expected to increase aging population. Advanced age has important implication as typically these patient have severe comorbid condition that increase to advance the risk of interventional treatments. High surgical risk it is the most important factor associated with choice of conservative therapy in patients ≥ 80 years with severe aortic stenosis which has been shown to entail worse prognosis.

Frailty is not a reason to withhold care but rather a means to structure care in a more patient- centred fashion. The important tool set to measure frailty is a high priority. A day- to- day clinical practice in which frailty assessment can provide helpful prognostic information allowing clinician to optimal care pathways to these patients. The value of frailty as a prognostic marker as well demonstrated and can guide cardiovascular care as well as decision making process. Evaluation of elderly patients with symptomatic aortic stenosis is challenging and continuously evolving. Traditional risk assessment has proven to be insufficient thus consideration regarding frailty, comorbidity and disability with prognostic impact and not included in commonly used risk scores are of great importance as they can improve decision making.(29). Canadian study of Health and Aging Clinical Frailty Scale. Trained Research assistants determined frailty status in the 2 weeks preceding index admission by interviewing patients shortly after admission or by reviewing medical charts. Degree of frailty was very fit to well [ termed well for brevity score1 or 2 ], managing well to vulnerable [ termed vulnerable score3 or4] or mildly to moderately frail [ termed frail 5 or 6 ]. Very fit refers to people who are very active and energetic "well indicates those who are occasionally active managing well” indicates those who are physically inactive beyond routine walking vulnerable indicates those with comorbidity and limited activity, but without disability: mild frailty “ indicates depend in1 or more instrumental activities of daily living eg [ food preparation and household work] and moderate frailty“ indicates dependence in 1 or 2 basic activities of daily living eg (dressing and bathing). Patients with severe or very severe frailty indicating complete dependence in 3 or more activities of daily living and terminally ill patients [score ≥ 7]. American Society of Anaesthesiologists classification was statistically different for different levels of frailty. Patients classified as frail were more likely to require postoperative intensive care or close observation to stay in hospital longer and were less likely to discharged home independently. Studies are needed to assess the impact and feasibility of interventions in terms of changing frailty status or decreasing risk among frail surgical patients, but current evidence supports the use of well-validated frailty assessments when evaluating risk for adverse postoperative outcomes. The result of this study shows that poor postoperative prognosis is not
limited to the most severely frail patients. In epidemiological studies shows that the baseline of frailty has been associated with poor outcomes both community cohorts and hospitalized patients. Specifically in cardiac surgery, frailty has been strongly associated with postoperative mortality and morbidity and thus frailty likely to improve the identification of high-risk patients beyond known risk scores. For perioperative then the question arises how to incorporate this information into perioperative care. Preoperative identification of high-risk patients to guide both patient expectation and surgical decision making and perioperative optimization strategies of frail patients. In many cases principles of geriatric care may need to be applied. The aging of women is the related symptoms of weakness was the common first manifestation among participants with frailty. Subsequently weight loss and exhaustion were key components of progression to frailty. Energy related hormones such as growth hormones, androgen and insulin-like-growth factor-2 decline with age and have been associated with frailty. The overall balance of these age related cellular process likely influence the development of the frailty phenotype through changes in organ and system function.

Chronic diseases plays a significant role in the development of frailty(1). Longer-term mortality was considerably lower in patients < 60 years than in patients > 60 years and with mortality rates reported in previous studies of young patients undergoing cardiac surgery. Systemic comorbidities usually associated with severe coronary artery diseases such as chronic pulmonary diseases, diabetes, and extra arteriopathy were be found to be less frequent in patients aged <60 and this contributes to the lower postoperative and long morbidity of these patients(23). The longer hospital stays in frail patients, suggesting prolonged recovery time or a higher rate of minor complication(13). The frail patients faces a higher risk from invasive procedures but also potential benefit from intervention such as cardiac rehabilitation to counteract the physical weakness characteristics of frailty. Cardiac rehabilitation may potentially improve frailty and although it has to be proven may ultimately severe to facilitate surgical recovery for frail elderly patients. The fried scale encompasses slowness, weakness, physical activity, exhaustion, and shrinking with ≥ 3 of 5 criteria required for the diagnosis of frailty. The Short Physical Performance Battery is another diagnosis of frailty slowness, weakness and balance. This is measured by series of 3 timed physical performance test(gait speed, chair rises, and tandem balance) each is scored 0 to 4 and total score ≤ 5 of 12. It is evidence that frail patients who undergo cardiac surgery have higher rates of postoperative mortality, morbidity, prolonged length of stay and need for discharge to facilities. The value of frailty in guiding cardiovascular care and as therapeutic target is beginning to emerge and should be expanded in future applications to improve patient outcomes. Some studies suggest when the degree of frailty is out of proportion to the burden of comorbidity., it is intrinsic and less likely to improve after removal of the comorbidity.
9. CONCLUSION

This case illustrates the complexity of frailty assessment and reveals the importance of older patient’s problem. Literature suggests that frailty predisposes elderly to worsening outcome after surgery. That is why it is important to assess frail patient before the surgery and determine the risk and anticipate the postoperative measures. In the situation before cardiac surgery a structured questionnaire and physical performance tests to measure indices of frailty should be performed. Unfortunately in our present case, it was not done, only the patient physical status by ASA was evaluated. Perhaps because no consensus on how to assess frailty in studies is recommended to apply. The fried score that reflects unintentional weight loss, self-reported, exhaustion, weak hand grip strength, slow 5-m gait speed and low physical activity. It is important to assess frailty before surgery.
10. PRACTICAL RECOMMENDATIONS

1. Before cardiac surgery, a structured questionnaire and physical performance test to measure indices of frailty should be performed.

2. Physical rehabilitation for frail older people can positively affect functional and physical capacity and this affect may be related to the frailty.

3. Physical activity recommendation and exercise programmes can be useful for frailty prevention to improve physical and functional capacity (Gait speed, TUG, SPB and survival) and quality of life as well as to decrease prevalence of anxiety and risk falls in community-dwelling frail in older people.

4. It is known that exercise based comprehensive cardiac rehabilitation is based on strong evidence and well recognized treatment for patients with different cardiovascular diseases.

5. Exercise training (endurance and strength training to improve muscle mass and strength balance and coordination and to avoid falls.

6. Nutritional intervention is recommended for older adults who has low serum albumin or other markers to be at risk for malnutrition with protein supplementation have measuring effect of mortality and morbidity. Therapy may be indicated for certain causes of anaemia such iron deficiency and myelodysplastic syndrome and deficiency or folate of vitamin B12.
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The Impact of Frailty on Outcomes after Cardiac Surgery

Senatvinio silpnumo sindromo įtakarezultatams po širdies operacijų

Dr. Judita Andrejaitien, Prof. dr. Jūratė Gudaitytė

Santrauka

Vyresnio amžiaus operuojamų žmonių skaičius nuolat didėja, ir pooperacinių komplikacijų skaičius vyresnio amžiaus pacientams gali siekti net 65%, tačiau to paties amžiaus pacientų rizika nėra tokia pati. Itin svarbu įvertinti senatvinio silpnumo sindromą priešoperaciniame laikotarpyje, nes šio sindromo nustatymas ir įvertinimas gali pažanginti pažeidžiamų chirurginių pacientų identifikavimą ir galimų komplikacijų prevenciją, siekiant parinkti optimalų chirurginį ir anestetinį gydymą. Senatvinio silpnumosindromas vis labiau pripažįstamas kai

Summary

The number of older people undergoing surgery is steadily increasing, and the number of postoperative complications in older patients may be as high as 65%, but the risk for the same age is not the same. It is of utmost importance to evaluate senile weakness syndrome in the pre-operative period, as the identification and evaluation of this syndrome may facilitate the identification of vulnerable surgical patients and the prevention of possible complications in order to select optimal surgical and anesthetic treatment. Old age weakness is increasingly recognized as a specific clinical condition associated with worse outcomes in many medical and surgical areas. It is crucial that cardiologists, anesthesiologists and cardiac surgeons know how to assess weakness and its potential impact on postoperative results. This study analyzes the impact of senile weakness syndrome on postoperative progress, and in the case of clinical case analysis we understand the importance of evaluating this syndrome in the early postoperative period and consider what measures can be taken to improve post-operative results.