CHAPTER – 13

Frailty and Abdominal Surgeries

Background:

Accurate patient selection is one of the most difficult aspects of surgery. Individual clinical judgment-based treatment decisions are prone to prejudice, and may result in unnecessary surgery and negative consequences. There is a constant and growing need for remedy in the general population, with often unrealistic expectations. Patients may be exposed to an excessive risk of significant postoperative morbidity and death, as well as a poor long-term prognosis, due to strong patient incentive for surgery and a lack of standardised risk assessment. In contrast, it is inappropriate to refuse to do surgery with the goal of curing patients who are deemed unfit based on broad and imprecise risk factors.[1, 2]

Despite technological developments and advancements in perioperative care, large abdominal operations continue to be associated with a high rate of severe complications, long-term impairment, and health and social expenses.[3] Furthermore, the chances of successfully saving patients from surgery-related morbidity remain uncertain. The chance of mortality following a significant complication is characterised as failure to rescue.[4, 5] Whether or not a patient can be saved after a complication is a result of the hospital's treatment, as well as its resources and facilities, but most importantly, of the patient's resilience.[6] Even when treated with the greatest available care, failure to rescue happens frequently in frail patients who lack the physiological reserve to endure serious postoperative sequelae. Frailty is a state of sensitivity to inadequate homeostasis resolution

after a stressful event.[7]

It occurs as a result of a gradual loss of function across several physiological systems, and it raises the likelihood of adverse consequences. It has recently been claimed that chronological age and comorbidity are insufficient criteria for determining whether a patient should have surgery.[8] Frailty, on the other hand, could be a more accurate and customised indicator of 'biological age'.[9] Frailty should not be thought of as an age-related condition; it can be identified in anyone with a low functional reserve for a variety of causes.

The variety of definitions and scoring methods proposed in the surgical scenario, as well as the metric complexity, may limit routine assessment and make it difficult to interpret. The scoring techniques used to evaluate frailty in surgical patients, as well as their capacity to predict unfavourable clinical outcomes, will be discussed in this chapter. The chapter's main goal is to describe the global influence of frailty on postoperative morbidity and mortality, as well as long-term mortality, in patients who have major abdominal procedures.

Transdisciplinary Model of Care: the Ideal Model

The transdisciplinary model of care has been developed to give smooth and outstanding care to senior patients undergoing major abdominal surgery through a patient-centered, collaborative care approach, in order to meet the complex and multidimensional needs of elderly surgical situations. [10]

With an integrated team of surgeons, anaesthetists, physicians, nurse clinicians, and allied healthcare professionals leveraging individual domain expertise in delivering the most holistic care for elderly surgical patients, the transdisciplinary model ensures consistent,

successful outcomes in elderly colorectal surgery patients. Transdisciplinary care is devoid of hierarchy, and communication is free-flowing, continuous, coordinated, and seamless, with an ongoing goal to improve. It emphasises open communication among team members, seamless evaluation, and team management of the patient rather than interdisciplinary referrals, with scheduled opportunities for talks, briefings, and debriefings, as well as central coordination by the hospitalist.

More than 83% of patients handled with this multidisciplinary approach were able to return to premorbid functional state 6 weeks following major colon resection, and more than 90% after 90 weeks, according to Alexandra Health's geriatric surgery service (GSS).[11]Following the transdisciplinary approach's success, a trans-institutional start-to-finish (STF) model was proposed, which included prehabilitation in the patients' homes in collaboration with the community or in a day rehabilitation centre, followed by postoperative rehabilitation in either the community hospital or the patients' homes.The GSS has been tracking its performance using the cumulative summation (CUSUM) methodology since its inception in 2007.[12] The occurrence of one or more of the following events: Failure was defined as

(1) Perioperative mortality,

(2) An unplanned prolonged hospital stay for any reason, including morbidity, or

(3) Failure to achieve a functional score (Barthel score) within 10% of preoperative function at 6 weeks, as indicated by an upward slope on the CUSUM curve.

A descending slope would suggest consistent success. Figure 1 shows the CUSUM curve for the GSS's performance from 2007 to 2016. The download slope reflects the transdisciplinary approach's consistent success.

Figure 1: CUSUM curve tracking performance of the geriatric surgery service. The downward sloping curve indicates consistent success, i.e., reduced occurrence of perioperative[12]

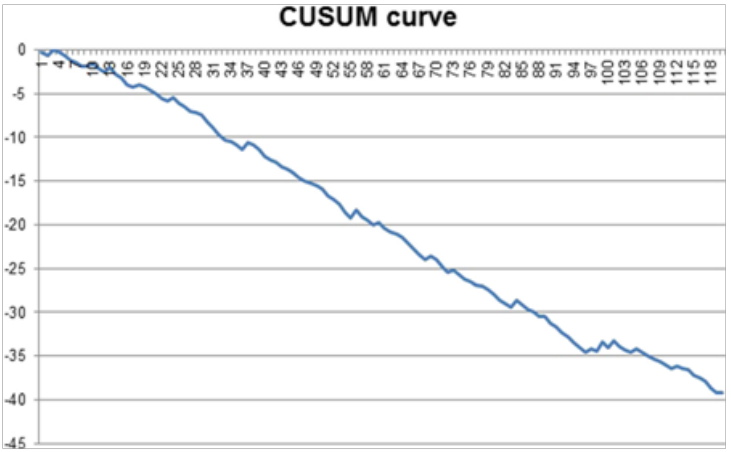

Image source: Lee DJ, Mak MH, Tan KY. Frailty in surgical preoperative evaluation and postoperative recovery. Curr Geri Rep. 2019;8(2):87-96.

Sarcopenia and abdominal surgeries:

The loss of muscle mass, also known as sarcopenia, can be measured in a more reproducible and objective way to determine frailty. Sarcopenia is defined as a syndrome characterised by a gradual and widespread loss of skeletal muscle mass and strength. [13]It can be thought as organ dysfunction, or skeletal muscle impairment, that develops after a prolonged period of disease or illness. Sarcopenia has been associated to falls, physical weakness and impairment, and a higher risk of mortality in older individuals who are referred to acute care units. Sarcopenia and postoperative outcomes are now the subject of a

growing amount of research. Poor surgical results have been linked to pancreatic cancer, liver tumours, colon cancer, and gastric cancer resection in studies. Therefore assessment of sarcopenia prior to any abdominal surgical procedure is of utmost importance to determine the post-operative outcome. [12]

A recent subsidiary study based on data from the National Emergency Laparotomy Audit (NELA) found 13.9% and 28.2% 30-day and 1-year mortality among the elderly, respectively.[14] Sarcopenia, as defined by psoas density and CT area, is linked to a higher risk of 30-day and 1-year death. In this study, psoas density as evaluated by CT predicted a higher likelihood of bad outcome than psoas area, implying that the quality of lean muscle mass, rather than the quantity, is more closely linked to sarcopenia and frailty. Rangel et al. observed a 32% 1-year death rate among elderly patients following emergency abdominal surgery in the United States.[15] Sarcopenia, as measured by a CT scan's total psoas index, was found to be related with 30-day mortality.[12]

Investigative tools and abdominal surgeries:

Because of their ability to differentiate fat from other soft tissues, computed tomography (CT) scans and magnetic resonance imaging (MRI) are regarded the gold standard for determining muscle mass. [16, 17] The cross-sectional psoas muscle index and the skeletal muscle index at L3, both adjusted for height, have previously been demonstrated to predict overall muscle mass. Jones et al evaluated image analysis using IMAGEJ software and manual CT methodology and found a significant correlation between the two methods.[18] Sarcopenic frail patients undergoing elective resection for colon cancer had a considerably greater chance of experiencing serious problems, according to his research.For elderly patients requiring major abdominal

surgery, a CT scan is usually routinely conducted prior to surgery. As a result, it is possible to estimate lean muscle mass for the aim of detecting sarcopenia at no additional cost, and it eliminates the need for additional time-consuming procedures to assess frailty. This is especially helpful in an emergency situation.

Post-operative outcomes:

An increased risk of adverse events is expected when a frail patient has a high-risk emergency surgery. A study by Castillo-Angeles and colleagues confirms this assumption, but also shows that frailty is linked to poorer outcomes, even following low-risk surgeries.[19] The authors discovered that patients with frailty were twice as likely to die within 30 days of discharge following low-risk emergency surgery in their examination of over 880 000 emergency general surgery procedures collected in the Medicare Inpatient Claims files (from 2007 to 2015), especially of appendectomy or cholecystectomy. This risk was substantially larger than the 53% increase in mortality risk following high-risk emergency surgery (exploratory laparotomy, lysis of adhesions, bowel resection, or peptic ulcer repair).[20]

Sandini M and coauthors used data from 35 trials with over one million participants in a meta-analysis. When compared to non-frail patients, having a frailty condition before surgery was linked to a threefold increase in long-term mortality, a sixfold increase in early postoperative death, and a more than doubled chance of significant postoperative morbidity.[21] This shows that frailty should always be assessed in patients who are scheduled for majorabdominal surgical operations before deciding whether and how to proceed.

Additionally, the prevalence of frailty among patients undergoing emergency abdominal surgery was 30.8%, according to a comprehensive review and meta-analysis by Kennedy CA and co-authors. The death rate from all causes was 15.68%. The mortality rate was 24.7% among the frail undergoing emergency general surgery. When compared to the non-frail, frailty was related with a higher mortality rate (p 0.05).[22] There is compelling evidence that frailty in the elderly predicts post-operative mortality, complications, a longer hospital stay, and loss of independence. In the perioperative pathway, collaborative working with medicine for the elderly physicians to target modifiable components of the frailty syndrome may enhance results. To improve decision-making and the development of novel postoperative methods, frailty score should be integrated into acute surgical assessment practise.

Pre-cautions prior to abdominal surgeries:

In order to achieve the best result, it is critical to select the appropriate treatment for the appropriate patient. The observation that frailty is a risk factor for poor surgical outcome raises the question of how to apply it. It could be used to limit access to major surgery for frail patients, albeit this is somewhat limited, given the growing number of elderly and frail patients. [23] It could allow for more individual risk assessment, discussion, and permission, as well as focused preoperative patient optimization. Wick and Finlayson's recent editorial encourages medical research to'move beyond measurement to action,' highlighting on the need to demonstrate that outcomes may be truly improved by modifying frailty components.[24]

Integrated care delivery methods, such as enhanced recovery after surgery programmes, have previously been shown to improve clinical and functional outcomes in

older and high-risk patients.Prehabilitation programmes, which include preoperative optimization of concomitant chronic illness therapy, nutritional status, physical function, and physiological support, may provide a more comprehensive and effective option in this setting, despite minimal evidence.

Summary:

Frailty affects more than 20% of older persons undergoing emergency laparotomies and other abdominal procedures, regardless of their age. Frailty raises the risk of postoperative mortality and morbidity in the older adult. Pre-operative frailty assessment and risk assessment, evaluation of extent of sarcopenia are the essential criteria to be considered prior to any abdominal surgical procedures. Proper pre-operative assessment along with prehabilitation and optimization can reduce the adverse surgical outcome.

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