CHAPTER – 5

Frailty and Intra-operative Management

Background:

Frailty, a term used to describe generalized weakness, progressive loss of weight, and unsteadiness, possess lot of clinical implications. Pre-frail and frail individuals are at an increased risk for intra-operative and post-operative complications resulting in amplified morbidity and mortality rates. Moreover, frailty has been abstractlyidentified to portray a condition of augmented vulnerability, diminished physiologic reserve and inability to defy the stressors.

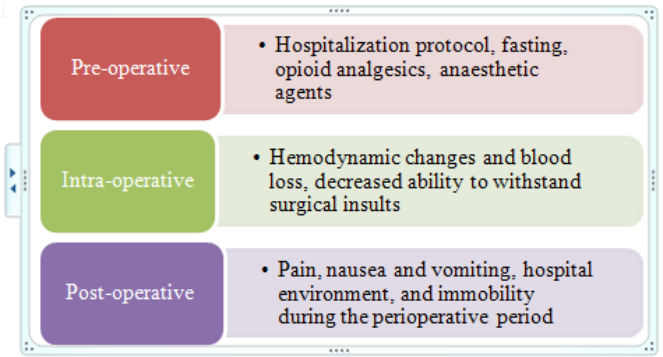
Frailty and surgery:

A hospitalized elder individual about to undergo surgical has to encounter many hardships all through their surgical expedition and the post-operative recoveryperiod. The following are the challenges faced by a frail patient during each phase of the surgery (Figure 1):

1. Pre-operatively: Hospitalization protocol, fasting, opioid analgesics, and anaesthetic agents
2. Intra-operatively: Hemodynamic changes and blood loss, decreased ability to withstand surgical insults
3. Post-operatively: Pain, nausea and vomiting, hospital environment,and immobility during the perioperative period

These factors canall be the sparks that results in failure of a formerlystable but frail body.

Figure 1: Challenges phased by a frail patientduring each phase of the surgery



The extent of insult required to initiate decompensationand consequentundesirable clinicaloutcome is inversely linked to the intensity of frailty (Figure 2).[2]A very frail patient may succumb to a minor insult whereas a pre-frail patient may successfully recover from major surgery and its post-operative complications.

Figure 2: Frailty and surgical insults [2]

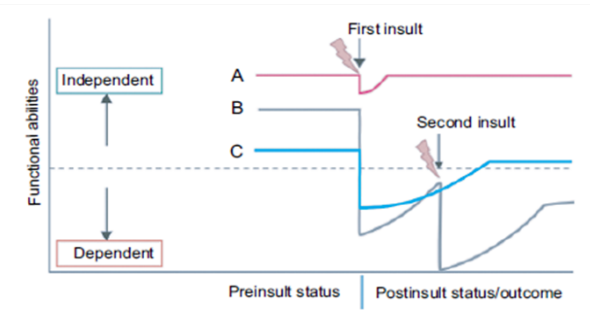


Figure 1 Role of frailty in recovery from surgery.
Source: Copyright ©1999–2018 John Wiley & Sons, Inc. Reproduced from Desserud KF, Veen T, Soreide K. Emergency general surgery in the geriatric patient. *Br J Surg*. 2016; 103(2):e52–61.[15] from Desserud et al.[15]

Patient "A" is a fit individual who is completely independent for his normal function. Therefore the patientshows hastened recovery after a minor insult.

Patient "B" is someone with mild degree of frailty. Any major insult results in the patient becoming dependent. If this person suffers a second injury, then it will result in further decline of the functioning ability or even in death. Furthermore, second insult will make the individual completely dependent for life.

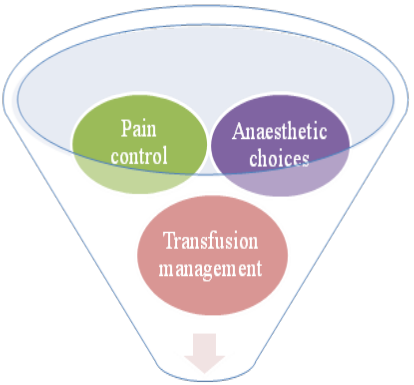
Patient "C" is a functionallyindependent but presents with a moderate degree of frailty. Therefore after an insult, the patient might become dependent on their caretaker for a certain period of time until complete recovery. The patient ultimatelyresumes to living independently after complete recovery, but at a decreasedlong-term function when contrasted with the functioning ability before surgery.

Frailty and intra-operative implications:

Clinically, intraoperative remedial decisions and treatment planning have anenduring and pensiveconsequence on the success of any surgical procedure as well as the post-operative morbidity and mortality rate, and the quality of life. It is noteworthy that the surgical aftereffects are intensified in a frail patient when compared to a fit individual. Figure 3 highlights the potential areas of intra-operative care that a surgeon must be heedful off. [3]

The choice of anaesthetic drug, methods adopted to control intra- and post-operative pain, and the usage of outcome-oriented transfusion careareacknowledged as prospective areas to recuperate the surgicaloutcomes. It is noteworthy that the post-operative complications such as protracted intubation, delirium, and pneumonia; eventually leading to increased duration of hospital stay can be handled explicitly if these three aspects are effectively considered intra-operatively.[4, 5]

Figure 3: Potential areas to improve the intra-operative management of frail patients



- **Anaesthetic choices:**

Anaesthetic choices have been recognized to have a profound effect on cognitive function post-surgically.[6] As mentioned in Chapter 3, elder patients are more prone to show higher global scores on cognitive impairmenteven a year after their critical illness. Furthermore, such individuals encounter postoperative delirium with significantly higher risk of getting institutionalized.[7] In order to avoid such eventful incidences, practising neuraxial anaesthesia and evasion of benzodiazepines can be applied to the patients.[8]

- **Pain control:**

Most of the older patients suffer from moderate to severe pain post-operatively, especially if it is a major surgery such as cardiothoracic or colorectal surgeries. The intensity of pain is increased by many folds in a frail patient. Taking adequate intra-operative measures to minimize pain, blood loss an intra-operative time will aid in reducing the

post-operative morbidity and mortality of such patients.

- **Transfusion management:**

Likewise, goal-directed fluid or outcome-oriented transfusionmanagement with least invasive monitoring devices and prudent practice of transfusion have major effect on older patients on both short- and long-term basis.[9, 10]

Even though most of these intercessions have been employed in the intraoperative care of geriatric patients, adequate prospective data is not available that has recorded the advantages of these methods on frail older population.[3]

Advanced programs such as "EnhancedRecovery After Surgery" have stemmed in the recent years. These programs employ thedemonstrated evidenceto regularize the care provided in hospitals, decrease the incidence of intra- as well as post-operative complications, and hasten the recovery of the frail patients after any surgical procedure. These programs stipulate anuprightagenda to enhance care throughout the intraoperative phase.[11, 12]

Frailty and operative stress:

Patients with frailty syndrome tend to show high mortality rates at high mortality rates at 30, 90, and 180 days even for surgeries that are considered to be least stressful.Moreover, it was found that the mortality rates were high for both elective as well as emergency surgeries. In fact, emergency surgeries showed very high death rate post-operatively. The level of operative stress can be assessed using a scale called as operative stress score (OSS). This OSS ranges from a score of 1 to 5 degree, rating that is based on the extent of physiologic stress applied to the patients.[13] The higher scores indicate higher degree of stress applied. This scale is encompassed in Veterans Affairs Surgical Quality Improvement Program.

Preoperatively, the patients should be assessed and categorized as normal, pre-frail, frail and very frail patients. With the help of this scale, the extent of intra- and post-operative stress the patients can withstand must be evaluated, and the decision on elective or emergency surgery must be made.

Intraoperative hemodynamic variations:

Homeostenosis is defined as physiologically impaired response to stress. A frail individual exhibits varying degree of homeostenosis. Levin et al hypothesized that the preoperative frailty and the extent of homeostenosis is linked to reducederraticism of mean arterial blood pressure (MAP) under anaesthesia. He also found that occurrences of blood pressure erraticism are essentiallydefensive but the phenotype of the patients must be taken into consideration.[14] The "reserve capacity" of patients can be identified if the phenotype of frailty is associated to hemodynamic variations pre-operatively.

In order to conferif intraoperative hemodynamic variability is part of the mechanistic pathway between frailty and mortality, James LA and co-authors conducted a retrospective cohort study. The study concluded that frailty is related with less intraoperative blood pressure changes, and the association of frailty with 30-day mortality is partlyarbitrated by incidents of absolute change >15% in fractional MAP.[15]

Thorough estimation of the above-mentioned factors will enable the physicians to determine the prognosis and thus reduce the post-operative mortality rate.

Summary:

A proper preoperative assessment will enable physicians in avoiding post-operative complications in a frail patient.

Intra-operatively, the factors that should be considered are the methods of pain control, anaesthetic choices and transfusion management, because proper choices associated with these factors will prevent the unsolicited post-operative complications such as total dependence, delirium, cognitive impairment, and in worst case scenario, the death of the patient. Another important factor to be considered intra-operatively is the operator stress. Assessing the extent of stress the procedure will impart of the patient and evaluating the capacity of the patient to withstand the stress is essential to prevent the adverse clinical outcomes.

References:

1. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. *J Gerontol A Biol Sci Med Sci*. 2001;56(3):M146–M156.

2. Desserud KF, Veen T, Soreide K. Emergency general surgery in the geriatric patient. *Br J Surg*. 2016;103(2):e52–61.

3. Anaya DA, Johanning J, Spector SA, Katlic MR, Perrino AC, Feinleib J, Rosenthal RA. Summary of the panel session at the 38th Annual Surgical Symposium of the Association of VA Surgeons: what is the big deal about frailty? JAMA surgery. 2014 Nov 1;149(11):1191-7.

4. Griffiths R, Beech F, Brown A, et al; Association of Anesthetists of Great Britain and Ireland. Peri-operative care of the elderly 2014: Association of Anaesthetists of Great Britain and Ireland. *Anaesthesia*. 2014;69(suppl 1):81-98

5. Dodds C, Foo I, Jones K, Singh SK, Waldmann C. Peri-operative care of elderly patients—an urgent need for change: a consensus statement to provide guidance for specialist and non-specialist anaesthetists. *Perioper Med (Lond)*. 2013;2(1):6.

6. Pandharipande PP, Girard TD, Jackson JC, et al; BRAIN-ICU Study Investigators. Long-term cognitive impairment after critical

illness. *N Engl JMed*. 2013;369(14):1306-1316.

7. Neufeld KJ, Leoutsakos JM, Sieber FE, et al. Outcomes of early delirium diagnosis after general anesthesia in the elderly. *Anesth Analg*. 2013;117(2): 471-478.

8. Pandharipande PP, Pun BT, Herr DL, et al. Effect of sedation with dexmedetomidine vs lorazepam on acute brain dysfunction in mechanically

9. Abbas SM, Hill AG. Systematic review of the literature for the use of oesophageal Doppler monitor for fluid replacement in major abdominal surgery. *Anaesthesia*. 2008;63(1):44-51.

10. Amato A, PescatoriM. Perioperative blood transfusions for the recurrence of colorectal cancer. *Cochrane Database Syst Rev*. 2006;(1):CD005033.

11. GrocottMP, Martin DS,Mythen MG. Enhanced recovery pathways as a way to reduce surgical morbidity. *Curr Opin Crit Care*. 2012;18(4):385-392.

12. Enhanced Recovery After Surgery (UK). ERAS Society (UK) website. http://www.erasuk.net. Accessed August 14, 2014.

13.Shinall MC, Arya S, Youk A, et al. Association of Preoperative Patient Frailty and Operative Stress With Postoperative Mortality. *JAMA Surg*. 2020;155(1):e194620. doi:10.1001/jamasurg.2019.4620

14. Levin MA, Fischer GW, Lin HM, McCormick PJ, Krol M, Reich DL. Intraoperative arterial blood pressure lability is associated with improved 30 day survival. Br J Anaesth. 2015;115:716–726.

15. James LA, Levin MA, Lin HM, Deiner SG. Association of preoperative frailty with intraoperative hemodynamic instability and postoperative mortality. Anesthesia & Analgesia. 2019 Jun 1;128(6):1279-85.