CHAPTER – 3

Frailty and Anaesthesia

Background:

The elderly people, as mentioned earlier, are more prone for falls, increased risk of institutionalization, and hospitalization. Recently, the global burden of expanding population of individuals above the age of 85 years has concerned the healthcare providers. Due to their increase risk for injuries, there is an increasing need for surgeries and thus anaesthesia. To deliver anaesthesia for an older patient is a subject of personalizing care according to the patient's specific requirements, but certaincommon aspects are imperative to consider.

This chapter discusses the characteristics of elderly, and the challenges and probabilities of administering anaesthesia for this delicate patient group, the existing methods and pharmacological preferences.

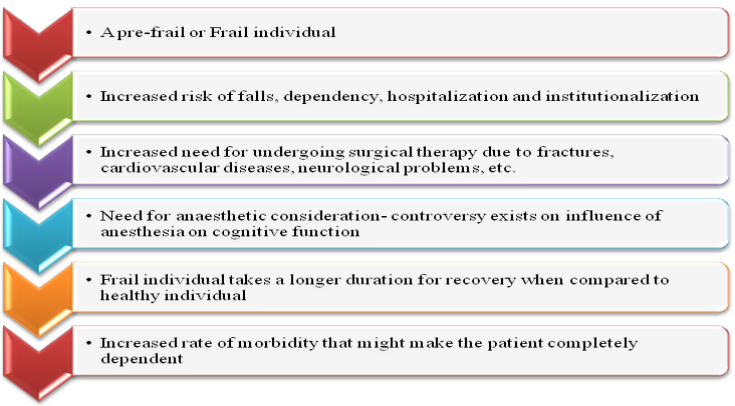
Frailty and surgery (Figure 1):

Since there is a considerable increase in the rate of surgical procedures amongst the elderly, the exigency for surgical proceduresunder anaesthesia is also expected to increase substantially (1, 2). An older individual who is hospitalized and requires a surgery experiences many challenges all through surgery and during the post-operative healing period. Most importantly, when frail individual is about to get operated, many factors should be considered as there is a multifacetedinteractionconcerning the process of aging, prevalence frailty, and anaesthetic procedure.A minor insult may be sufficient to lead to permanent functional decline post-surgery in a veryfrail patient,

whereas a robust older person may need majorsurgery and several postoperative complications to result ina decline in function.

For example, when a fit individual is injured or undergoes a minor surgery such as appendicectomy, he/she recovers quickly from the injury or the minor surgery and returns to perform daily activities with ease. In a similar situation, an individual with mild degree of frailty but functions independently takes a longer time to heal. Moreover, if they experience any major complication or undergo major surgeries, then functioning independently becomes almost impossible. Whereas an individual with moderate to severe degree of frailty and is already dependent on caretaker for day-to-day living takes the maximum duration of time to return to pre-surgical health status.

Figure 1: Influence of frailty on surgical therapy



Frailty and pharmacologicalconsiderations for anaesthesia:

Frailty is the accretion of discrepanciesamidst multiple organ systems resulting in deterioration of physiological functioning and subsequent pharmacological changes.

These concerns are additionallycomplicated by co-existence of co-morbidity, disability, organ malfunction, and polypharmacy.

The various pharmacological considerations in a frail individual are listed in table

Table 1: Pharmacological considerations in a frail individual (3, 4, 5)

1. Reduced muscle mass, total body water content and increase in adipose tissue. Therefore, drugs that are lipophilic drugs are distributed in large volumes all over the body resulting in longer duration of action. However, increased plasma concentration of hydrophilicdrugs is noted due to decrease in the central compartment.

2. The reduced musclemass usuallysuggests that the renal function is deterioratingbutit is not revealed specifically by the serum creatinine levels.Besides, aging condenses the renal mass, and lessens the rate of excretion of drugs.

3. The patientshave increased sensitivity to drugs with potential for renaltoxicity.

4. Frailty is associated with a reduction in estimatedglomerular filtration rate (GFR). This is suggested to be negative influence on prognosis of a frail individual after any surgical therapy.

5. Overall, there is considerable alteration in the drug metabolism inthe older population due to reduced hepatic blood flow anda reduction in the activity of the cytochrome P450 system.

Subsequently, drugs are less effectively cleared by Phase I reactions.

6. Frailty influences the cardiac functioning by reducing

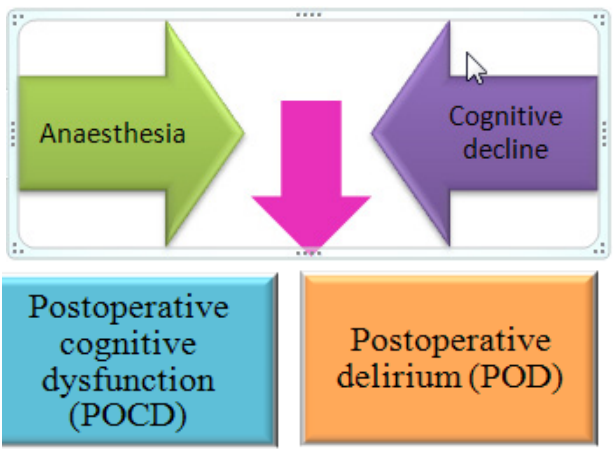
the cardiac muscle mass, thus decreasing the cardiac output. The resultant effect is hypotension and hypovolemia that has a significant influence while considering anaesthesia.

7. Aging causes progressive loss of lung parenchyma elasticity, a reduction in functionalalveolar surface area and reduced respiratory musclestrength. But frailty increases the severity these changes. Therefore, drugs such as neuromuscular blocking agents, opioids, or sedatives,may increase the risk of aspiratio

Anaesthesia and cognition:

A frequent finding in geriatric patients is decline in cognitive function. But the theory that is of particular interest is the instabilities in cognition during the perioperative phase of the older individuals who undergoes surgical treatment. These instabilities are termed as postoperative cognitive dysfunction (POCD) and postoperative delirium (POD). These two factors determine the prognosis of the patient post-surgically. An individual presenting with frailtytends to show impairment of the cognitive function with decreased cognitive reserve. Therefore, these patients aremore susceptible to POCD and POD.

Figure 2: Anaesthesia and cognition



Frailty and anaesthesia:

In general, the anaesthetic technique can be broadly classified into two categories, regional anaesthesia (RA) and general anaesthesia (GA), depending upon the requirement for a particular surgery. The method of anaesthesia preferred for the management of a patient rely upon the surgical needs, duration of the procedure as well as the prevailing comorbidities. There are various debates arguing about the influence of anaesthesia on cognitive function post-operatively, especially in pre-frail and frail patients. But before proceeding in detail into the topic of frailty and anaesthesia, it is important to remember certain points before administering anaesthesia to old patients in general (Table 2).

Table 2: Points to consider before administering anaesthesia to the elderly

1. Age is a predictor for increased mortality and morbidity
2. Biological age is more important than chronological age
3. Frailty denotes loss of function in all organs and is common
4. Cognitive changes are frequent and important
5. Preoperative assessment can be difficult and time consuming
6. Relatives may be crucial to obtain a reliable functional assessment and secure informed consent
7. Reduce doses of anaesthetic drugs, titrate to effect and evaluate responses repeatedly
8. Neuromuscular blocking agents have prolonged duration of action, so use neuromuscular monitoring
9. Assess pain with an appropriate pain score and secure pain relief
10. Facilitate early rehabilitation and minimise time in

hospital

Adopted from: Strøm C, Rasmussen LS, Steinmetz J. Practical management of anaesthesia in the elderly. Drugs & aging. 2016 Nov;33(11):765-77. (6)

A detailedassessment of the older patients prior to surgical procedure is essential to minimize poor clinical outcomes and to improve the prognosis. This is important because frailty is often an overlooked concept and in case a frail individual needs to undergo surgery, failure to adequately assess the patient before the procedure increases the morbidity and mortality rate. As a first step en-route this objective, Chow et al proposed certain guidelines for preoperative evaluation of older patients (Table 3).

Table 3: Guidelines for preoperative evaluation of older patients

- Assess the patient's cognitive ability
- Evaluate for depression or the tendency to develop depression
- Identify the risk factors for POD
- Present status of alcohol intake and substance abuse
- Estimation of cardiac and pulmonary function and output
- Assessment of the patient's general nutritional and functional status, history of falls, and social support

Influence of frailty on procedures requiring anaesthesia gained the importance anaesthetists come across frail patientsmore frequently. The National Joint Registry report from 2012 recorded nearly 166 000 cases of primary hip and knee arthroplasty surgeries. Approximately 51% and 43% of females and males, who underwent such surgeriesaged between a range 70 and 89 years,

respectively. This number became one of the concerns for anaesthetists because of the independent relationship of frailty with higher rate of postoperative morbidity, and the occurrence of postoperative complications, especially after procedures that required anaesthesia. Though this hypothesis has been explained by various studies retrospectively, more prospective studies are mandated to validate this association.

Mason SE and authors in 2010 in a meta-analysis considered the effect of anaesthetic technique on POCD and POD. The results suggested that GA was slightlybut non-significantly related to the incidence of POCD (8). Moreover, RA was expected to be favourable when administered as an analgesic agent, but the degree of analgesia depends uponthe type of block employed.

The intravenous agents utilized for GAseem to negatively affect the neuronal structures by altering the axonal growth and retarding the developments of neuronal networks. It can also derange the axonal growth, andproduce apoptosis of the brain cells. All of these changes combined together can result in alterations of critical areas that play a vital role in forming and retaining memory (9).

Apart from the effect of anaesthesia on frail patients, the influence of frailty on the choice of anaesthesia also needs to be discussed. All the above-mentioned information must be kept in mind before performing any surgical procedure on old as well as frail patients because, their organs take much longer time to heal than a healthy or pre-frail person. Therefore, the advantages and disadvantages of both RA and GA must be evaluated before choosing the method of anaesthesia.

Summary:

In general, an elderly person must be handled with utmost care both pre and perioperatively. The choice of anaesthesia depends on various factors and clinicians

must be thorough with the guidelines to reduce the risk of morbidity and mortality post-operatively. Some studies suggest that RA has an edge over GA for treating the frail patients. However, adequate and convincing evidence is lacking to substantiate this hypothesis.

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