CHAPTER – 8

Frailty and neuraxial Anaesthesia

Background:

Frailty is described as a loss of homeostasis and stress resistance, which increases a person's vulnerability to negative changes (illness or mortality) disproportionately in relation to the occurrence.[1] In lieu of ambulatory surgical patients undergoing procedures lasting up to 60 to 90 minutes, such as knee arthroscopy, hernia repair, and extracorporeal shock wave lithotripsy, neuraxial mode of anaesthesia (spinal or epidural) can be considered as an excellent choice.[2]Longer ambulatory surgery cases or instances with an unknown duration may profit from epidural anaesthesia. Lower-extremity surgery, hernia repair, and lower-abdomen laparoscopy have all benefited from epidural anaesthesia.[3]The necessity to demonstrate the ability to void before discharge, lower backache, and other procedure-related adverse effects have all been mentioned as obstacles to administering epidural anaesthetic in an outpatient setting.

Spinal anaesthesia is a straightforward procedure that involves injecting modest doses of local anaesthetic solution into the subarachnoid region to create a deep and quick surgical block. It ispondered to be adequately safe, and severe complications are reasonably rare.Local anaesthetics injected into the cerebrospinal fluid (CSF) provide access to action sites in the spinal cord and peripheral nerve roots.[1] But, there is a complex interplay between aging, frailty, and anesthesia.

Functional decline, mobility impairment, polypharmacy,

psychosis, dementia, pressure ulcers, falls, malnutrition, and incontinence are all connected with frailty, all of which have an impact on postoperative recovery.[4]Individuals with pre-existing geriatric syndromes are more prone to post-surgical problems; nevertheless, non-elective and significant surgery increases the risk of developing geriatric syndromes during a patient's hospital stay. This chapter will elaborate on the interaction between frailty and neuraxial anesthesia.

Important neural changes that occur in the body of elderly: [5]

i. **Anatomical changes:**
   - Reduction in brain mass, number of neurons, neurotransmitters and receptors
   - Reduced number of pain transmitting peripheral nerve fibres

ii. **Functional changes:**
   - Decreased autonomic responsiveness (diminished central response to hypercapnia/hypoxemia, autoregulation, decreased parasympathetic function)
   - Slower and decreased pain perception and ability to report pain
   - Higher sensitivity to most anaesthetics

Anaesthetic management necessary to handle these changes: [5]

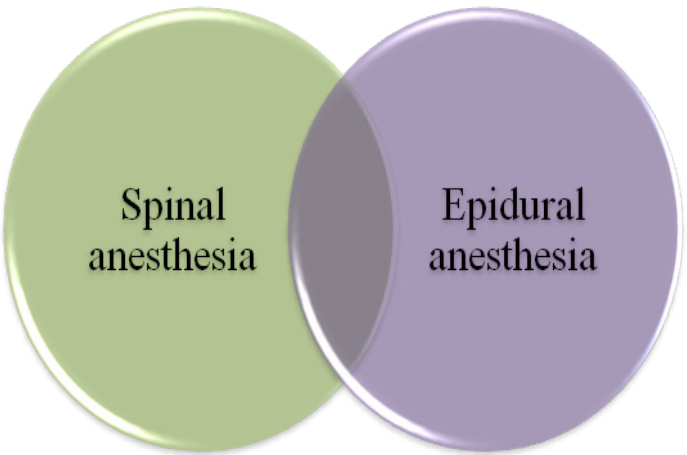
- Reduce doses of intravenous sedatives, hypnotics and analgesics; minimum alveolar concentration for volatile anaesthetics is lower
- Titrate dose of anaesthetics carefully; beprepared that onset of hypnotic effectsmay occur suddenly

- Consider pain score (VAS, NRS ifcognitively intact; VRS if mild cognitiveimpairment; behavioural pain scores ifsevere cognitive impairment)
- Prevent and screen for cognitive disorders;prevent postoperative delirium bypreferable non-pharmacologic efforts

Role of regional anesthesia (RA):

Neuraxial blockade with spinal or epidural anaesthesia, or a combination of the two, and peripheral nerve blocks are examples of regional anaesthesia procedures (Figure 1). A number of analgesics, sedatives, or general anesthesia (GA) can be used in conjunction with any of these approaches.[4]

Figure 1: Methods of achieving neuraxial anesthesia



Mulroy et al found identical operating room turnover times for epidural and general anaesthesia when the epidural was provided in an induction area outside the operating room in a comparison of epidural, spinal, and general anaesthesia.[6]When compared to a subarachnoid block,

the slower onset of action after epidural administration of a local anaesthetic actually makes it less dangerous for patients in terms of sudden hemodynamic changes, and the dose of anaesthetic can be gradually titrated to the desired dermatome and level of sensory and motor blockade.In that study, epidural and general anaesthesia had identical postanesthesia care unit (PACU) discharge periods, whereas spinal anaesthesia had a longer PACU discharge time and a higher incidence of adverse effects.

Although backache after epidural anaesthesia is not a typical occurrence, it appears to be linked to the local anaesthetic used and the patient's age, with young patients experiencing it more frequently. [7] In addition, the time from injection to voiding was shorter in the epidural group than in the spinal group. Mulroy et al determined that predischarge voiding after outpatient epidural anaesthesia with short-acting medications for low-risk procedures was not necessary in another recent study explicitly addressing the topic of bladder dysfunction after neuraxial blocking for outpatient surgery. [8]

Common complications encountered following neuraxial anesthesia:

Operating room turnover time, post-anesthesia recovery and time to discharge, the need to demonstrate ability to void before discharge due to fear of bladder dysfunction, lower backache, and other procedure-related complications are all common concerns about using epidural anaesthesia for day-case surgery.

Frailty and anesthesia:

It's uncertain whether anaesthetic method has a major impact on surgical outcomes in frail patients. The best

anaesthetic approach for performing surgery that is acceptable for either regional or GA is a hot topic of discussion. The anaesthetic approach used to manage a patient is determined by the surgical needs as well as the patient's comorbidities.

Disturbances in cognition in the perioperative period are the most researched of all the geriatric syndromes in older surgical patients. These cognitive impairments are known as postoperative cognitive dysfunction (POCD) and postoperative delirium (POD), and they are essential in predicting how well an older patient will recover from surgery. Frail patients are more susceptible to POCD and POD because they are more likely to have pre-existing cognitive impairment and lower cognitive reserve. These drawbacks can be overcome when preferring neuraxial anesthesia over general anesthesia. [4]

However, some people are not candidates for regional anaesthetic due to drugs, comorbidities, or personal preference. Similarly, the type of surgery or planned duration may preclude the use of regional anaesthetic, at least completely.Theoretically, regional anaesthesia has advantages such as avoiding GA exposure and lowering the risk of airway and pulmonary problems in frail patients.

RA versus GA in frail patients:

Several research on the incidence of postoperative neurological problems in older patients have found no differences in terms of the percentage of cases or the type of anaesthesia used. Some studies have found no changes in cardiovascular problems, use of the intensive care unit, or overall hospitalisation expenditures in older patients when one form of anaesthesia is used versus the other. [9, 10]

Bryson and co-authors found no significant differences

between the use of regional or general anaesthesia in a meta-analysis of 18 randomised studies on delirium and cognitive dysfunction, highlighting the difficulty of preventing these two events due to the difficulty of managing some of the patient-related risk factors.[11]

White and co-authors found no differences in mortality in patients undergoing hip fracture repair surgery under regional or general anaesthesia in an observational study of 65,535 patients, with the only difference in outcome being increased mortality within the first 24 hours associated with the use of cemented prostheses. [12]

However, a meta-analysis of the effects of anaesthetic technique on postoperative cognitive dysfunction and delirium found no statistically significant difference between regional and GA (odds ratio for POD/POCD in GA versus non-GA was 0.88, 95% CI 0.51–1.51), but GA was marginally non-significantly associated with POCD (odds ratio of 1.34, 95% CI 0.93–1.95). Furthermore, it suggested that regional anaesthetic is likely to be advantageous for analgesia, the level of which is dependent on the type of block utilised, and may potentially lessen systemic analgesia's negative effects.[13]

In a prospective cohort research, the incidence of frailty in patients receiving spinal anaesthetic was 25.8%, whereas another large-scale investigation found a prevalence rate of 21.5%. [14, 15] The greater rates of frailty in surgical patients getting neuraxial anaesthesia compared to general anaesthesia could simply indicate that anesthesiologists perceive regional blocks to be a safer alternative, given they are associated with less perioperative problems in sicker and elderly patients. [16, 17] The Mayo Clinic study group discovered that frail patients who had knee arthroplasties done under neuraxial blocks had considerably reduced mortality and wound complication rates than those who

got general anaesthesia in a recent cohort analysis. [15]

The above-mentioned studies suggest that it is vital to evaluate whether frail individuals are more sensitive to local anaesthetics during spinal nerve blocks, and if so, whether local anaesthetic dosages should be reduced for spinal anaesthesia while using neuraxial anaesthesia.

Advantages of RA:

- The avoidance of GA medications and opiates, which have been associated to postoperative delirium, is one possible primary benefit of RA. [18]
- In addition, RA allows for earlier oral intake and a faster return to mobility, as observed in the enhanced recovery programme. [19, 20]
- Excessive anaesthetic depth and perioperative hypotension under GA are linked to a greater mortality rate. This disadvantage is overcome when RA is preferred. [21]

Drawbacks associated with RA:[22]

- Hypotension is linked to neuraxial anaesthesia.
- There is increased risk of sequelae such epidural hematoma, infection, and post-dural puncture headache.
- In addition, the patient must also be willing to endure RA.
- Sedation strategies utilised in conjunction with regional anaesthetic are highly diverse, and their usage may reduce the benefits of GA avoidance.

Regional anaesthetic agents (spinal or regional blocking) caused greater perioperative problems than GA, according to a recent retrospective cohort study data from the

American College of Surgeons' NSQIP database. [23] Both RA and GA frequently cause hypotension, which is treated with fluid resuscitation and/or vasopressors. Perioperative hypotension is a condition that causes organ hypoperfusion, which can lead to myocardial infarction, psychosis, and renal failure. [24] The physiological cause of hypotension is unknown, however many anesthesiologists feel that it is caused by a drop in systemic vascular resistance, while others believe it is caused by a decrease in cardiac output. [25, 26]

Clinical consideration:

The analgesic options available are determined by whether the procedure is suitable for regional anaesthetic, the absence of contraindications, and the expected duration of substantial discomfort. Central neuraxial blockade with an epidural with a catheter or spinal anaesthesia, which is limited to a single dosage, or peripheral nerve blocks with a single shot or with the insertion of a catheter and the delivery of local anaesthetic via infusion or boluses are two choices. [4]

Summary:

Frailty is linked to increased surgical mortality and morbidity, and it may influence the anaesthetic approach and perioperative analgesics utilised. In the literature and in clinical practise, the use of GA versus RA is ardently contested, with no clear consensus. Individual deficits, probable complications, and surgical goals should all be addressed in the perioperative treatment plan for the frail patient. The advantages of RA for surgery and postoperative analgesia should be considered, and the anaesthetic technique used should be tailored according to the patient's need after thorough preoperative assessment.

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