

## Strategies to prevent post operative cognitive dysfunction

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### Article Info

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Post operative delirium (POD) represents an acute cerebral dysfunction in postoperative period. It is an acute disorder of cognition and attention that one may witness postoperatively or in an ICU patient. It exhibits fluctuating symptoms of inattention and cognitive dysfunction, along with disorganized thinking, and an altered level of consciousness.<sup>1</sup> It is seen in elderly patients following anaesthesia and surgery and leads to short and long term morbidity and mortality leading to increased duration of hospital stay and that in turn increases the cost of care. Even though POD is reversible in character, it may cause long term cognitive impairment like dementia. Studies have reported around 11-13% of patients above the age of 60, had postoperative cognitive dysfunction three months after surgery. So a very valid question arises- Should General Anaesthesia be avoided in Elderly?

POD is predominantly a diagnosis of older patients and in that the prevalence becomes significant after age 60-65. It has been referred to as "interval delirium" as it presents typically 24-72 hours after the completion of a surgical procedure. For general surgery, the incidence of POD is reported from 5-15%, ranging up to 65% for patients with hip fractures.<sup>2</sup> Delirium occurs in up to 80% patients admitted to intensive care. In ICU, the age specificity is less marked. The diagnosis of ICU delirium has required the development of instruments that adjust to patients who are intubated for mechanical ventilation, but the general criteria are similar. Prior to the extensive description of ICU delirium by Ely and colleagues<sup>3</sup> this phenomenon was frequently termed ICU psychosis and it was a diagnosis of exclusion.

The pathophysiology underlying delirium is not clear. No biomarkers or external diagnostic tests (no anatomic or

### Abstract

Post operative cognitive dysfunction is a new cognitive impairment, arising after a surgical procedure or anaesthesia. It occurs in elderly patients following anaesthesia and surgery and is a significant source of short and long term morbidity and mortality, longer duration of hospital stays and increased cost of care. Meticulous surgical and anaesthesia techniques are important for prevention.

histological findings) are available for diagnosis of delirium. Precipitating factors including acute illness, surgery, drugs and trauma. Patients with pre-existing cognitive impairment such as dementia or depression, abnormal serum sodium, age more than 70 years are at a higher risk of developing delirium.<sup>4</sup> Other risk factors are exposure to drugs like meperidine, benzodiazepine, alcohol abuse and use of narcotic analgesics.<sup>4</sup> Development of infections is thought to predispose a patient to delirium. In elderly patients, few factors like decreased brain volume, decreased density of blood brain barrier, decreased baseline cognition, increased likelihood of inflammation, presence of Cerebrovascular disease have been suggested.

Delirium may occur because of direct and indirect neurotoxicity or neuromodulatory effects from drugs primarily administered for anesthesia. Some hypothesis suggest inflammation or ischemia as possible causes. For years some sort of misbalance of the cholinergic system has been suggested. Severe cholinergic toxicity causes a syndrome consistent with delirium.<sup>5</sup> Studies have tried to focus on the difference between regional and general anesthesia. Regional anesthesia, usually either epidural or subarachnoid, produces a complete lack of sensation by blocking neural transmission at the spinal cord level. In theory, patients having operations amenable to regional anesthesia could be wide awake during surgery, as opposed to the effect of general anesthesia which produces a profound but reversible coma. This has led many a clinician to recommend regional anesthesia, particularly for hip fracture. But till date, meta-analytic reviews for both postoperative delirium and postoperative cognitive dysfunction have failed to suggest any advantage. An important clinical issue highlighted in this literature is that a very few patients undergoing regional anesthesia receive significant sedation during their procedure. A recent trial by Sieber suggests that the depth of sedation can be an important factor in determining the incidence of postoperative delirium.<sup>6</sup>

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Benzodiazepines have generated mixed reports. One trial comparing midazolam to dexmedetomidine suggested that delirium was more common with midazolam. Although it is common for experts to recommend that benzodiazepines be avoided in the elderly to prevent paradoxical agitation, there is relatively little data suggesting a direct link to postoperative delirium. The relationship of opioid analgesics to delirium is similarly complicated by the need to distinguish the role of pain in the generation of delirium. Meperidine, which has been thought to have a relationship to delirium, is not a good medication to use in the elderly for many reasons, including myocardial depression. If surgery and anesthesia are associated with the deterioration of patients with dementia, one would expect patients with early forms of dementia to be at particular risk. Another cause leading to delirium is possibly ischemia or relative ischemia. Although results are still inconclusive yet NIH clinical guidelines have include assessment for hypoxia and optimization of oxygenation as one of 13 recommendations for the prevention of delirium.

Various assessment methods include-confusion assessment method (CAM), the CAM-ICU, the Delirium Rating Scale (DRS), as well as clinician determination using various DSM criteria. For cognitive assessment, approaches range from complete neuropsychological batteries to forms of the MMSE (mini-mental state exam).

Measures that can be taken to tackle this problem-

1. Establish a cognition care oversight committee which oversees pre-hospital and admission screening programs, multidisciplinary care programs and perioperative assessment and care strategies. Routine monitoring of delirium should be performed in all ICU patients.
2. Develop a hospital wide education program to increase awareness of the importance of identifying cognitive impairment and delirium, and what strategies can be used to support for best management of such patients.
3. Establish hospital resources including protocols and guidelines to prevent factors leading to development of delirium, minimizing trigger factors and optimize assessment and for providing care in perioperative environment, including ICU and HDU.
4. Intraoperative guidelines to mitigate the risk of postoperative delirium by avoiding excessive anaesthetic drug administration by using EEG-based monitoring (including raw EEG and/or burst suppression) or using age adjusted end tidal concentrations for volatile anaesthetics. Optimization of cerebral perfusion by using appropriate monitoring, avoiding drugs which may exacerbate delirium (e.g. benzodiazepines, anticholinergics)
5. ICU patient should be mobilized early, if possible, to avoid the development of delirium.
6. Promote sleep in ICU patients by controlling light and noise and minimizing the stimuli to the patients in night.

7. In absence of compelling evidences, there is no suggestion or recommendation for the use of pharmacological drugs (haloperidol or other antipsychotics) to prevent delirium.
8. Continuous IV infusions of dexmedetomidine rather than benzodiazepines are suggested for sedation in patients with delirium unrelated to alcohol or benzodiazepine withdrawal.
  - a. Indications for surgery- Requirement of surgery should be weighed against potential harm including cognitive impairment. Preoperative cognitive testing should be indicated.
  - b. Types of surgeries- It was seen more in extensive surgeries.
  - c. Duration of surgery- Any prolonged surgery leads to more chances of postoperative cognitive dysfunction (ISPOCD 1 Trial -18% if surgical duration is less than 2Hours, 27% if, more 3 hours).<sup>7</sup>

As now, data suggests that delirium can be prevented; there is great interest in understanding the relationship between delirium and dementia. We have literature to suggest that surgery and anaesthesia are potent stimuli to the development of delirium. Only a small proportion of ICUs have established and written protocol for sedation and analgesia or a scoring system for monitoring of analgesia, sedation and delirium. A successful strategy is to implement evidence – based; institutionally specific, integrated pain, agitation and delirium protocol assess, treat and prevent POD, using an interdisciplinary team approach. A protocolized approach can significantly improve patient outcomes and serve as a guide for quality assurance efforts.

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