

RISK FACTORS AND PREVENTION OF POST OPERATIVE DELIRIUM

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ABSTRACT

Postoperative delirium is among the most frequent complications occurring after an operation in an elderly patient. It is related with poor cognitive and functional recovery, longer hospital stays and increased mortality. Regarding its treatment little is known, but it is an issue that can be prevented in up to 40% of cases. Therefore, prevention of postoperative delirium is of utmost importance. Raising awareness about postoperative delirium, increasing its recognition among medical students and doctors and giving a notion related to its prevention are among the objectives of this paper.

Keywords: Postoperative delirium, prevention, risk factors

INTRODUCTION

Post operative delirium (POD) is a topic of importance for elderly patients. It is among the most frequent complications occurring in sick and elderly patients after an operation. It has an incidence ranging between 9% and 87%(1). The measured incidence of postoperative delirium varies with the type of surgery, the urgency of surgery, and the type and sensitivity of the delirium assessment (2). Post operative delirium is a cause of morbidity and mortality. Patients with POD have high in-hospital mortality (4-17%) and 1-month, 6-month, 12-month, and long-term mortality remains elevated (3-7). It is associated with poor cognitive and functional recovery. It causes longer hospital stays, increased post-op institutionalization, rehabilitation and home-care, therefore increased cost (8, 9, 10). Moreover, incidence of POD is expected to increase with an aging population. Physicians used to consider it to be normal for an elderly patient to be a little bit confused after an operation that is why it is a frequently missed complication. But due to reasons counted above, POD should be regarded as an issue that needs to be taken seriously and every effort should be made for its recognition and prevention. Identification and elimination of preoperative, intraoperative and postoperative risk factors are the major components in prevention of POD. A qualified perioperative care plan encompassing wise selection of drugs used perioperatively, appropriate anesthesia strategy, qualified nursing surveillance, systematic use of diagnostic tools, accurate staff communication can decrease incidence and clinical impact of POD.

Risk Factors

Delirium is rarely caused by a single factor. Many factors have been associated with POD and it is a multifactorial syndrome most of the time with effect of hospital related insults acting on vulnerable patients. (8) Risk factors can be grouped into 3: preoperative risk factors, intraoperative risk factors and postoperative risk factors.

A. Preoperative Risk Factors:

Assessment of preoperative risk factors is of great importance; this allows to select patients having a higher risk for POD in whom a dedicated preoperative care plan is necessitated. Age of the patient is a major risk factor with an odds ratio of 3.3 for patients older than 70 years and 5.2 for patients older than 80 years (10). Co-morbidities like hypertension, diabetes mellitus, myocardial infarction, stroke, heart failure, atrial fibrillation, peripheral vascular disease are associated with POD. These cardiovascular pathologies are possibly increasing the incidence by deteriorating the vascular supply of the brain. Some studies have linked male sex with increased risk of delirium whereas others have found no link between gender and POD (11, 12). Males having an increased risk factor for cardiovascular disease may be the explanation for that. Chronic Obstructive Pulmonary Disease is among co-morbidities related to POD. Smoking status (preoperative smoking, COPD patients) of the patient increases the POD by 18%. (13). Since smoking plays a role in atherosclerosis and also in increasing arterial wall stiffness, smokers brain may be less equipped to

deal with stressful situations. Furthermore, chronic hypoxia occurring in COPD patients which facilitates mitochondrial dysfunction, brain dysfunction and cognitive decline. Obstructive Sleep Apnea is another co-morbidity with an increase of 4.3% in occurrence of POD. This relation is possibly due respiratory encephalopathy caused by imbalance between oxygen requirement and supply to brain. (14, 15). This intermittent hypoxia induces oxidative stress and changes in protein profile of hippocampus and prefrontal cortex areas and chronic sleep deprivation. (16). Continuous positive air pressure (CPAP) is an effective treatment approach for these patients. Cognitive status of the patient (dementia, neurodegenerative diseases (Alzheimer's, Parkinson's disease etc.), attention deficit and psychiatric disorders) effects POD occurrence by an odds ratio of 4.2(10, 17). Preexisting cognitive impairment is among the most common independent risk factors for delirium across studies (18). Preoperative cognitive screening is beneficial for assessing delirium risk, as well as, documenting baseline performance to detect delirium postoperatively. Cognitive screening can be done with one of the many brief cognitive screening tests in these patients. Preoperative functional status is also a risk factor for POD. Physical impairment of the patient can be evaluated by Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). ADLs measure the ability to perform 7 basic care skills (feeding, bathing, grooming, using the toilet, transferring, and walking) (19). The IADLs assesses the ability to perform 7 complex activities (using the telephone, grocery shopping, using transportation, cooking, housekeeping, taking medications, and handling finances) (20). In addition to providing risk stratification for delirium, assessing this information preoperatively can inform the patient, the family, and the surgical team about the expected course of recovery postoperatively. Many studies have associated preoperative depression to POD (21). Depression can be assessed by Geriatric Depression Scale. An increased incidence for POD is identified among patients with alcohol abuse or illicit drug use. Withdrawal from alcohol use has long been understood to precipitate delirium tremens, a variant of delirium. However, most postoperative delirium is not delirium tremens. Additionally, long history of alcohol abuse even in the absence of active drinking has been independently associated with postoperative delirium (22). Screening for alcohol use preoperatively can allow prevention of alcohol withdrawal with standardized protocols. Factors associated with increased risk for POD that can be corrected preoperatively are

fluid fasting time, electrolyte imbalances (Na level <130 or >150 mmol/L, K level <3 or >6 mmol/L), fluid abnormalities, low serum albumin level, malnutrition, glycemic abnormalities (blood glucose <60 mg/dL or >300mg/dL), anemia and preoperative medication with benzodiazepines (10). These laboratory values may be a sign of underlying organ or system dysfunction which is an independent risk factor. Hyponatremia is a frequently seen electrolyte abnormality seen in patients with renal disease, chronic diuretic therapy and it should be corrected preoperatively. Hypoalbuminemia is also an important parameter which can be related with malnutrition or decreased liver's synthetic capacity, that elicits hormone and drug binding and it can affect the metabolism of drugs (23). Serum albumin is also an antioxidant that prevents toxic cognitive impairment. Since glycemic abnormalities and anemia effect brain metabolism and oxygen transport, it is important to treat these abnormalities preoperatively. Also avoidance of medication with benzodiazepines is associated with reduced risk for POD (24).

B. Intraoperative risk factors:

Type of surgery and whether the surgery is elective or emergent or not and duration of the surgery are among the most important risk factors. Orthopedic surgery, abdominal aortic aneurysm repair surgery, cardiac thoracic surgeries are related to increased incidence of POD. Hip fracture has the highest incidence of delirium (%35-65), which is probably due to the urgent nature of the surgery and high co-morbidity among these patients. Abdominal aortic aneurysm surgery (%33-54), coronary artery bypass graft surgery (%37-52), peripheral vascular surgery (%30-48) are other surgery types which are frequently related to POD (25, 26, 27, 28, 29). Although elective orthopedic operations have a lower incidence when compared to hip fracture surgery, still has a high POD occurrence after. Some intraoperative complications are associated with an increased risk for POD. Severe bleeding (>1000ml) and acute anemia, intraoperative hypotension (low MAP), hypoxia, hypercarbia, hypocarbia are among factors that are related to POD. Especially it is important to prevent hypotension and hypocarbia since occurrence of these will lead to decreased cerebral blood flow. Several drugs including atropine, propofol, long acting opioids, ketamine are related to a higher incidence of POD (24).

C. Postoperative Risk Factors:

In the postoperative period, failure of pain management, administration of benzodiazepine and anticholinergic drugs, sensory deprivation, inadequate nutritional status are related to POD and they can be prevented. Persistent hypoxia or hypercarbia, need of inotrop administration, hypotension requiring vasopressor administration, new onset atrial fibrillation are associated with an increased risk for POD.

Prevention of POD

Regarding the prevention of POD, it is quite important to note that POD is up to 40% preventable (29). For prevention of POD, identifying the pre, intra and post operative risk factors for delirium and treatment of these factors are the cornerstones of prevention. Firstly, taking a good and detailed history of the patient is a must to identify high risk patients for POD. History should include co-morbidities (COPD, OSA, Hypertension, Diabetes Mellitus, Congestive heart failure), previous and operations, alcohol, tobacco and illicit drug use. While taking the history mental status and mood of the patient should also be evaluated. Electrolyte abnormalities, fluid abnormalities, low serum albumin level, malnutrition, hypo/hyperglycemia and anemia should be corrected preoperatively and preoperative medication with benzodiazepines should be avoided. In the operative period careful monitoring of the patient is quite important; also it is important to avoid drugs like benzodiazepines, ketamin, propofol which are related to higher incidence of POD. For the postoperative period, again avoidance of the drugs noted above is important. Pain management of the patient should be assured. (25). Orientation of patient to the date, localization, care-giving hospital personnel should be provided (30). To prevent sensory deprivation, glasses and hearing aids of the patient should be kept with them. Cognitive stimulation activities are suggested. (31). Fluid balance and fluid assistance should be provided. Malnutrition of the patient should be prevented. Dehydration of the patient should be avoided. Hygiene measures are the first priority to decrease the rate of infections (32). Unnecessary catheters should be avoided since they increase infection risk which may be a cause for POD. Early mobilization and exercise of the patient are recommended, if possible.

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