Risk Factors for Early Delirium after Surgery

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Abstract

Background: Although unrecognized, early postoperative delirium and cognitive dysfunction in the Intensive Care Unit (ICU) are relatively common.

Aim: The present study has proposed to identify the risk factors for delirium and their early incidence after surgery, with a view to implementing a screening list for delirium in ICU (ICDSL).

Method: 722 patients undergoing abdominal surgery, with general anesthesia, were prospectively monitored for the development of postoperative delirium during Intensive Care Unit (ICU) stay.

Results: The incidence of postoperative delirium was 8.03% (58 cases). No statistically relevant prolongation predictors for delirium were found. The duration of surgery was double, thus significantly higher in the delirium group (2.5 ± 1 vs 1 ± 0.87 hours). Patients in the delusion group were transfused with blood products, had episodes of intraoperative cardiocirculatory decline, underwent protracted mechanical ventilation (averaging 1.15 hours longer), and the duration of the ICU stage was double.

Conclusions: The incidence of delirium, after surgery under general anesthesia, was 8.03%. The independent predictors of delirium were: the duration of surgery and post-operative mechanical ventilation and the length of hospitalization in ICU.

Key words: delirium, risk factors, surgery

1. Introduction

Although not always recognized, altered mental status in the immediate postoperative period in the ICU is a reality that influences patient progress, prolongs admission, and increases hospitalization costs [1].

Called Postoperative Cognitive Dysfunction (POCD), this nosological framework includes, besides delirium, memory loss, psychomotor disturbances, dementia, depression, coordination disorders and cognitive impairment. Although cognitive changes are transient and the return to normalcy occurs within a few days after surgery, POCD may be the cause of postoperative complications and the development of disabilities over a long period of time (reduced daily activity, social dependence, increased mortality). There is a reported increase in POCD incidence in patients over 60 years, subjected to multiple surgeries under general anesthesia, and a 5-year mortality rate for patients with early postoperative cognitive dysfunction [2].

Delusion has been defined as a disorder of cognition and consciousness, developed in a short period of time (hours-days) and having a fluctuating character. This term is required in the literature in front of other notions such as intensive care psychosis, intensive care syndrome, acute confusional status, critical patient encephalopathy, acute cerebral dysfunction or cerebral insufficiency.

The current research is aimed at discovering the risk factors and potential curative-prophylactic strategies needed to annihilate the complications and/or chronicity of psychiatric illnesses.

2. Material and method

We studied 722 patients undergoing abdominal surgery under general anesthesia by OTI, between 2013 and 2017. The selection criteria were: absence of chronic comorbidities (diabetes mellitus, atherosclerosis, HTA); absence of antipsychotic medication or mental illness in the past; absence of chronic pain (hyperalgesia, allodynia) and analgesic medication abuse.

General anesthesia is, in fact, an induced programmed medication coma in order to obtain the state of unconsciousness (patient comfort) and the reduction of muscle activity (the surgeon's comfort). The technique of balancing anesthesia was used, by combining anesthetics for: anxiety reduction (anxiolytics); hypnosis (midazolam); induced unconsciousness (thiopental sodium); analgesia (fentanyl, propofol), muscle relaxation (pancuronium).

Different demographic parameters (age, background, living conditions, education) and anesthetics (quality of anesthesia, anesthetic anesthesia, analgesia, from the peri- and post-operative period) were analyzed. The development and early evolution of POCD in the ICU was monitored, referring to the type and duration of preoperative treatment incidents and therapies. The scale of the delirium screening in ICU adapted from Bergeron and Ouimet was used [3].

3. Results

The incidence of early postoperative delirium was 8.03% (58 cases). Much more numerous, but less relevant, were the cases of subsyndromal delirium: 210 cases (29%).

Among the demographic and anesthetic parameters, there were no significant predictive factors for the manifestation of delirium, also due to the relative homogeneity of the studied group (age 30-50 years, 51% of the urban environment, living conditions and medium education) and anesthetic protocols.

We find the following factors statistically suggestive:

- duration of surgery (2.5 hours +/- 1 vs 1 +/- 0.87)
- intraoperative blood transfusion
- intraoperative cardio-circulatory dysfunction
- prolonged mechanical ventilation (on an average, more than 1.15 hours), with consecutive doubling of internship in ICU.

4. Discussions

Delirium, as a manifestation of cerebral dysfunction, correlates with a short-term prognosis and cognitive sequelae that can persist for months to years, and can be equated with the care problems that different degrees of dementia pose. Moreover, in the multiple organ dysfunction syndrome, the hypothesis of promoting systemic inflammation by the brain affected by delirium, as is the case of the lung affected by acute pulmonary injury, has been advanced.

The prevalence of delirium in intensive care varies between 20-80%, depending on the severity of the disease and the diagnostic methods used. Delusion is more common in elderly patients, occupying the sixth place among preventable dysfunctions in patients over 65 years of age. Often, delusions are not recognized by clinicians, who only identify it with the appearance of agitation and hallucinations, features that are not really necessary for diagnosis, or misdiagnose the manifestations of dementia or depression. Even worse, it can be considered a somewhat awaited condition for a critical patient, remaining undefined as such. Due to its fluctuating nature, delirium can easily escape a superficial assessment, the more so as the interaction between the medical staff and the patient is reduced.

Depending on the psychomotor behavior, two subtypes of delusion are recognized:

- purely hypoactive delirium – manifested by a diminished response to stimuli, retreat and apathy, and occuring in 43.5% of cases, this being another explanation for its non-recognition, in a superficial assessment the patient being considered quiet;
- purely hyperactive delirium – manifested by agitation, restlessness, emotional lability, and only present in 1.6% of cases; the delirium is mixed in 54.9% of cases.

The number and type of symptoms can define the normal neuropsychological status (absence of symptoms), subsyndromal delirium (the presence of 1-3 symptoms) and proper delirium (the presence of 4-8 symptoms), according to ICDSL (Intensive Care Delirium Screening List).

The risk factors for developing delirium are:

- preexisting, belonging to the host and difficult to influence. The genetic predisposition for delirium is related to the presence of apolypoprotein E (known risk factor for Alzheimer's disease) polymorphism with double duration of delirium compared to non-polymorphism. The first category of risk factors is: advanced age, comorbidities, background cognitive impairment, high blood pressure, smoking. In our study, smoking (20 cigarettes a day on average) does not appear to be a predictive factor for early postoperative delirium.
- relating to the disease: sepsis, hypoxemia, cerebral hypoperfusion, the overall severity score of the disease, which definitely occurs in triggering delusions to a degree that is difficult to appreciate.
- iatrogenic or environmental: metabolic disorders, mechanical ventilation, anticholinergic medication, sedative medication, benzodiazepines, opioid analgesics, prolonged immobilization and sleep disturbances. Judicious use of opioids is preferable, because inappropriate pain management is also a risk factor for delirium. It is believed that the presence of three or more risk factors is associated with 60% delirium, and intensive care patients accumulate about 10 risk factors, which places them in a high-risk category [4-6].

In the pathophysiology of delirium, studied predominantly in patients outside of ICU, the following hypothetically occur: neurotransmitter imbalance, inflammation, reduction of cerebral oxidative metabolism, availability of large neutral amino acids. Changes in the synthesis, release and inactivation of neurotransmitters, especially dopamine, acetylcholine and GABA, are one of the possible explanations for the occurrence of delirium. While dopamine increases neuroexcitability, GABA and acetylcholine have a reverse effect. Delusion is correlated with an excess of dopamine or acetylcholine decrease. Other inherited neuronal mechanisms would be serotonin imbalance, endorphin hyperfunction, central noradrenergic hyperactivity and melatonin. Cytokines and chemokines released during severe conditions (tumor necrosis factor alpha and interleukin-1) initiate endothelial lesions, micro thrombus formation, impaired brain microcirculation, cell infiltration and tissue lesions. Inflammation may also cause cerebral vasoconstriction by action at the level of adrenergic alpha-1 receptors and interfering with neurotransmitter activity. On the other hand, cerebral inflammation leads to increased systemic cytokine production: tumor necrosis factor alpha, interleukin-1, interferon gamma, the brain being seen as a motor of systemic inflammation with a role in the development of multiple organ and systemic dysfunction. Also, delirium, always associated with the global slowdown in brain activity, involves reducing cerebral oxidative metabolism. Possible neurotransmitter imbalance may be based on altered plasma concentrations of precursor aminoacids (tryptophan and phenylalanine). Aminoacids overcome the hematoencephalic barrier with the LAT 1 transporter (large amino acid transporter type 1), transporter with other large aminoacids: tyrosine, valine, leucine and isoleucine. Increased cerebral uptake of tryptophan and phenylalanine over other amino acids is involved in the pathogenesis of delirium. Delusion is associated with multiple complications, such as self-inflating, auto-suppression of catheters, increased cost of medical care, prolonging the duration of hospitalization, and three times mortality [7-9].

The 2002 guidelines of the SCCM-Society of Critical Care Medicine recommend routine evaluation of all intensive care patients to detect delusions. The validated tool for diagnosing delirium is precisely ICDSL [5].

Non-pharmacological means of delirium prevention are less applicable to intubated patients: early mobilization, movement exercises, activities that stimulate knowledge, use of glasses, magnifiers, hearing aids, regulation of sleep-wake pace by non-pharmacological means, correction of dehydration, catheter suppression at the appropriate moment, reduction of unnecessary noise with the possible involvement of the family in these activities [10-11].

Pharmacological means are only discussed after exclusion or correction of life-threatening conditions that may manifest clinically by altering the state of consciousness: hypoxemia, hypercapnia, hypoglycemia, cerebral hypoperfusion.

Also, in ICU, control of hydro-electrolyte disorders and sepsis, and the judicious use of sedatives should be considered, with intermittent boluses being recommended and not continuous sedation, and avoidance of sedative action with GABA (benzodiazepine, propofol) receptors. The choice drug for the treatment of delirium is haloperidol, a dopamine D 2 receptor antagonist. Recommended doses are between 2-5 mg iv or per os, repeated every 20-30 minutes until the patient is pacified, often requiring doses of 20 mg or more. Maintenance doses are given at 4-6 hours and are reduced by ticking, the rule being the minimum effective dose for the shortest possible time. Haloperidol has also been used and prophylactically successful in elderly patients undergoing hip surgery. Atypical antipsychotic drugs (risperidone, ziprasidone, quetiapine, olanzapine) also act on serotonergic, cholinergic and adrenergic receptors, with the benefit of fewer side effects and a comparable efficacy to haloperidol [12]. The adverse effects of antipsychotic drugs are dystonia, extrapyramidal phenomena, hypotension, laryngeal spasm, hyperthermia, dry mouth, constipation, urine retention, and the worst complication of torsades de pointes (which contraindicates the administration of haloperidol in patients with prolonged QT interval). The use of dexmedetomidine (selective central alpha 2 adrenoceptor agonist) and clonidine (less selective) has been shown to be a good alternative to benzodiazepine therapy, significantly reducing the incidence of delirium. Benzodiazepines remain the treatment of choice for patients who develop delirium tremens [13-17].

5. Conclusions

Early postoperative delirium is a common complication in ICU patients, which affects vital prognosis in the short-term and sometimes long-term cognitive prognosis, especially when it is underdiagnosed and inadequately treated. Under these conditions, ICDSL assessment, follow-up studies on pathophysiology and identification of risk factors, use of prevention methods and treatment options when needed are required [18].

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