ANALYSIS FACTORS THAT AFFECTING DELIRIUM AT POST-OPERATIVE CRANIOTOMY PATIENT IN INTENSIVE CARE UNIT (ICU) OF BANJARMASIN ULIN GENERAL HOSPITAL

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ABSTRACT

Patients with post-operative craniotomy are patient with critical condition and often encountered state of delirium which are called post-operative delirium. Many studies suggest the mortality of delirium in intensive room almost 95% of the total number patients treated. A important step of delirium management in intensive care is to identify the etiologies that can be done by identifying risk factors and then subsequent interventions should focus on minimizing the causes of delirium, while this identification process in ICU is sometimes not optimal and overlooked. The aim of this study is to analyze the factors that influence delirium incident at post-operative craniotomy patients. This study is an analytic correlative with cross-sectional approach at 30 respondents. The statistical test used chi-square, spearman rho and logistic regression. The result showed that factors associated with delirium were age with p value 0.000, electrolyte with p value 0.031, comorbidity with p value 0.029, and age is the most factor related to the delirium incidence with OR 29.418. This study needs to apply and to be developed to improve the quality of emergency nursing care and critically ill patients monitoring. Need to do further research with other factors such as the use of any mechanical ventilator, infections and metabolic disorders in patients with post-operative or other medical diagnosis in the ICU.

Keywords: Delirium, ICU, craniotomy

I. INTRODUCTION

One of ICU services scope includes to support the functions of vital organs including the central nervous system such as patients with postoperative craniotomy who need to give intensive care observation requiring and it becomes a priority to get treatment in the ICU because critical condition considered after it10.

Patients undergoing neurosurgery especially craniotomy is common behavioral agitation after one to three days called post-operative delirium24. Delirium itself according to the American Psychiatric Association's (APA) and Diagnostic Statistic Manual of Mental Disorder 4th (DSM-IV) is interpreted as a disturbance of consciousness and cognition that develops a short period of time (hours to days) and fluctuate from time to time8.

Multicenter study in 2013 stated the prevalence of ICU delirium incidence in the world ranges from 45% - 87%, and a meta-analysis states the mortality rate due to the incidence in intensive room reached 95%, but the syndrome is often not detected by a doctor or nurse5,19,12. Especially for postoperative delirium craniotomy does not obtain good data in the world and Indonesia, the problem proves that the detection of delirium after neurosurgical especially surgery craniotomy is neglecting, but delirium become one of the complications most often occur in critical
nursing and have a poor impact, not only because it increases the risk of death up to ten times, but also for extending the duration of hospital as well as improving care needs of health care workers. Different pathophysiological mechanisms also lead to different factors affect and the prognosis in a state of delirium. Advanced age is most common risk factor for delirium at patients with critical conditions because many pathophysiological processes associated with the inflammation process due to degenerative disease that produces cytokines and interfere with the brain's neurotransmitters. Other factors lead to disorders of the brain neurotransmitter is often found in patients with comorbidities, electrolyte imbalance, use of sedation and the history of neurological underlying disease.

Process understanding of pathophysiological conditions is useful for nurses to detect and provide nursing care in patients with a state of delirium, nurses also have an important role in detecting the early signs and symptoms because nurses are who directly with patients, therefore need to further research of others factors related to delirium incidence.

II. METHOD

This study was an analytic correlative research with cross sectional approach, and the aim this research is to analyze the factors related to delirium incidence at patients who had craniotomy in the ICU. The factors studied are age, the use of sedation, electrolyte imbalance, comorbidities, and a history of neurological disease.

A. Instrument

Delirium assessment is done by using sheets of the modified Confussion Assessment Method (CAM). Consciousness survey respondents were measured under influence sedation using Richmond Agitation Sedation Scale (RASS), and electrolyte imbalance data, comorbidity, and history of neurological disease seen from medical records of respondents.

B. Data collection

The research was conducted at ICU of Ulin General Hospital Banjarmasin in December 2016 until January 2017. The population in this study were all patients whose postoperative craniotomy. Samples were taken by purposive sampling sample technique were 30 respondents with criteria are: 1. craniotomy postoperative patients after the first 24 hours, 2. patients aged ≥ 12 years.

C. Analysis

Chi square and spearman rho were used to analyze the relationship of each factor on delirium. Then re-analyzed using multiple logistic regression to determine the most factors associated with delirium occurrence.

III. RESULT

The study suggests 76.7% at postoperative of craniotomy patients in the ICU experienced delirium.

Table 1. Factors Related to Delirium

<table>
<thead>
<tr>
<th>p value</th>
<th>OR</th>
<th>Factor</th>
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<tbody>
<tr>
<td>0.003 *</td>
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<td>Age</td>
</tr>
<tr>
<td>0.999</td>
<td>0.000</td>
<td>Sedation (1)</td>
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<tr>
<td>1.000</td>
<td>1.000</td>
<td>Sedation (2)</td>
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<tr>
<td>1.000</td>
<td>1.000</td>
<td>Sedation (3)</td>
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<tr>
<td>0.054 *</td>
<td>9.333</td>
<td>Imbalance electro</td>
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</table>
Dominant factor associated with postoperative craniotomy delirium incidence in ICU is age factor with p value of 0.008 and odds ratio 29.418. It can be interpreted that respondents with adult category are more adaptable to the conditions of post-operative craniotomy compared to those in the category of elderly beginning to the elderly amounted to 29.418 times compared to electrolytes factor.

IV. DISCUSSION

Relationship between age with delirium

AANA journal reveals the incidence of postoperative delirium (POD) depending on the age of the patients who underwent surgery, the reported incidence of about 12% after surgery in patients aged > 50 years and almost 52.2% occurs the elderly who underwent neurosurgery. Because of the high prevalence of delirium age refers delirium to the term "geriatric syndrome" which significantly affects mental status.

The results showed the prevalence of elderly more dominant supported because aging is a physiological process in which the structure and function of organs progressively degenerates over time and makes the population of older adults and the elderly is a major player in the incidence of cognitive impairment triggered by surgical procedures. Postoperative delirium (POD) in the elderly with trauma surgical can lead to activation of immune system and hyperactivity of hypothalamic-pituitary and adrenal which leads to an abnormality acetylcolin, norepinephrine, 5-hydroxytryptamine, and other neurotransmitters in the central nervous system. These deviations result in brain dysfunction after surgery as a result of the cytokines produced by peripheral postoperative inflammation, cytokines in the brain disrupt connections and transmission function of synapses also cause a reduction in dendritic arborisation, decrease cholinergic in hippocampus, and increase long-term potentiation of synaptic transmission, the process is causing delays behavioral performance, disruption of significant amounts of memory and neurological disorders with cognitive dysfunction.

Relationship between uses of sedation with delirium

Some neurosurgical procedure can cause postoperative pain including craniotomy, and showed that 60% of postoperative patients had moderate to severe pain up to 48 hours after the procedure and some studies suggest up to
two months\textsuperscript{22}. The efforts to improve patient comfort and support management in ICU, sedation is a provision administration procedure of the ICU, particularly in neurosurgical patients to avoid the continuous increase of intracranial pressure. Giving a sedative is special procedures with some choice of pharmacotherapy with clinical state of appropriate patient consideratations.

Class of sedative Benzodiazepine like diazepam, midazoloam and lorazepam is the most often given in the ICU. But in addition to the benefits, long-term use can trigger the occurrence of confusion to a state of delirium. Not only class of benzodiazepines, other excessive factions use of sedatives was considered to have a relationship with the incidence of delirium because they cause toxic effects on the brain\textsuperscript{16}. However, despite sedatives and analgesics are a risk factor, the extent of which occurred in the ICU delirium is associated with commonly used drugs have not been able to understand and explain more\textsuperscript{3}. 

In line with a recent study states that there is no significant relationship between uses sedation with incidence of delirium was supported by other research stated eventhought sedative analgesic commonly used in ICU patients, interference between sedation and assessment of delirium has been ignored. Effects on the CAM-ICU sedation is good in most of the validation studies conducted. In the study revealed that there is no clear evidence that induction of sedation can cause delirium, and the patient has possibility more than 10 times to have a CAM-ICU score positive in the sense of experiencing delirium before sedative induction and after sedation was stopped\textsuperscript{16}. This study shows postoperative sedation after first 24 hours have good and comfort outcome of respondents. It can be concluded sedation on postoperative craniotomy patients is intended to reduce the pain that is generally felt neurosurgical patients, as well as a procedure to prevent increased intracranial pressure due to restless behavior and pain or delirium due to brain disturbance after craniotomy itself. The theory that state sedative cause delirium can be eliminated from the conditions that occurred in postoperative craniotomy patients after first 24 hours.

**Relationship between imbalances of electrolytes with delirium**

Critically ill patients with brain trauma is very susceptible to interference of intravascular volume because electrolyte and osmotic disruption due to neuroendocrine disorders center. Syndrome of Inappropriate Antidiuretic Hormone (SIADH) or Cerebral Salt Wasting Syndrome (CSW), which often occurs postoperative craniotomy also cause hyponatremia effect, this occurs in response to brain trauma affecting the hypothalamus as neuroendocrine control center. In particular sodium imbalance caused hyponatremia clinical consequences involving the central nervous system because it can affect the size of neurons and cerebral perfusion\textsuperscript{7}.

In addition to hyponatremia, 10% of respondents who experienced delirium also experienced hyperchlorea- or excess levels of chloride in the blood. Hyperchoremia after postoperative craniotomy occur as a result of fluid referfusion after surgery that uses a lot of fluid osmolarity types resembling with blood-brain barrier (NaCl 0.9%) to avoid edema in the brain. So in postoperative cranotomy patients is
common hyperchloremia acidosis condition with symptoms of agitation and tachycardia. Although there is no certainty relationship between levels of chloride which accumulates in incidence of postoperative craniotomy delirium, but chloride is one part of the electrolyte which dominate CES. Chloride is also part of sodium that play a role in the process of electrical conduction in neurons, thus affecting neurotransmitters and synapses between neurons \(13,1\).

**The relationship between comorbid with delirium**

The complexity of emergent diseases may occur prior to a surgical procedure performed or the surgical procedure itself that causes the appearance of two or more disorders. In addition to cases, pre-operative or post-operative patients complications are almost always experiencing atrial hypertension due to auto regulation of brain disorders that increase Cerebral Blood Flow (CBF), cerebral edema and cerebral hemorrhagic. It usually tends to be a result of the conditions of hyperglycemia. Besides severe brain injury is a major problem that causes respiratory complications in critically ill patients due to depress of conciusousness level and capability to maintain airway and breathing patterns, and that complications will arise other problems such as the failure of breath up to impaired cognition as a response of body \(11,2,6\).

In addition to hyperglycemia, respondents with respiratory failure will also have high prevalence of delirium incidence. Patients with apnoe need to obtain assistance from a mechanical ventilator, which is an invasive procedure that makes feeling uncomfortable and even painful for the patient and appears behavioral agitation \(17\).

**Relationship between neurological diseases with delirium**

Neurological disease is the originator indication for craniotomy procedure with outcome of delirium, but some studies suggest the risk factors are dominant occurrence of Postoperative delirium is the cognitive decline that occurs as result or complication of craniotomy procedure itself apart from age factor \(9,23\).

Besides history of neurological disease, traumatic brain injury is also the biggest indication to do a craniotomy which also causes cognitive decline. Traumatic brain injury caused by stroke or other traumatic injury to the head or body that the level of damage can depend on several factors, including circles and force of impact that causes neuropathology in brain tissue \(5,18\).

**V. CONCLUSION**

Based on study, it can be concluded that:

1. Age has a significant relationship with the occurrence of delirium in postoperative craniotomy patients due to degenerative processes in brain cause pre and postoperative inflammation process intolerance at elderly.
2. Sedation does not have a significant relationship to occurrence of postoperative craniotomy delirium due indication itself in order for patient to be quiet, and to prevent postoperative acute pain that can lead to anxious behavior and increase intracranial pressure.
3. Electrolyte imbalance has a significant relationship to occurrence of postoperative craniotomy delirium in
patients because sodium is an instrumental fluid for neurotransmitters that affect impulses between synaptic brain cells.

4. Comorbidity had a significant association to occurrence of postoperative craniotomy delirium because accompanying comorbidities that affect many metabolic processes and others disturbances affecting central nervous system and causing disruption of neurotransmitters.

5. History of neurological disease have no significant relationship with the occurrence of postoperative craniotomy delirium in patients because delirium occurs as outcome of surgery on brain that resulting disruption of neurotransmitters and other accompanying factors.

6. The most dominant factor associated with the incidence of postoperative craniotomy delirium is age factor by reason of other interference factors such as intolerance toward postoperative inflammation process and the presence of other diseases in elderly patients.

References


