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Post-Concussion Syndrome Latent Onset Related to Intracranial Lesion on Head Injury Patient in Dr. M. Djamil General Hospital Padang

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ABSTRACT

Background. Post-concussion syndrome is associated with damaged axons in patients with a mild head injury but little is known about their consequences for brain tissue. This study aims to examine the relationship between latent onset post-concussion and intracranial lesions in head injury patients at Dr. M. Djamil General Hospital Padang. **Methods:** The research design is an analytical observational study with a cross-sectional approach. A total of 25 patients with head injuries participated in this study with inclusion criteria being hospitalized patients alive without physical and mental disabilities and patients diagnosed with latent onset post-concussion syndrome (PCS) without any additional diagnoses for patients with a history of trauma. **Results:** The average age of the respondents in this study was 34.08 ± 17.45 years and more than half of the respondents were male, namely 18 (72%) respondents. half of respondents with persistent PCS symptoms > 6 months experienced EDH, as many as 5 (55.6%) respondents, ICH 2 (66.7%) respondents, and cerebral contusion 6 (60%) respondents. The results of statistical tests showed that there was no relationship between latent onset PCS and lesion appearance ($p>0.05$). The results of statistical tests showed that there was no relationship between latent onset PCS and the degree of head injury ($p>0.05$). **Conclusion:** There is no significant relationship between post-concussion syndrome (PCS) latent onset with a degree of head injury and lesion description in head injury patients at Dr. M. Djamil General Hospital Padang.

1. Introduction

Head injury is one of the most serious types of injury, both in terms of case fatality and long-term implications for sufferers. Based on clinical examination, head injuries were divided into mild, moderate, and severe based on the Glasgow coma scale (GCS). These categories have been found to predict long-term outcomes in patients.[1] Head injuries contribute to death and disability worldwide and are a growing public health problem making it the largest contributor to death and disability globally among trauma-related injuries. [2] Around 69 million people worldwide experience head injuries every year. Studies in the United States and New Zealand estimate that about 500-800 new cases of head injury per 100,000 people occur each year.[2] The proportion of head injuries due to traffic collisions was highest in Africa, Southeast Asia (both 56%), and the lowest in North America (25%). The incidence of head injury found in Southeast Asia is 1.5% of the population per year and Europe is 1.2%.[2-5]

Minor head injury was defined as an acute brain injury resulting from mechanical energy from external physical force to the head with any of the following symptoms: loss of consciousness for no more than 30 minutes, posttraumatic amnesia for no more than 24 hours, Glasgow coma scale (GCS) not below 13 30 minutes after injury, and there is no period of confusion (feeling dazed, disoriented, and confused) or other transient neurologic abnormalities such as focal signs or seizures.[6,7] As many as 10-25% of patients with mild head injury have symptoms of post-concussion syndrome (PCS) that persist over time. Post-concussion symptoms usually fall into three groups: physical (or somatic) including headache, dizziness, nausea and vomiting, sleep deprivation, fatigue, sensitivity to light, sensitivity to noise, and visual disturbances (blurred or double vision), cognitive symptoms include poor memory, poor concentration, and slower thought processes; and psychological disorders including irritability, frustration, depression, and anxiety.[5,6,8,9]

Currently, PCS is a clinical diagnosis without diagnostic biomarkers and does not have ancillary tests that become the gold standard. Patients with PCS are often frustrated by the difficulty of diagnosis and the absence of proven treatment for PCS. [10] Persistent/latent post-concussion syndrome was defined as the presence of PCS symptoms persisting 6 months after the injury. Studies report that more than half of people with PCS still have symptoms more than 1 year after the injury. [10,11] PCS usually disappears within 2-4 weeks but some studies have found PCS last more than 6 months (latent onset). Another study states that PCS may be permanent if recovery has not occurred within 3 years. This of course will disrupt daily activities for the patient's life which will reduce the quality of life. [12] syndrome Post Concussion is associated with axonal damage in patients with a mild head injury, but little is known about its consequences for brain tissue. Studies have found that PCS results in association with brain tissue abnormalities that explain the deficits that occur in PCS patients.[13] Another study found that PCS in mild head injury was associated with abnormal CT-*scan.*[14] Another study found a high rate of sequelae in patients with mild head injury with CT *scans* showing cerebral edema. Frequently missed examinations in patients with mild head injury may result in a high incidence of PCS because intracranial lesions are not detected at baseline. This study aimed to examine the relationship between latent onset post-concussion and intracranial lesions in head injury patients at Dr. M. Djamil General Hospital Padang

2. Methods

The research design was an analytical observational study with a cross-sectional approach to examine the relationship between latent onset post-concussion and intracranial lesions in head injury patients at Dr. M. Djamil General Hospital Padang. A total of 25 patients with head injuries participated in this study with inclusion criteria being hospitalized patients alive without physical and mental disabilities and patients diagnosed with latent onset post-concussion syndrome (PCS) without any additional diagnoses for patients with a history of trauma. This study has been approved by the health and research ethics committee of Dr. M. Djamil General Hospital Padang (LB.02.02/5.7/39/2022). This study presents the sociodemographic characteristics of the patients, the description of the lesions, and the degree of head injury.

Data analysis was carried out with the help of SPSS version 25 software. The univariate analysis presented the frequency distribution of the test variables. Bivariate analysis was carried out to see the relationship between the dependent and independent variables with the help of the chi-square test analysis, p-value <0.05.

3. Results

Table 1 shows that the average age of the respondents was 34.08 ± 17.45 years and more than half of the respondents were male, namely 18 (72%) respondents. Table 2 shows that more than half of the respondents with persistent PCS symptoms > 6 months experienced EDH, namely 5 (55.6%) respondents, ICH 2 (66.7%) respondents, and cerebral contusion 6 (60%)

respondents. The results of statistical tests showed that there was no relationship between latent onset PCS and lesion appearance (p>0.05).

Table 1. Characteristics of research respondents

Characteristics	Mean ± SD	f (%)
Age	34.08 ± 17.45	-
Sex	-	-
- Male	-	18 (72)
- Female	-	7 (28)

Table 2. Relationship of latent onset PCS with lesion description

Lesion description	PCS Status		Total f (%)	*p-Value
	Persistent PCS symptoms > 6 months	No persistent PCS symptoms		
	f (%)	f (%)		
EDH	5 (55.6)	4 (44.4)	9 (100)	0.826
ICH	2 (66 ,7)	1 (33.3)	3 (100)	
Cerebral Contusion	6 (60)	4 (40)	10 (100)	
SAH	1 (50)	1 (50)	2 (100)	
SDH	0 (0)	1 (100)	1 (100)	
Total	14 (56)	11 (44)	25 (100)	

*chi-square test, p<0.05

Table 3 shows that more than half of respondents with persistent PCS symptoms > 6 months experienced a moderate degree of injury, namely 5 (55,6%) respondents and the degree of minor injury was 8 (57,1%) respondents. The results of statistical tests showed that there was no relationship between latent onset PCS and the degree of head injury (p>0.05).

Table 3. Relationship of latent onset PCS with a degree of head injury

Degree of Injury	PCS status		Total f (%)	*p-Value
	Persistent PCS symptoms > 6 months	No persistent PCS symptoms		
	f (%)	f (%)		
Severe	1 (50)	1 (50)	2 (100)	0.981
Moderate	5 (55.6)	4 (44.4)	9 (100)	
Mild	8 (57.1)	6 (42.9)	14 (100)	
Total	14 (56)	11 (44)	15 (100)	

*chi-square test, p<0.05

4. Discussion

In head injuries, prompt examination for craniocerebral lesions is very important given the high mortality rate. A prompt and appropriate diagnosis and treatment of head injuries will significantly reduce complications. CT scanning is currently the main modality in the evaluation of patients with head injuries. Its role is very important in helping clinicians to make decisions on early treatment and predict long-term complications.[16] Studies have shown that the symptoms of PCS are most common in mild head injuries with a CT scan showing cerebral edema. Where the CT scan of all head injury patients studied was cerebral edema (68.2%), followed by epidural hemorrhage (9.4%), intracerebral hemorrhage (8.2%), combination (7.6%), subarachnoid hemorrhage (4.1%), and the last is subdural hemorrhage (2.4%).[17] These findings are almost the same as this study which found the CT scan in PCS patients sequentially from the most, starting from cerebral contusion, epidural bleeding, intracerebral hemorrhage, subarachnoid hemorrhage, and the least being subdural bleeding. In head injury, although there is no major lesion seen on the CT scan of the head, there has likely been damaged to the intracerebral white matter that will contribute to the cognitive impairment of PCS and several other neurological manifestations through complex mechanisms.[18]

Based on the GCS, head injuries can be divided into mild, moderate, and severe head injuries. In this study, PCS was most commonly found in mild head injuries, namely 56%, followed by moderate head injuries as much as 36%, while the remaining 8% were severe head injuries. A study dividing head injury into severe head injury, minor head injury, and other head injuries gave different results, where each group found that the group with severe head injury progressed to PCS (38.2%) than mild head injury (24. .1%) and other head injuries (30.6%).[19-21] In this study it was also found that patients with mild head injury were more likely to progress to latent PCS. Among all PCS patients with a mild head injury, 57.1% progressed to latent PCS. Meanwhile, in the PCS group with moderate and severe head injuries, the percentages that progressed to latent PCS were 55.6% and 50%, respectively.

5. Conclusion

There is no significant relationship between post-concussion syndrome (PCS) latent onset with the degree of head injury and the appearance of the lesion in head injury patients at Dr. M. Djamil General Hospital Padang

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