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Characteristics of Calvaria Depression Fractures Patients in Dr. Kariadi General Hospital, Semarang

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ABSTRACT
Introduction. Head injury is one of trauma cases with high morbidity and mortality, with an incidence of 7.3 to 811 cases per 100.000 individuals per year and mortality ratio varying from 5.2 to 80.73 cases per 100.000 cases. Calvaria fractures that result from head injuries are often associated with risk of post-traumatic morbidity and mortality, where the incidence of post-trauma calvaria fractures is about 25% of all cases and around 10% of calvaria fractures are depressed calvaria fractures. This study was aimed to identify the characteristics of patients with depressed calvaria fractures at Dr. Kariadi General Hospital in 2020. **Methods.** This research is a descriptive study using secondary data from medical records. There were 30 patients with depressed calvaria fractures in January - December 2020 at Dr. Kariadi Hospital. The data is then presented in tabular form. **Results.** Depressed calvaria fractures in the period 2020 at Dr. Kariadi General Hospital was dominated by male (76.7%), mainly age 12-45 years old with a mean of 25.73 years old. The most common cause of depressed calvaria fractures is high velocity trauma. Minor head injury is the most common type of head injury. Depressed calvaria fractures of the frontal bone predominate in 80% of cases, with fracture depth > 1 tabula. **Conclusion:** There were no cases of posttraumatic infection. There were 16.7% of cases with neurological deficits at the time of discharge. There were 73.3% cases with other intracranial disorders associated with depressed calvaria fractures. Operative management is the main choice of management with most cases length of stay are 5-10 days.
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1. Introduction

Head injury is one of the most common cases in emergency departments, with high morbidity and mortality, especially in young adults with an increasing incidence worldwide. The incidence of head injury varies from 7.3 to 811 cases per 100.000 individuals per year worldwide, with the mortality ratio varying from 5.2 to 80.73 cases per 100.000 cases worldwide or can be estimated at 50.000 cases of death in America in 1 year.[1,2] Calvaria fractures that are often caused by head injuries are often associated with the risk of post-traumatic morbidity and mortality, where the incidence of post-head calvaria fractures is about 25% of all cases, and of all cases of calvaria fractures, 10% are cases of depressed calvaria fractures.[3,4] The incidence of calvaria depressed fracture was highest in men (93%) and those aged > 31 years. Calvaria fracture is an important marker of the possibility of more severe brain injury, including epidural hematoma, subdural hematoma, cerebral contusion and intracerebral hematoma. Head CT scan without contrast is the standard diagnostic tool used to rule out intracranial problems.[5]

Research on the incidence and characteristics of head injuries at dr. Kariadi Semarang has been done and the prevalence of cases is quite a lot in 1 year.

However, currently there are no studies regarding calvaria depression fracture in head injury patients who are admitted to Dr. Kariadi Semarang. Therefore, the researcher intends to conduct a descriptive study regarding calvaria depression fractures in the period January - December 2020 at Dr. Kariadi Semarang

2. Method

This research is a descriptive study using secondary data from medical records taken at the medical record installation of Dr. Kariadi. Before the research was conducted, Dr. RSUP ethical clearance was obtained. Kariadi. The sampling method used was total sampling with the research sample used were all medical records of patients with calvaria depression fracture in Dr. Kariadi period January - December 2020 that met the inclusion criteria and was not included in the study exclusion criteria. The inclusion criteria were head trauma patients who had a depressed calvaria fracture and the exclusion criteria were head trauma patients who were not depressed calvaria fractures. The data were then processed and presented in tabular form to determine the incidence and characteristics of calvaria depressed fractures at Dr. Kariadi period January - December 2020. The head injury is classified into 3 degrees based on the level of consciousness of the patient with head trauma, namely mild (GCS 14-15), moderate (GCS 9-13) and severe (GCS 3-12). A depressed fracture is a fracture in which part of the external tabula of the fracture lies inferior to the normal anatomical position of the internal tabula. Apart from the location of the fracture, the fracture is also divided into either an open / compound fracture (fracture segment with laceration of the scalp) or a closed / simple fracture (without any laceration of the scalp). Associated with the incidence that causes fracture is divided into two groups, namely high velocity (> 50 km / hour) and low velocity.[6,7]

3. Results

In the January-December 2020 period, there were thirty patients with calvaria depression fractures at Dr. Kariadi. Cases were dominated by men, as many as 23 cases (76.7%) with a mean age of all cases 25.73 years, mostly in the 12-45 years age group (80%).

Judging from the incidence of the cause of the fracture, it was entirely caused by high-velocity trauma. The majority of patients (50%) had minor head injuries, followed by the frequency of severe head injuries in 9 patients (30%) and moderate head injuries in 6 patients (20%). There was dominance of depressed fractures in the frontal bones in 16 cases (53.3%), followed by combination fractures (occurring in > 1 bone) in 8 cases (26.7%), and also fractures of the parietal and temporal bones. Twenty-four cases (80%) were open fractures and the remainder were closed fractures. There were 29 cases (96.7%) with a depressed fracture depth of calvaria of more than one tabula, whereas only 1 case (3.3%) was a depressed fracture of calvaria less than one tabula.

There were no patients who had complications in the form of post-traumatic infections. When the patients were discharged, 25 cases (83.3%) had no symptoms of neurological deficit. There were 22 cases (73.3%) of calvaria depressed fractures associated with other intracranial abnormalities, while 8 cases (26.7%) were not. The majority of cases (96.7%) underwent surgery for the management of depressed fractures with a mean duration of hospitalization of 5-10 days.

Table 1. Demographics of patients with calvarial depression fractures at RSUP Dr. Kariadi

	Total (n=30)	Percentage (%)
Gender		
Male	23	76.7 %
Female	7	23.3 %
Age		
< 12 years old	4	13.3 %

12 – 25 years old	24	80 %
> 45 years old	2	6.7 %

Table 2. Causes, degree of head injury, fracture location, and fracture depth in a patient with a depressed calvarial fracture

	Total	Percentage
Cause		
High Speed Trauma	100	100 %
Slow Speed Trauma	0	0 %
Degree of Head Injury		
Minor Head Injury	15	50 %
Moderate Head Injury	9	30 %
Severe Head Injury	6	20 %
Fracture Location		
Os Frontal	16	53.3 %
Os Parietal	5	16.7 %
Os Temporal	1	3.33 %
Combination (occurs in> 1 bone)	8	26.7 %
Fracture Depth		
1 tabula	1	3.3 %
> 1 tabula	29	96.7 %

Table 3. Post-traumatic complications, neurological deficits, other intracranial disorders, management, and length of stay in patients with calvarial depression fractures.

	Total	Percentage
Post Trauma Complications		
Infection	0	0 %
Neurological Deficit Symptoms		
Accompanied Neurological Deficits	5	16.7 %
No Neurological Deficits	25	83.3 %
Associated with Other Intracranial Disorders		
There is a relationship with other intracranial disorders	22	73.3 %
There is no association with other intracranial disorders	8	26.7 %
Governance		
Operative Action	29	96.7 %
Non-Operative	1	3.3 %
Length of Hospitalization		
<5 days	10	33.3 %
5-10 days	14	46.7 %
> 10 days	6	20 %

4. Discussion

In this study, it was found that the sex of the majority of patients who experienced calvaria depression fractures in the period 2020 at dr. Kariadi Semarang is male (76.7%). This is consistent with research conducted by previous researchers which stated that cases of depression fracture of calvaria were dominated by men with a ratio of 7: 1. Other studies have also shown that the incidence of calvaria fractures is dominated by men with a prevalence rate of 71.2.[3]

The dominance of the age group and the mean age in this study are also in line with previous studies where the average age of calvaria fracture cases was 26 years, and the highest prevalence rate occurred in productive age, namely at the age of 21-30 years.[3,4,8] In this study, the most common cause of depressed calvaria fractures was the result of high-velocity trauma, in line with previous studies, supporting the conclusion that high-velocity trauma can exceed the threshold for the ability of the bones to stretch so that it can cause fractures in the area. The highest degree of head injury in this study was minor head injury. This is in line with previous studies which showed that in the case of calvaria fractures, most patients had mild head injuries (60.3%), followed by moderate head injuries (29.5%) and severe head injuries (10.2%). [4,8,9]

The calvaria bone that has the most depressed fractures in this study is the frontal bone, according to the literature which states that the most cases of depressed calvaria fractures occur in the frontal os. Open depressed fracture predominates in this study, accounting for 80% of cases. The results of previous studies reported that the most cases of Calvaria fractures were closed fractures (72.6%), but there were those who reported more open fractures (69%). The cause of more open fracture cases in this study was because the majority of the causes of accidents in this study were motor vehicle accidents, where it is very likely that there were more open fracture cases than closed fractures. This also applies to fractures of more than one tabula. In this study, it was found that the majority of cases were fractures of more than one tabula because all cases in this study were caused by high velocity trauma.[4,10]

Regarding the complications of depressive fractures, this study is not in line with previous studies that showed 8.2% of cases with meningitis symptoms after depressive fracture, but there are also studies that suggest that the infection ratio is quite low. Surgery in a timely manner and administration of pre-operative antibiotics helps in reducing the infection rate. [3,8,10,11] The findings of neurological deficit symptoms in this study were 16.7% of cases, slightly larger than the previous study, where 9.8% of cases were found.[3] This is due to the higher incidence of severe head injury in this study compared to other studies. The presence of 73.3% cases with other intracranial abnormalities associated with depressed calvaria fractures is in line with previous studies which revealed 69.4% cases with other intracranial disorders.[3] In this study, it was found that operative management was an option in 96.7% of cases. This is not much different from previous studies which stated that surgery was performed in 90.72% of cases either for reasons of eliminating compression of the fracture segment in the brain, removing fractures from the dura, or cosmetics, and preventing the risk of infection.[9,11-13] In this study, it was found that the most length of stay was 5-10 days. This is because in cases of depressed calvaria fractures, close monitoring must be carried out, especially in cases of depressed calvaria fractures that are often followed by the presence of other intracranial abnormalities, which of course will prolong the length of stay of the patient.[13-15]

Based on the results of this study, it was found that the incidence of calvaria depression fracture in the period 2020 at Dr. Kariadi Semarang, dominated by male gender (76.7%) with the majority aged 12-45 years and an average age of 25.73 years. The most common cause of depressed calvaria fractures is high-velocity trauma with the most cases being minor head injuries. The most common location of depressed calvaria fractures was on the frontal os (80%) with the greatest fracture depth of more than one tabula. There were no cases with post-traumatic infection, however, 16.7% of cases had neurological deficits at the time the patients were discharged. There were 73.3% cases with other intracranial disorders associated with depressed

calvaria fractures. Operative management is the main choice with the most length of stay for 5-10 days. The results of this study are in line with and contradict previous studies which could be influenced by various factors.

5. Conclusion

The most common cause of depressed calvaria fractures is high-speed trauma with the most cases being minor head injuries, the most common location for depressed calvaria fractures is the frontal os. Operative management is the main choice with the most length of stay for 5-10 days.

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