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Case evaluation of traumatic brain injury in Wahidin Sudirohusodo Hospital, Makassar during period January 2016 - December 2017



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ABSTRACT

Introduction: Traumatic Brain Injury is a case that is often encountered in emergency care installation and is one of the leading causes of death in the productive age range. Globally, the Traumatic Brain Injury incident increased sharply, mainly due to the increase in motorized vehicle use. In 2020, the WHO estimated that traffic accidents would be the third-largest cause of disease and trauma in the world. In Indonesia, at Cipto Mangunkusumo Hospital Jakarta shows that the mortality rate is high in patients with severe head injuries with a percentage of 35% -50%. This figure is higher than the international literature standard. This study aims to describe the traumatic brain injury case in Wahidin Sudirohusodo Hospital from January 2016 - December 2017.

Methods: This descriptive study report the evaluation of cases of traumatic brain injury patients at Wahidin Sudirohusodo Hospital Makassar, from January 2016 - December 2017. The population and sample are 1217 patients (total sampling).

Result: From 1217 samples, most are men (70%), and 30% are women, with age 11-20 years are the most (30%). The most common causes of traumatic brain injury are caused by traffic accidents (89%). The largest group of patients (50%) had a mild head injury (GCS 14-15). From a Head CT scan, the most lesion was epidural hemorrhage (EDH) (26-34%) followed by intracerebral hemorrhage (ICH) (23-28%). About 36% patients were treated by operations and the rest were conservative. Based on the outcomes, about 77% were discharged from a hospital in life and 23% died.

Conclusion: The highest mortality was in severe head injury, about 87% was died (161 of 186 patients with a severe head injury). From the Head CT Scan, about 95% (19 of 20 patients) with IVH lesions were died and followed by ICH lesions as 39% (122 died from 309 patients). Based on the therapy given both surgery and conservative, patients who were discharged from the hospital in life at 77-79% and died 21-23%.

Keywords: brain injury, case, epidemiology, study.

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INTRODUCTION

Head injury is a case that is often encountered in emergency care installations. Head injury is one of the leading causes of death in the productive age range. Globally, the incidence of head injuries increased sharply, mainly due to an increase in motorized vehicle use. In 2020, it is estimated that WHO traffic accidents will be the third-largest cause of disease and trauma in the world. Head injury or Traumatic Brain Injury is a significant cause of morbidity and mortality after myocardial infarction in the world. Every year around 50,000 people died from head injuries in the United States. This number represents one-third of the total deaths due to the incidence of injury.^{1,2}

In America every year there are 1,500,000 head injuries, around 50,000 dies, and 80,000 experience disability. At present, there are about 5,300,000 Americans who are permanently disabled due to head injuries. In Indonesia, based on statistical data quoted from Cipto Mangunkusumo Hospital in Jakarta, it shows that head injury sufferers who are hospitalized consist of patients with mild head

injuries (60% - 70%), moderate head injuries (15% -20%), and injuries heavy head (around 10%). High mortality rates in patients with severe head injuries with a percentage of 35% -50% and moderate head injury 5% -10%. From the data of brain injury patients who came to Dr. Hospital Sutomo Surabaya from January 2002 to December 2013, the mortality rate in all severity of head injuries ranged from 6.171% to 11.22%. This figure is higher than the international literature standard, which ranges from 3-8%. Based on the severity, the mortality of severe brain injury patients is still high, ranging from 25.13% to 37.14%, with a declining tendency. This figure is relatively high compared to the literature, which is 22%. The operating rate ranges from 18.87% to 25.27% of all brain injury patients who come to the emergency department Dr. Sutomo Hospital Surabaya.³⁻⁵ In Wahidin Sudirohusodo Hospital Makassar, data from 2006 to 2010 showed a mortality rate of 23% (29 people out of 101 cases) who underwent surgery. This is far from the target of 0% mortality in EDH, given the facilities and

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support and operating rooms available for emergency neurosurgical cases.⁶

Based on the description above, the current study aimed to evaluate the case of Traumatic Brain Injury or Head Injury at Wahidin Sudirohusodo Hospital Makassar in the period January 2016 to December 2017,

METHODS

This research is a descriptive study with a retrospective method to evaluate the case of Traumatic Brain Injury. The research was conducted in the Hospital of Wahidin Sudirohusodo Makassar, where is a type A hospital which is a reference center for Eastern Indonesia. The samples in this study were traumatic brain injury patients hospitalized from January 2016 to December 2017 and a head CT scan was performed. Data is obtained by looking at the patient's medical record. The data recorded in the recording sheet is the medical record number, name, date of birth or age, gender, GCS score at admission, head CT scan, surgery or conservative measures, and the final condition of the patient (external). The collected data is processed using Excel 2010 and analyzed descriptively using a distribution table. Univariate analysis of each variable is carried out to provide a general description of the data, expressed in statistical measures according to the type of data (numerical or categorical). Then bivariate analysis was performed to assess the relationship between independent variables (GCS at entry, head CT scan and, surgery or conservative therapy) with the dependent variable (end condition of the patient).

RESULT

From 1217 samples sufferers of traumatic brain injury who were hospitalized in the Wahidin Sudirohusodo hospital, the most are male, which is 70% every year between 2016 and 2017 and 30% female. Based on the age group, the majority is 11-20 years old (30%), followed by the second most at the age of 21-30 years (15%), the third-most in the age range 0-10 years which is around 13%, and the percentage is more decreased at age 50 and above. Based on the most causes of trauma were traffic accidents, with 695 people (91.8%) in 2016, but decreased by almost half in 2017, with 396 people (86.2%). The second most common cause is falling from a height where the number of patients is 46 people (6.1%) in 2016 which is almost the same as the number of patients in 2017. At least that is in blunt trauma, in this case, is ahead hit by blunt objects are 16 (2.1%) patients in 2016 and not different from 2017, with 17 patients.

Traumatic brain injury patients hospitalized at Wahidin Sudirohusodo Hospital Makassar based on the highest severity level is a mild trauma capitis which 50-53% each year in 2016 and 2017, followed

Table 1 Characteristics of patients

Characteristics	2016		2017	
	N	%	N	%
Gender				
Man	573	71	324	70.4
Woman	220	29	136	29.6
Age				
<11	109	14,3	56	12.1
11-20	247	32.6	140	30.4
21-30	116	15.3	67	14.5
31-40	85	11.2	62	13.4
41-50	89	11.7	64	13.9
51-60	64	8	42	9.1
61-70	29	3	17	3.6
71-80	15	1.9	9	1.9
>80	3	0.3	3	0.6
Cause of Trauma				
Traffic accident	695	91,8	396	86.2
Fall down	46	6.1	47	10,2
Blunt trauma	16	2.1	17	3.6
Degree of Trauma Capitis				
Mild (GCS 14-15)	405	53%	229	50%
Moderate (GCS 9-13)	233	31%	164	35%
Severe (GCS 3-8)	119	16%	67	15%
Lesion on head CT				
EDH	199	26.2	159	34
SDH	78	10.3	54	11,7
SAH	44	5.8	19	4.1
ICH	179	23.6	130	28.2
IVH	17	2.2	3	0.6
Contusio	40	5.2	20	4.3
Udem Cerebri	60	7.9	16	3.4
Depressed Fr	34	4.4	17	3.6
Linear Fr	3	0.3	0	0
Normal	103	13.6	42	9.1
Therapy				
Operation	221	29.2	220	47.8
Consevative	536	70.8	240	52.2
Outcome				
Life	577	76.7	369	80
Died	180	24	91	19

Table 2 Relationship between the degree of Capitis Trauma Based on Outcome Conditions

Degree of Capitis Trauma	Life		Died		Total
	N	%	N	%	
Mild (GCS 14-15)	621	98	13	2	634
Moderate (GCS 9-13)	300	76	97	24	397
Severe (GCS 3-8)	25	13	161	87	186

Table 3 Relationship of Lesions on Head Scan CT Based on Outcome Conditions

Lesion on Head CT Scan	Died		Life		Total
	N	%	N	%	
Normal	2	1	143	99	145
Depressed Fracture	4	8	47	92	51
Linear Fracture	0	0	3	100	3
Epidural hemorrhage (EDH)	57	16	301	84	358
Subdural hemorrhage	46	35	86	65	132
Subarachnoid hemorrhage	16	25	47	75	63
Intracerebral hemorrhage (ICH)	122	39	187	61	309
Intraventricular hemorrhage (IVH)	19	95	1	5	20
Contusio	0	0	60	100	60
Cerebral edema	5	7	71	93	76

Table 4 Relationship of Traumatic Brain Injury Therapy based on Outcome Conditions

Therapy	Life		Died		Total
	N	%	N	%	N
Operation	347	79	94	21	441
Conservative	599	77	177	23	776

by moderate capital trauma which is around 31-35%, while the lowest is in severe capital trauma which is 15-16%. Based on the location of the lesion on the head CT scan, the most was epidural hematoma (EDH), which was 26-34%, followed by intracranial hematoma (ICH) which was 23-28%, then normal head CT scan of 9-13%, Hematomal Subdura (SDH) by 10-11%, Cerebral Udem by 3-8%, Subarachnoid Hematoma (SAH) by 4-5.8%, Cerebral Contusion 4-5%, Depress Fracture 3-4%, Intraventricular Hematoma (IVH) 0.6 -2%, while the lowest is linear fracture which is 0.3%. Based on the therapy given, most were conservative, namely 52-70% in 2016 and 2107. The surgical procedure referred to was a craniectomy of 29-47%. Based on the condition when returning home (out) the most is life, which is 76.7% in 2016 and experienced an increase of 80% the following year, while those who died were 24% in 2016 and decreased in the following year which was 19%.

From table 2 it can be seen that 634 patients with traumatic brain injury with mild degrees were more alive (98%) while those who died were 2%. In moderate traumatic brain injury degrees, 76% of those who came out were alive and 24% died. The highest proportion of deaths was in traumatic brain injury, which was 87% and those who were alive only slightly, 13%.

From table 3, the data obtained is that there is 1% who died with a normal CT scan, the remaining 99% came out alive. In depress fractures there are 4% who die. In linear fractures, no patient died. In EDH found 16% of patients died, the remaining 84% came out alive. In SDH 35% of patients died and 65% lived. In SAH, 25% died and 75% lived. In ICH 39% died and 61% lived. In IVH, 95% of patients died and only 5% lived. In Contusion, there were no patients who had died. In cerebral edema, there were still 7% of patients who died and 93% came out alive.

Based on table 4 above, information can be obtained, that of the 441 patients who were operated on, there were 21% who died and 79% of them left alive. Of the 776 people with non-operative therapy, there were 77% who came out alive and the remaining 23% died.

DISCUSSION

Based on the bivariate analysis between the degree of head trauma, associated with the outcome of the patients in Table 2, it can be seen that from 634 patients with mild traumatic brain injury, 98% were life while those who died were 2%. The presence of patients who died in mild Head trauma is due to other trauma accompanying traumatic brain injury and exclusion is not carried out so that it can lead to bias in the study. In moderate traumatic brain injury, 76% of those who came out in life and 24% with deaths. The highest proportion of deaths was in severe traumatic brain injury, which was 87% and those who were alive only 13%. The research by Wirza et al. in Adam Malik Medan Hospital also found similar results, the amount of mortality experienced by patients with severe head trauma (86.3%). According to Abdul Gofa et al. the outcome will progressively decrease if the initial GCS decreases, in patients with GCS 3 at admission, 87% will die.^{7,8}

Based on the bivariate analysis between lesions on the head CT scan associated with output conditions in table 3, there was 1% who died with a normal CT scan, the remaining 99% came out alive. In depress fractures there are 4% who died. In linear fractures, no patient died. In EDH found 16% of patients died, the remaining 84% came out

alive. In SDH 35% of patients died and 65% lived. In SAH, 25% died and 75% lived. In ICH 39% died and 61% lived. In IVH, 95% of patients died and only 5% lived. In Contusion there were no patients who had died. In cerebral edema, there were still 7% of patients who died and 93% came out alive. Gofar et al. a normal head CT scan at the time of admission treated in patients with a severe head injury is associated with lower mortality and better functional healing, when compared to patients who have abnormal CT scans, even in patients with an initial GCS score of 3 or 4. Patients with DAI (diffuse axonal injury), may only get a little cortical bleeding or there is diffuse edema or CT scan that is entirely normal but becomes severe in the disease. Mass lesions, especially subdural hematomas and intracerebral hematoma, are associated with increased mortality and reduced likelihood of functional healing. The finding of compression in basal cisterna is also a predictor of poor outcome after severe head injury regardless of the presence or absence of an intracranial hematoma. With the presence of SAH in traumatic brain injury patients, the mortality rate has doubled.⁸

Based on the bivariate analysis between therapies in patients with traumatic Brain Injury associated with outcomes in table 4, information can be obtained from 441 patients who were operated on, 21% died and 79% left alive. Of the 776 people who have not carried out the surgery, there were 77% who came out alive and the remaining 23% died. In addition to the initial GCS and intracranial hematoma lesions, many things that affect the prognosis of patients with traumatic brain injury, for example, are ages, which, along with increasing age, have been found to increase mortality due to systemic diseases. There was an increase in the percentage of poor outcomes (death or vegetative state) in patients over 56 years of age, where this was not found in young patients.⁹

Dilation and fixation of a pupil indicate irreversible brainstem injury and herniation. Pupillary function abnormalities predict poor outcome in patients. In a review of 153 adult patients with tentorial herniation, only 18% had proper healing. Among patients with anisocoria pupil when entering, the brainstem that is not injured, 27% achieved proper healing, but if they found immovable and bilateral dilated pupils, it was found only 3.5% were cured. Theoretically, patients with a history of hypotension associated with increased morbidity and mortality. According to Chestnut et al. The presence of hypotension accompanying head injury results in twice the risk of death compared with patients without hypotension.¹⁰ Research conducted by Manley et al. Found that out of 26 patients with

hypotension, 17 (65%) patients with outcomes died ($p = 0.009$).¹¹ Based on the theory that 6-12 hours after injury, the brain will experience an initial systemic phase in the form of decreased blood pressure, oxygenation, temperature, blood glucose control, fluid status, infection where this phase is the beginning of death. In this phase, secondary head injuries have occurred which will cause brain ischemia which will determine the outcome of head injury patients.¹²

CONCLUSION

The highest mortality was in severe head injury, about 87% was died (161 of 186 patients with a severe head injury). From the Head CT Scan, about 95% (19 of 20 patients) with IVH lesions were died and followed by ICH lesions as 39% (122 died from 309 patients). Based on the therapy given both surgery and conservative, patients who were discharged from the hospital in life at 77-79% and died 21-23%.

CONFLICT OF INTEREST

The author declare there is no conflict of interest regarding all element of this study.

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