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Clinical, radiological features, and surgical management of spontaneous intracerebral hemorrhage patients in East Nusa Tenggara-Indonesia

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ABSTRACT

Introduction: Spontaneous intracerebral hemorrhage accounted for 10-15% of strokes and considered as the most fatal type. Management of spontaneous intracerebral hematoma (SICH) is divided into two groups; medical and surgical interventions. Although surgical management is controversial, it can be lifesaving when the patient condition is deteriorating. Objective: The aim of this study is to describe clinical, radiological features, surgical management, and patient's outcome.

Method: This is a descriptive case series study, carried out retrospectively over a period of 2 years at the department of surgery, neurosurgery division, Prof. DR. WZ Johannes General Hospital, Kupang. Total of 14 patients was included in the study. Clinical, radiological features, the period between onset and operation, surgical management and outcome were identified.

Results: Hemiparesis or hemiplegia and language dysfunction (92.86%) was the commonest presenting clinical feature followed by a headache (71.43%). Most of the hematomas were in basal ganglia region (57.14%), (50.00%) involving cortex cerebral, (35.71%) involving thalamus, and (28.57%) had an intraventricular extension. Craniotomy clot evacuation was the major surgical intervention used to manage.

Conclusion: Hemiparesis and language dysfunction were the most frequent presenting clinical features. The deeper regions of the brain as basal ganglia were more involved than other areas of the brain. The surgical intervention used for management of SICH is based on clinical condition and anatomical complication of the patients.

Keywords: Intracerebral hematoma, Clinical, Radiology, Surgical management

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INTRODUCTION

In America and developing country such as Indonesia, cerebrovascular disease or stroke is the leading cause of chronic disability and death.[1] According to WHO data, stroke is the third leading cause of death after heart disease, and cancer with death incidents of stroke reached 123.684 people and causing disability in 8 out of 1000 population in Indonesia. Spontaneous Intracerebral Hemorrhage (SICH) is defined as bleeding into brain parenchyma without accompanying trauma.[2] SICH accounts for 10 to 15% of all strokes and is associated with a higher mortality rate than either ischemic stroke or subarachnoid hemorrhage, with only 38% of affected persons surviving 1 year.[3] Men are more likely to suffer SICH than women and likelihood increase with age.[3,4]

Depending upon the underlying cause of bleeding, intracerebral hemorrhage is classified as either SICH has wide range of presentations, from asymptomatic or transient ischemic attack-like to coma or death, which determined by its size and location of the bleeding.[2] Sometimes prodromal signs arise like headache or dizziness.[1] Study by Azra and Farrukh (2008)[5] showed that a sudden headache followed by loss of consciousness, loss of speech, hemiplegia or hemiparesis were the most frequent presenting complaints.[5] Another study said that the location of the bleed largely determines the observed neurologic deficits.[6,7] Basal ganglia bleeds present as massive hemiplegia, whereas thalamic bleeds usually impact on hemisensory disturbance. Cortical hemorrhages often accompanied by seizures as well as focal neurologic deficits. Posterior fossa lesions impacts on nausea, vomiting, decreased mentation, and hydrocephalus, ataxia, nystagmus, and dysmetria from cerebellar involvement.[4,7]

If ICH is suspected, cerebral imaging is obligatory. Cranial CT has a good sensitivity (more than 95%). Acute hemorrhage on CT appears brighter than normal brain tissue, and it changes over time to become isointense lesion and within period of

weeks to months it becomes hypointense. MRI has little advantage over CT in the acute setting and should be used only if CT is not available.[6] ICH can be treated either medically or surgically. For the most part, surgery is performed only if patient can't be managed medically. Patients with small hemorrhages or minimal neurological deficit generally do well by undergoing medical treatment alone.[7,8] Surgical intervention is resorted to if the patient is deteriorating rapidly and immediate evacuation is needed to either reduce intracranial pressure or relieve local compression of neural structures. Patients with cerebellar hemorrhages greater than 3 cm in whom are symptoms or neurological deterioration have occurred, or in whom brainstem compression and hydrocephalus are present, should undergo evacuation of the clot.[8] Evacuation should be considered in patients with moderate or large sized lobar hemorrhages, basal ganglia large hemorrhages, and those with progressive neurological deterioration.[7,8] There's no evidence of optimal time performing surgery, but some study stated that optimal time for surgery for patients with SICH was from 12 until 48 hours.[9] Ultra early surgery results in increase risk factors of rebleeding.

The prognosis of ICH depends on several factors those are locations and size of hemorrhage are of primary importance.[3,10] They are closely followed by the patient's age, development, and severity of post hemorrhagic complications such as cerebral edema, hydrocephalus, and herniation syndromes, as well as systemic disorders, including pulmonary emboli, myocardial infarcts, and pneumonia.[3] Outcome of the patients can be defined and measured by Glasgow Outcome Scale (GOS). GOS is a global scale for functional outcome that rates patient status into one of five categories: dead, vegetative state, severe disability, moderate disability or good recovery.[1,2,4]

METHOD

This is a descriptive case series study, carried out prospectively over the period of 2 years (from January 2015 to December 2016) at the department of surgery, neurosurgery division, Prof. DR W.Z. Johannes General Hospital, Kupang. Spontaneous intracerebral hemorrhage was defined as bleeding into brain parenchyma without accompanying trauma with confirmation of intraparenchymal hemorrhage by CT scan.

Total of 14 patients were enrolled. Patients were collected by consecutive sampling and data from patient's medical record obtained. All patients with spontaneous intracerebral hemorrhage that consulted to neurosurgery division for surgical treatment were included in this study. Patients with secondary causes of hemorrhage, and were not consulted to neurosurgery division for surgical treatment were excluded.

Baseline characteristics of patient were noted, followed by presented clinical features which included, hemiparesis or hemiplegia, speech dysfunction, altered sensorium, headache, and vomiting were noted. Location according to CT scan examination was confirmed in many locations (basal ganglia, thalamus, lobar, and intraventricular). Associated radiological features as perifocaledema and hydrocephalus were also described. The time interval between onset and surgery were obtained between 24-72 hours. Surgical approach was identified including craniotomy clot evacuation, craniotomy decompression, ventriculo-peritoneal shunting, and external ventricular drainage. The outcome of the patients was defined by Glasgow outcome scale (GOS).

Data were analyzed by SPSS version 22.0. Descriptive statistics were applied to calculate frequencies and percentages of qualitative variables, like findings on CT scan as location and outcome. Mean values with standard deviation were computed for quantitative variables as age, interval time between onset and surgery.

RESULT

Out of 14 patients enrolled, 9 subjects (64%) were males, and 5 subjects (36%) were females. Age varies from 32 to 74 years old with mean of age was 51 years old.

Most of the patients have high systolic and diastolic blood pressure, with mean of systolic pressure was 196.23 ± 23.23 mmHg, and diastolic pressure was 106 ±12.15. Based on blood pressure measurements, we concluded that most of the patients have a history of hypertension either controlled or uncontrolled. Hemiparesis and Language dysfunction were the commonest presenting complaints found, followed by a headache and decrease of consciousness. In our study 24.07% patients came with hemiparesis and speech dysfunction, 18.51% with headache, and 16.67% came with vomiting as well as decrease of consciousness.

In this study, we found that most of the patients came to the hospital in late onset of hemorrhage to get surgical intervention. That late onset showed by mean of interval onset between spontaneous hemorrhage and surgical intervention (136 ± 12.81 hours), interval onset varies from 12 hours to 504 hours.

Table 1 Patient Characteristic and Presenting Complaint

Patient Characteristic	Total (n)	Percentage (%)	Mean ± SD
Sex			
Female	5	36%	
Male	9	64%	
Age (years)			51 ± 9.17
Onset (hour)			136 ± 12.81
Systolic Blood Pressure (mmHg)			196.23 ± 23.23
Diastolic Blood Pressure (mmHg)			106 ±12.15
Presenting Complains			
Headache	10	71.43%	
Vomiting	9	64.29%	
Language Dysfunction	13	92.86%	
Decrease of Consciousness	9	64.29%	
Hemiparesis	13	92.86%	

Table 2 Radiological Features

Location of ICH	Total Case (N)	Percentage (%)
Basal Ganglia	8	57.14%
Thalamus	5	35.71%
Cortex Cerebri	7	50.00%
Intraventricular	4	28.57%

Table 3 Anatomical Complication

Anatomical Complication	Total Case (N)	Percentage (%)
Perifocal Edema	8	57.14%
Midline shift	5	35.71%
Hydrocephalus Non Communicant	4	28.57%

Table 4 Surgical management of patient

Operation Technique	Total case	Percentage
Evacuation Craniotomy	8	57.14%
Decompression Craniotomy	3	21.42%
VP Shunt	1	7.14%
EVD	2	14.28%

Table 5 Observe outcome of patients

Outcome	Mean ± SD
Length of stay / hospitalization	20.5 ± 1.41
GOS	3 ± 0.87

Cerebral imaging is obligatory if ICH has suspected. Cranial CT Scan with more than 95% sensitivity should be done as radiological supporting examination. Most of the hematomas were in basal ganglia region (57.14 %), 7 patients (50.00 %) involving cortex cerebri and 5 patients (35.71 %) involving thalamus, 4 patients (28.57 %) had intraventricular extension. These hemorrhages may occur overlapping in 2 or 3 areas of the brain in one patient (Table 2).

Another radiological feature we found in this study was anatomical brain complication. Table 3 showed that half of the patients experiencing perifocal edema (57.14%) followed by midline shift (35.71%) and 4 patients experiencing hydrocephalus non-communicant (28.57%). This complication determined by radiological examination and influenced by intracranial bleeding volume. The volume of the hemorrhages varied from 15 ml to 56 ml.

Specific surgical management were done for the patients based on bleeding volume and its complication on radiologic features. From all surgical intervention, Craniotomy evacuation was the major surgical intervention used to manage SICH (57.14%). Craniotomy decompression (21.42%), External ventricular drainage (14.28%), and VP shunt (7.14%) were done based on anatomical complication in patient.

Surgical outcome in this study was measured by 2 indicators those are Glasgow Outcome Scale (GOS) and length of stay in hospital from the first day of hospitalization. Surgical outcome was better in younger age group than patients with advanced age. Based on GOS, we found 6 patients (42.85%) with moderate disability, 4 patients (28.57%) with severe disability, 4 patients (28.57%) with persistent vegetative state. This outcome showed in Table 5 as mean ± SD. Mean length of patient stayed in hospital was 20.5 ± 1.41 days with mean of GOS was 3 ± 0.87 after surgical procedure was done.

DISCUSSION

Spontaneous intracerebral hemorrhage is a blood clot that arises in the brain parenchyma in the absence of trauma or surgery.[2] This entity accounts for 10 to 15% of all strokes and is associated with a higher mortality rate than either ischemic stroke or subarachnoid hemorrhage. It is associated with high morbidity and 6-month mortality of 30 – 50%.[3,4] In our study, hypertension was the major risk factor both in males and females. Hypertension, however, remains the single greatest modifiable risk factor for SICH. Other potential causes of SICH (amyloid angiopathy, coagulopathy, vascular anomalies, tumors, and various drugs) were not assessed in this study due to diagnostic tools limitation.

The classic presentation of SICH is sudden onset of a focal neurological deficit that progresses over minutes to hours with accompanying headache, nausea, vomiting, decreased consciousness, and elevated blood pressure.[11] Hemiparesis and Language dysfunction were the commonest

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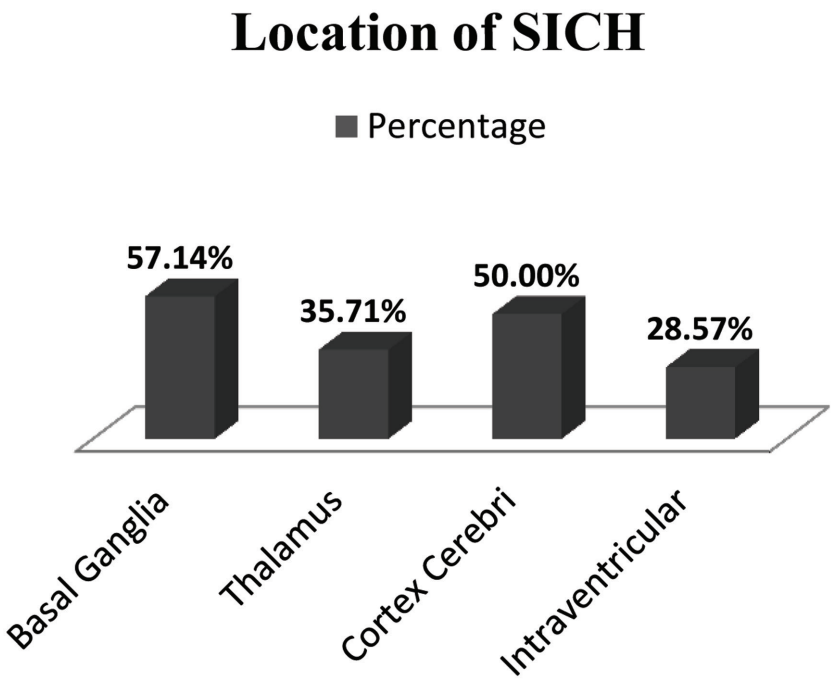

Figure 1 Location of SICH based on Cranial CT Scan

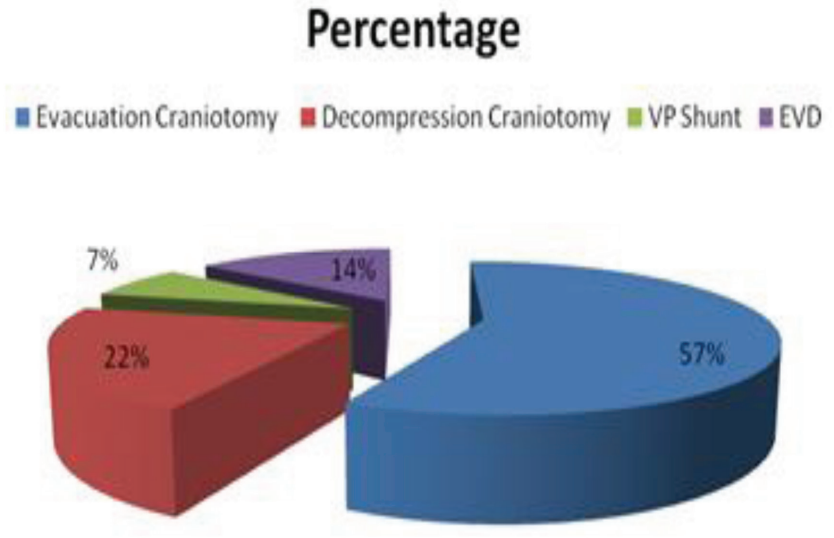

Figure 2 Surgical management of SICH patient

presenting clinical feature found (92.86%) in this study. This finding as same as study held by Azra and Farrukh[5] which found Hemiparesis or hemiplegia (78%) was the commonest presenting feature followed by speech dysfunction (60%).[5] These clinical presentations appear based on the site of the focal neurological deficit.[1,3,11] Other study by Arshad et al[12] loss of consciousness was the commonest complaints. Decreased level of consciousness commonly occurs when large hematoma develops, and intracranial pressure rises, which directly compresses the thalamic and brain stem reticular activating system in brain.

Patients came with headache, and vomiting were present 18.51% in our study, as well as decrease of consciousness (16.67%). Headache and vomiting are frequent nonspecific symptoms which occur due to increased intracranial pressure.[5,6] Compared with ischemic stroke patients, headache and vomiting at onset of symptoms are observed three times more often in patients with ICH.[13] The progression of neurological deficits in many patients with SICH is frequently due to ongoing bleeding and enlargement of the hematoma during the first few hours.

It's also found that most of the patients came to the hospital in late onset of hemorrhage viewed by mean of interval onset between spontaneous hemorrhage and surgical intervention (136 ± 12.81 hours). Although there's no evidence of optimal time performing surgery, some study stated that optimal time for surgery for patients with SICH was from 12 until 48 hours.[9,11,12] Ultra early surgery results in increased risk factors for re-bleeding.[3]

CT and magnetic resonance imaging (MRI) are both reasonable for initial evaluation. CT is very sensitive for identifying acute hemorrhage and is considered the "gold standard"; gradient echo and T2* susceptibility-weighted MRI are as sensitive as CT for detection of acute hemorrhage and are more sensitive for identification of prior hemorrhage.[12,13] Intracerebral hematoma secondary to hypertension are commonly found in basal ganglia, putamen & globus pallidus, thalamus, cerebral lobes, cerebellum and brain stem.[11,12,13] Our study also found that most of the hematomas were in basal ganglia region (57.14%), (50.00%) involving cortex cerebri and (20.83%) involving thalamus, (16.67%) had intra-ventricular extension. It suit on the major clinical presentation founded (hemiparesis or hemiplegia) that weakness may the initial symptom with a basal ganglia hemorrhage. Patients with lobar hematomas had a better outcome when compared to the basal ganglionic hematoma with ventricular extension almost 100% mortality.

Various surgical techniques of SICH have been mentioned. Specific surgical management were done for the patients based on bleeding volume and its complication on extension of bleeding. From all surgical intervention, Craniotomy evacuation was the major surgical intervention used to manage (57.14%), Decompression craniotomy (21.42%), External ventricular drainage (14.28%), and VP shunt (7.14%) were done based on hydrocephalus non-communicant in the cases. The earlier surgery intervention predicted the better result.[7,8,13]

Surgical outcome in this study was measured by 2 indicators those are Glasgow Outcome Scale (GOS) and length of stay in hospital from the first day of hospitalization. Surgical outcome was better

in younger age group than patients with advanced age.[13,14,15] The surgical outcome was assessed according to Glasgow Outcome Scale (GOS). They were: 5 = Good recovery, mild to nil disability; 4 = Moderate disability, disabled but independent; 3 = Severe disability, conscious but disabled and defendant; 2 = Persistent vegetative state; 1 = Death, Based on GOS, we found (42.85%) with moderate disability, (28.57%) with severe disability, (28.57% with persistent vegetative state. Mean length of patient stayed in hospital was 20.5 ± 1.41 days with mean of GOS was 3 ± 0.87 after surgical procedure was done. The preoperative GCS and volume of hematomas also directly related to the surgical outcome. Patients with a GCS less than 6 had bad prognosis while those between 13-15 had a good outcome. When the volume of hematoma is more than 60 ml, the prognosis was bad.[16,17,18]

There are limitations to these results because of the nature. Time limitation also causes limited data collection. Another history such as chronic degenerative disease and risky lifestyle such as smoking, drug abuse, or long-term drug induce hemorrhage consumption were not collected. Another limitation of this study is the small sample size and heterogeneity of the patient population.[17,19,20,21]

CONCLUSION

In the presented study, hemiparesis and language dysfunction were the most frequent presenting clinical complaints. The deeper regions of the brain as basal ganglia were more involved than the area with perifocal edema as the most common anatomical complication. Craniotomy evacuation was the major operation technique used to evacuate the cloth. The surgical intervention used to manage is based on clinical condition and anatomical complication of the patients. Most of the patients were discharged from hospital after 20 days with moderate disability (GOS 3).

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