Determinants of Mortality in Aneurysmal Subarachnoid Hemorrhage: A Single Center Study

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Background and Aims

Aneurysmal subarachnoid hemorrhage (aSAH) is the most life-threatening complication of ruptured cerebral aneurysms with high mortality rate. The aim of this study was to determine the predictors of in-hospital mortality of aSAH patients.

Methods

- We retrospectively reviewed all data from the aneurysm registry of the National Brain Center Hospital Jakarta from January 2019 to June 2022.
- Demographic, clinical, treatment, and radiological variables of aSAH were analyzed by univariate analysis followed by multivariate logistic regression.
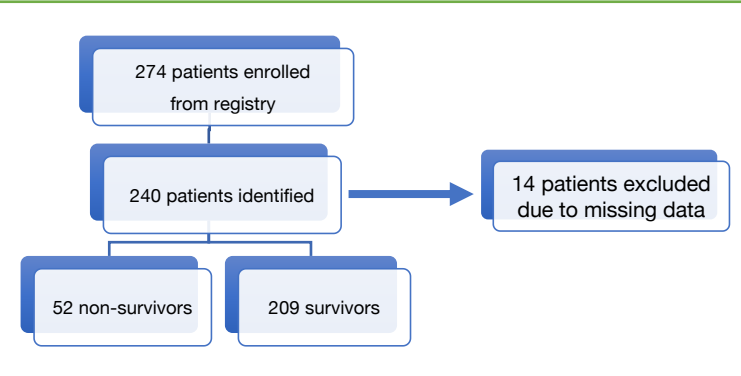- Statistical analyzes were performed using STATA Ver.16.0.

Figure 1. Subjects Selection Process

Results

Of the 274 total cases; 260 cases of aSAH were identified and 14 cases were excluded due to missing data. Fifty-one patients (19.6%) did not survive during hospitalization. Most subjects were female (66.92%) with a mean age was 55 years old. Multivariate logistic regression analysis showed 5 variables as predictors of aSAH mortality, these included SAH grade (aOR= 2,428; p=0.047), aSAH treatments (coiling aOR=0.380; p=0.045 and clipping aOR=0.091; p=0.181), cardiovascular comorbid (aOR= 2.869; p= 0.039), pneumonia (aOR=8.869; p<0.0001), and respiratory failure (aOR=3.569; p=0.006). SAH treatments were discovered as protective factors toward mortality in aSAH.
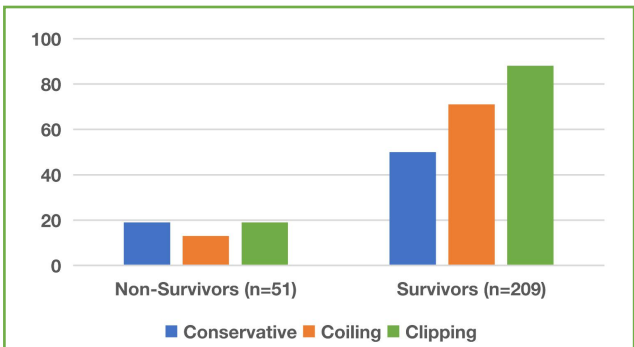
Figure 2. Distribution of Mortality in aSAH According to Treatment

Table 1. Univariate and Multivariate Analysis

Variables	n (%)	Univariate Analysis		Multivariate Analysis	
		OR (95% CI)	p-value	aOR (95% CI)	p-value
Age					
<40	21 (8.0%)	Reference			
40-59	153 (58.6%)	0.752 (0.232-2.437)	0.635		
> 60	87 (33.3%)	1.645 (0.502-5.390)	0.411		
Gender					
Female	174 (66.9%)	1.102 (0.549-2.284)	0.772		
Risk Factors					
Hypertension	207 (79.6%)	1.244 (0.542-3.129)	0.588		
Diabetes	56 (21.5%)	1.504 (0.685-3.164)	0.252		
Dyslipidemia	94 (36.2%)	0.610 (0.286-1.244)	0.149	0.494 (0.219-1.118)	0.091
Smoking	35 (13.5%)	0.486 (1.119-1.486)	0.189	0.422 (0.116-1.529)	0.189
Family History	12 (4.6%)	0.812 (0.084-3.996)	0.792		
Grade					
High-grade SAH (WFNS IV-V)	94 (36.3%)	6.101 (2.976-12.841)	0.000	4.144 (0.116-1.529)	0.000
Treatment of aSAH					
Conservative	69 (26.5%)	Reference			
Coiling	84 (32.3%)	0.526 (0.241-1.148)	0.107	0.380 (0.148-0.978)	0.045
Clipping	107 (41.2%)	0.532 (0.256-1.106)	0.091	0.181 (0.675-0.488)	0.001
Medical Condition					
Respiratory Failure	144 (55.4%)	3.219 (1.539-7.117)	0.0007	3.569 (1.441-8.837)	0.006
Cardiovascular	53 (20.4%)	3.203 (0.540-2.387)	0.0009	2.869 (1.054-7.810)	0.039
Pneumonia	101 (38.9%)	7.461 (0.390-4.795)	0.0000	8.869 (3.517-22.364)	0.000
Hypokalemia	143 (55.0%)	2.254 (1.244-4.093)	0.354		
Hyponatremia	139 (53.5%)	2.274 (1.254-4.128)	0.587		
Hydrocephalus Treatment					
Lumbar Drain	13 (5.0%)	5.382 (1.456-20.232)	0.014	3.655 (0.931-14.357)	0.063
VP Shunt	69 (26.5%)	0.935 (0.425-1.955)	0.850		
EVD	16 (6.2%)	1.397 (0.313-4.874)	0.575		
Angiography of aneurysms (n=265)*					
Location					
Anterior	48 (18.1%)	1.586 (0.345-14.838)	0.547		
Dome size					
<5 mm	146 (55.1%)	Reference			
5-10 mm	96 (36.2%)	1.438 (0.757-2.733)	0.266		
>10 mm	23 (8.7%)	0.220 (0.283-1.708)	0.258		
Cons		0.101 (0.042-0.242)	0.000	0.101 (0.042-0.241)	0.000

Conclusions

High grade SAH, respiratory failure, pneumonia, and cardiovascular comorbid were independent factors associated with in-hospital mortality in aSAH whereas aSAH treatments (coiling and clipping) reduced the risk of mortality.

Refferences

1. C Van Gijn J, Kerr RS, Rinkel GJE. Subarachnoid haemorrhage. The Lancet. 2007;369(9558):306-18.
2. Van Donkelaar CE, Bakker NA, Birks J, et al. Prediction of Outcome After Aneurysmal Subarachnoid Hemorrhage: Development and Validation of the SAFIRE Grading Scale. Stroke. 2019;50(4):837-844.
3. Ramadhania NN, Darmawan AF, Sani AF. Higher mean arterial pressure increases risk of in-hospital mortality inaneurysmal subarachnoid hemorrhage. Universa Medicina. 2020 Sep 23;39(3):153–6.