Int. j. adv. multidisc. res. stud. 2023; 3(1):360-362

Received: 27-11-2022
Accepted: 07-01-2023

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Mortality Factors of Brain Damaged Patients in the Intensive Care Unit of the University Hospital Center of Anosiala Madagascar

[1] Randrianambinina H, [2] Randriaminomanana F, [3] Ramarokoto M, [4] Ralinirina VJ, [5] Rakotondrainibe A, [6] Randriamizao HMR, [7] Rajaonera AT

[1, 4] Anesthesiologist in the University Hospital Center of Anosiala Antananarivo, Madagascar
[2] Anesthesiologist Resident in the University Hospital Center of Anosiala Antananarivo, Madagascar
[3] Neurosurgeon in the University Hospital Center of Anosiala Antananarivo, Madagascar
[5, 6, 7] Professor, Anesthesia and Resuscitation in the University Hospital Center of Joseph Ravoahangy Andrianavalona Antananarivo, Madagascar

Corresponding Author: **Randrianambinina H**

Abstract

Introduction

The brain damaged patients are the patients with central nervous system injured due to trauma or non-traumatic origins. The main objective of this study is to determine the mortality factors of brain-damaged patients in intensive care and secondarily to analyze the epidemiological and clinical aspects of these patients.

Patients and methods

This is a retrospective, descriptive and analytical study of brain-damaged patients in intensive care unit of the university hospital center of Anosiala Antananarivo over a period of 42 months from January 2019 to June 2022. The primary endpoint was patient mortality within the first thirty days of intensive care stay. The statistical test used was the binary logistic regression model on SPSS 18.0 with a statistically significant test if $p<0.05$.

Results

At all, 114 patients were included with an average age of 60 +/- 16 years old and a sex ratio of 1.2. Strokes were the main etiologies (81% of cases including 67% hemorrhagic and 33% ischemic). The mortality rate was 63.2%. Statistically significant factors associated with mortality were the age > 55ans (p=0.02), female gender (p=0.01), initial Glasgow Coma Scale <8 (p=0.001), Charlson comorbidity index ≥1 (p=0.005), NIHSS>15 (p=0.008) and hemorrhagic nature of stroke (p= 0.02). The symptoms durations before admission >12 hours (OR=10.62) were not significant.

Conclusion

Predicting the prognosis of brain-damaged patients in intensive care is essential in their management. This study allowed to determine clinical and paraclinical elements associated with their mortality.

Keywords: Brain Damaged, Glasgow Scale, Intensive Care, Mortality, Prognosis

1. Introduction

The brain damaged patients are the patients with central nervous system injured due to trauma or non-traumatic origins [1]. The prognosis of these patients, whether vital or functional, remains engaged, influenced by various factors [2]. These prognosis evaluations determine the therapeutic outcome of these patients. The main objective of this study is to determine the mortality factors of brain-damaged patients in intensive care and secondarily to analyze their epidemiological and clinical aspects.

2. Patients and methods

This is a retrospective, descriptive and analytical study of brain-damaged patients in the intensive care unit of the university hospital center of Anosiala Antananarivo, over a period of 42 months from January 2019 to June 2022. All brain-damaged adult 18 years old patients and over who had undergone a brain scan and were hospitalized in intensive care during the study period were included. The non-inclusion criteria were the lack of scan data, a stay of less than 03 days in intensive care (because most often fewer investigations carried out, whether diagnosis or prognosis aiming during these first 3 days) and finally pre-existing cerebral pathologies. The studied variables were demographic data (age and gender), clinical and diagnostic parameters (etiologies, Glasgow coma scale, NIHSS (National Institute of Health Stroke Scale), Charlson comorbidity index, which is a patient outcome prognostic scale). The primary endpoint was the patient mortality in the first thirty (30) days of intensive care stay. The statistical test used was the binary logistic regression model on SPSS 18.0 with a

statistically significant test if p<0.05. The odds ratio (OR) of death for each variable studied was calculated with a confidence interval (CI) of 95%.

3. Results

Among the 1019 intensive care admissions, 539 comas were identified but 114 cases of brain damage were retained. This study population was composed of 63 men (55%) and 51 women (45%) with a sex ratio of 1.2. The average age of the patients was 60 years +/- 16 years old with extremes of 25 years and 91 years old. The stroke were the main etiologies concerning 93 patients (81% of cases) including 62 cases of hemorrhagic stroke (67%) and 31 cases of ischemic stroke (33%), followed by subarachnoid hemorrhage represented by 10 cases (09%), 04 cases of extradural hematoma (04%) and 04 cases of cerebral thrombophlebitis (04%), and finally 03 cases of acute subdural hematoma (02%). The symptoms evolved for more than 12 hours before their admission in 87 cases (76%) and less than 12 hours in 27 cases (24%). Only 24 patients (21%) had a Glasgow coma scale less than 8/15 (Table 1). The NIHSS (National Institute of Health Stroke Scale) and the Charlson Comorbidity Index were shown in Table 2. The mortality rate was 63.2%. The patients age over 55 years old (OR=5.8 and p=0.02), the female gender (OR=2.4 and p=0.01), the initial Glasgow scale less than 8/15 (OR=6.2 and p=0.001), the Charlson comorbidity index equal or more than 1 (OR=9.5 and p=0.005), the NIHSS more than 15 (OR=5.4 and p=0.008) and the hemorrhagic nature of stroke (OR=2.5 and p=0.02) were statistically significant mortality factors, the ischemic stroke (OR=0.3 and p=0.005) was significantly a good prognostic factor (Table 3).

Table 1: Initial Glasgow coma scale

Glasgow coma scale	N (%)
< 8	24 (21%)
8-13	51 (45%)
>13	39 (34%)

Table 2: Charlson comorbidity Index and NIHSS

		N (%)
Charlson Index (Total: 114)	≥ 1	103 (90, 4%)
	0	11 (9,6%)
Score de NIHSS of Stroke patients (Total: 93)	< 5	03 (3,2%)
	5-15	11 (11,8%)
	>15	79 (85,0%)

NIHSS: National Institute of Health Stroke Scale

Table 3: Death according to variables

Variables	n	Alive	Deceased	OR	p-value
Ages (Years)					
<45	34	20	14	1,5	0,5
45 – 55	14	10	04	1,7	0,06
>55	66	12	54	**5,8**	**0,02**
Gender					
Male	63	30	33	1,2	0,06
Female	51	12	39	**2,4**	**0,01**
Glasgow coma scale					
<8	24	04	20	**6,2**	**0,001**
8-13	51	10	41	1,2	0,05
>13	39	28	11	1,4	0,06
Index de Charlson					
0	11	09	2	1,1	0,05
≥1	103	33	70	**9,5**	**0,005**
NIHSS of stroke patients					
<5	03	03	00	0,1	0,09
5-15	11	07	04	0,3	0,07
>15	79	25	54	**5,4**	**0,008**
Etiologies					
Hemorrhagic stroke	62	17	45	**2,5**	**0,02**
Ischemic stroke	31	18	13	**0,3**	**0,005**
subarachnoid hemorrhage	10	02	08	2,5	0,26
Extradural hematoma	04	02	02	0,6	0,58
Cerebral thrombophlebitis	04	02	02	0,6	0,58
Acute subdural hematoma	03	01	02	1,2	0,89

OR: Odds ratio

4. Discussions

The male predominance observed in this study was also demonstrated in studies by Bernard as well as Miroslow and their collaborators, with sex ratios of 2 and 1.7 respectively [1, 2]. This has been explained by the fact that male genders often have a behavior at risk of brain damage (motorcycle or vehicle accidents). A Malagasy study in neurosurgery units carried out by Ramarokoto and al [3] on brain-damaged patients requiring decompressive craniectomy found a sex ratio of 6.4 supporting this hypothesis. Akinyemi and al [4] included patients with stroke in their study, had found an average age of 70.2 years. Our study population had got an average age of 60 years +/- 16 years old which were mainly explained by the inclusion of patients with craniocerebral trauma which often concerns much younger people. It is the first cause of death before the age of 45 years in a Swiss study [5]. Hemorrhagic strokes accounted for 54% of cases in our study, followed by ischemic strokes (27%), but on the other hand in Switzerland it is the ischemic stroke which predominates representing 80% of cases among the 150 strokes per 100,000 inhabitants each year recorded [5]. The stroke type is multifactorial, especially depending on the

comorbidities of the patients. The symptoms duration was more than 12 hours in most cases in the study population (76%). In an American study, on the causes of delayed assessment and management of stroke [6], all patients were admitted to hospital within 6 hours of the onset of symptoms. It is therefore necessary to identify the factors prolonging the time of hospital admission in Madagascar. Age over 55 years old was a mortality factor, older age is associated with an unfavorable prognosis according to Husson, Murray and Mushkudiani and their respective teams' studies concerning the traumatic brain injury [7-9]. In a recent analysis of the American program "Get With The Guidelines-Stroke (GWTG)", it was proven that the risk of intra-hospital death in elderly subjects increases for each increase in age of 10 years [10]. Regarding patient gender, female gender was correlated with mortality, however Béjot and his collaborators indicated the male gender as being a factor of mortality in their study [11] and Kammersgaard and al. found that gender did not influence the outcome of brain-damaged patients [12]. The low Glasgow Coma Scale on admission was also associated with mortality with an Odds ratio of 6.2; other study done by Kulesza and al. has described it as a factor of bad prognosis with an Odds ratio of 7.8 [13]. The Charlson comorbidity index more than 1 was also a statistically significant mortality factor, similar correlation was found by Larry and al. in their study in ischemic stroke patients [14]. The NIHSS more than 15 was statistically significant in our study. This scale is one of the scales that predict the prognosis of patients with ischemic stroke within 48 hours of admission in Paris study [15]. A German study had proven that an NIHSS score less than 8 within 24 hours of their admission is the best early marker for predicting a favorable evolution of the patient at 3 months in patients who have had a thrombectomy, moreover, an age advanced is a predictor of a negative outcome at 3 months despite an NIHSS score ≤8 [16]. The nature of cerebral damage has an important role in the prognosis of brain-damaged patients. The hemorrhagic nature increases the risk of mortality 2.5 times compared to other types of damage; it was labeled as a mortality factor in the study on North African populations [17].

5. Conclusion

Predicting the prognosis of brain-damaged patients in intensive care is essential in their management, especially in low developed countries such as Madagascar considering the high cost of these patients care. This study had allowed to determine some clinical and paraclinical elements associated with their mortality. An established guidelines with assembly of these prognostic elements is necessary to lead the therapeutic decision of these patients which must be collegial.

6. References

1. Bernard F, Outtrim J, Menon DK, *et al*. Incidence of adrenal insufficiency after severe traumatic brain injury varies according to definition used: Clinical implications. British Journal of Anaesthesia. 2006; 96(1):72-76.
2. Miroslaw Z, Zaczyñski A. The golden hour and the dull reality. Analysis of traumatic brain injury Management in pre-hospital and emergency care. Neurologia i Neurochirurgia Polska. 2007; 41(1):22-27.
3. Ramarokoto M, Ramarolahy ARN, Rasaholiarisoa N, *et al*. Craniectomie décompressive vue au service de Réanimation Chirurgicale du Centre Hospitalier Universitaire Joseph Ravoahangy Andrianavalona, Antananarivo. Rev. Anesth.-Réanim. Med. Urg. Toxicol. 2019;11(2):10-15.
4. Akinyemi RO, Ovbiagele B, Adeniji O, *et al*. Stroke in Africa: profile, progress, prospects and priorities. Neurology. 2021; 17:634-656.
5. Mühl A, Vuadens P. Intérêt et coût de la réadaptation neurologique des patients cérébrolésés. Rev Med Suisse. 2011; 7:948-951.
6. Lacy CR, Suh DC, Bueno M, *et al*. Delay in Presentation and Evaluation for Acute Stroke. Stroke. 2001; 32:63-69.
7. Husson EC, Ribbers GM, Willemse-van Son AH, and al. Prognosis of six-month functioning after moderate to severe traumatic brain injury: A systematic review of prospective cohort studies. J Rehabil Med. 2010; 42(5):425-436.
8. Murray GD, Butcher I, McHugh GS, *et al*. Multivariable prognostic analysis in traumatic brain injury: Results from the IMPACT study. J Neurotrauma. 2007; 24(2):329-337.
9. Mushkudiani NA, Engel DC, Steyerberg EW, *et al*. Prognostic value of demographic characteristics in traumatic brain injury: Results from the IMPACT study. J Neurotrauma. 2007; 24(2):259-269.
10. Fonarow GC, Reeves MJ, Zhao X, *et al*. Age-related differences in characteristics, performance measures, treatment trends, and outcomes in patients with ischemic stroke. Circulation. 2010; 121(7):879-891.
11. Béjot Y, Troisgros O, Gremeaux V, *et al*. Poststroke Disposition and Associated Factors in a Population-Based Study the Dijon Stroke Registry. Stroke. 2012; 43(8):2071-2077.
12. Kammersgaard LP. Survival after stroke. Risk factors and determinants in the Copenhagen Stroke Study. Dan Med Bull. 2010; 57(10):B4189.
13. Kulesza B, Nogalski A, Kulesza T, Prystupa A. Prognostic factors in traumatic brain injury and their association with outcome. J Pre-Clin Clin Res. 2015; 9(2):163-166.
14. Larry Goldstein B, Gregory P, Samsa, David B, Matchar, Ronnie Horner D. Charlson Index Comorbidity Adjustement for Ischemic stroke Outcomes Studies. Stroke. 2004; 35:1941-1945.
15. Lin F, Hocquet G, Boursier V, *et al*. Construction d'un score multidimensionnel pour prédire le pronostic fonctionnel des patients victimes d'un accident vasculaire cérébral ischémique. Revue d' Épidémiologie et de Santé Publique. 2022; 70(1):S29.
16. Merel L, Broocks G, Bechstein M, *et al*. Early clinical surrogates for outcome prediction after stroke thrombectomy in daily clinical practice. J Neurol Neurosurg Psychiatry. 2020; 91(10):1055-1059.
17. Moalla KS, Damak M, Chakroun O, and al. Prognostic factors for mortality due to acute arterial stroke in a North African population. Pan Afr Med J. 2020; 35:50.