Non-Traumatic Coma Mortality Factors at the Intensive Care Unit of Befelatanana, Antananarivo, Madagascar

Razafindraibe Faneva Angelo Parfait[1], Rakotomavo Falihery Albertin[1], Rasamoelina Ndrantoniaina[2]*, Rajaonarivelo Elino Rodolphe[3], Rajaonera Tovohery Andriambelo[4] and Raveloson Nasolotsiry Enintsoa[3]

[1]Intensive Care Unit, Anosiala Teaching Hospital, Antananarivo, Madagascar

[2]Intensive Care Unit, Tambohobe Teaching Hospital, Fianarantsoa, Madagascar

[3]Emergency Department and Intensive Care Unit, Joseph Raseta Teaching Hospital, Antananarivo, Madagascar

[4]Surgical Intensive Care Unit, Joseph Ravoahangy Andrianavalona Teaching Hospital, Antananarivo, Madagascar

*Corresponding Author: Rasamoelina Ndrantoniaina, Intensive Care Unit, Tambohobe Teaching Hospital, Fianarantsoa, Madagascar.

Abstract

Background: The coma constitutes one of the most frequent causes of admittance at the intensive care unit. Our aim is to determinate the factors associated with death in patients admitted for non-traumatic coma.

Methods: It is a prospective and descriptive study, which involved patients, hospitalized for a non-traumatic coma in the intensive care unit of Befelatanana, from November 2015 to July 2016.

Results: I: One hundred and forty-one patients have been included. The mean age was 55.93 +/- 15.25 years. Female gender predominated (54.61%). The arterial hypertension (57.14%) and the alcoholism (46.43%) were the most common chronic illnesses. The most frequent clinical signs were motor deficit (40.43%), pupillary abnormally (28.36%) and signs of cerebral engagement (12.77%). The mortality rate was 62.41%. The most observed etiology was the stroke (53.19%). The factors influencing the mortality were the presence of arterial hypertension (p = 0.003); management delay more than 24 hours (p = 0.02); brutal installation of coma (p = 0.008); arterial oxygen saturation less than 95% (p = 0.008); the presence of pupillary abnormally (p = 0.006), motor deficit (p = 0.008) and cerebral engagement signs (p = 0.001). There were also hypoglycemia (p = 0.006), vascular (p = 0.001), metabolic (p = 0.007) and alcoholic origin of the coma (p = 0.02).

Conclusion: The knowledge of these mortality factors will permit us to improve the management of our patients.

Keywords: Stroke; Non-Traumatic Coma; Mortality Risk Factors; Intensive Care

Introduction

Coma is an advanced stage of the disorders of the vigilance and expresses a brain suffering. It reflects an alteration of the activity of the ascending activator reticular formation of the brainstem, responsible for the physiological awakening [1]. It constitutes a diagnostic and therapeutic emergency. Non-traumatic comas constitute a relatively frequent pathology responsible each year for about 180,000 to 250,000 hospitalizations in France [2]. Disorders of consciousness disorders account for up to 3% of total emergency room admissions [3]. It constitutes a diagnostic and therapeutic emergency. The prognosis of the comatose patient depends mainly on the precocity and the quality of the initial management [4,5]. The objective of our study was to determine the factors influencing the mortality of patients admitted to non-traumatic comas.

Methods

We carried out a prospective and descriptive study concerning the patients hospitalized for a non-traumatic coma in the intensive care unit of the Befelatanana teaching hospital, in Antananarivo, Madagascar. The study period was 9 months from November 2015 to July 2016 i.e. 09 months. We included in this study all inpatients for a non-traumatic coma over the age of 15 years. We excluded from the study patients who were unable to perform biological examinations (blood glucose, blood ionogram, blood count, renal status). The statistical analysis was carried out with the software epi-info 7 versus 1.1.14 of the Center for Disease and Prevention (USA). The Chi-2 or Fisher test was used for the comparison of the qualitative variables and the Student's t-test for the comparison of means. A difference was considered significant for a value of p less than 0.05.

Results

Of the 3929 patients admitted to the ward during the study period, 193 patients (4.91%) were admitted for coma. Fifty-two (52) patients were excluded from the study because they could not perform biological tests. A total of 141 patients were selected. The average age of the patients was 55.93 +/- 15.25 years. A female predominance was noted (54.61%). Hypertension (57.14%), alcoholism (46.43%) and diabetes (15.60%) were the most frequently observed medical history.

Nearly 81% of comas started gradually. The delay in care defined as a management which exceeded 24 hours was observed in 48.93% of patients. It was a prehospital delay for all of the concerned patients.

At admission, hypertension was noted in 48.23% of cases and tachycardia in 50.35%. Arterial oxygen saturation (SpO_2) of less than 95% was observed in 27.86%.

The motor deficit was the most observed clinical signs (40.43%). Next are pupillary abnormalities (28.36%), signs of cerebral engagement (12.77%), signs of intracranial hypertension (7.09%) and meningeal syndrome (3.55%). Half (51.06%) of the patients had an inhalation pneumonitis.

Hyperglycemia greater than 2 g/l was noted in 29.79% of patients and hypoglycemia in 14.18%. Hyperleukocytosis was observed in 25.53% of patients, leukopenia in 1.41% and anemia in 7.09%. Hyponatremia (20.56%), hypokalemia (15.60%) and hypochloremia (11.34%) were the most observed ionic abnormalities.

Stroke was the main cause of the comas observed in our study (53.19%) followed by metabolic disorders (28.37%), alcoholic coma (15.60%) and septic shock (13.48%).

Comparing the characteristics of deceased and surviving patients, a history of hypertension was significantly associated with death in non-traumatic coma (p = 0.003). Table 1 represents the correlation between antecedents and the occurrence of deaths.

Antecedents	Non-deceased patients (N = 53)	Deceased patients (N = 88)	Total (n = 141)	Percentage (%)	P-value
Hypertension					
Yes	22	58	80	56,73	0,003*
No	32	29	61	43,27	
Stroke					
Yes	03	09	12	8,51	0,34
No	50	79	129	91,49	
Heart Disease					
Yes	0	02	02	1,41	0,27
No	53	86	139	98,59	
Hyperlipidemia					
Yes	12	28	40	28,36	0,32
No	41	60	101	71,64	
Diabetes					
Yes	12	10	22	15,60	0,07
No	41	78	119	84,40	
COPD					
Yes	0	01	01	0,70	0,43
No	53	87	140	99,30	
Asthma					
Yes	2	0	2	1,41	0,06
No	51	88	139	98,59	
Hyperuricemia					
Yes	04	08	12	8,51	0,99
No	49	80	129	91,49	
Alcohol intake					
Yes	25	41	66	46,80	0,76
no	27	48	75	53,20	
Epilepsia					
Yes	02	02	04	2,83	0,60
No	51	86	137	97,17	
Impaired renal functions					
Yes	13	19	32	22,69	0,68
No	40	69	109	77,31	

Table 1: Correlation between antecedents and the occurrence of death.

Similarly, more deaths were observed in patients with sudden onset of coma (p = 0.03) and patients treated beyond 24 hours (p = 0.02).

For admission endpoints and clinical signs, Hypertension (p = 0.02), $SpO_2 < 95\%$ (p = 0.008), pupillary abnormalities (p = 0.006), motor deficit (p = 0.008), and signs of cerebral engagement (p = 0.01) were significantly associated with the occurrence of death in patients. Table 2 reports the correlation between admission parameters and the occurrence of deaths while table 3 compares the data of the deceased and the survivors according to clinical signs at admission.

Parametres	Non-deceased patients (N = 53)	Deceased patients (N = 88)	Total (n = 141)	Percentage (%)	P-value
Blood pressure (BP)					
Hypotension	4	13	17	12,06	0,2
Normal BP	30	26	56	39,72	0,001*
Hypertension	19	49	68	48,23	0,02*
Heart rate (HR)					
Bradycardia	1	0	1	0,71	0,19
Normal HR	30	39	69	48,94	0,15
Tachycardia	22	49	71	50,35	0,10
Temperature					
Hypothermia	6	8	14	9,93	0,66
Normal	37	53	90	63,83	0,25
Hyperthermia	10	27	37	26,24	0,12
$SpO_2 < 95\%$					
Yes	8	31	39	27,65	0,008*
No	46	56	102	72,35	
CGS < 5	05	07	12	8,51	0,76

***Table 2:** Correlation Between Admission Parameters and Death Occurrence.*

Characteristics	Non-deceased patients (N = 53)	Deceased patients (N = 88)	Total (n = 141)	Percentage (%)	P-value
Management ≥ 24H delay					
Yes	23	46	69	48,93	0,02*
No	40	32	72	51,07	
Beginning					
Brutal	15	12	27	19,15	0,008*
Progressive	38	76	114	80,85	
Pupillary anomalies					
Yes	8	32	40	28,36	0,006*
No	45	56	101	71,64	
Motor deficiency					
Yes	14	43	57	40,43	0,008*
No	39	45	84	59,57	
Meningeal syndromes					
Yes	1	4	5	3,55	0,41
No	52	84	136	96,45	
Signs of Intracranial hypertension					
Yes	1	9	10	7,09	0,06
No	52	79	131	92,91	
Signs of cerebral engagement					
Yes	2	16	18	12,77	0,01*
No	51	72	123	87,23	
Inhalation pneumopathy					
Yes	27	45	72	51,06	0,98
No	26	43	69	48,94	

***Table 3:** Correlation between management delay, clinical signs at admission and the occurrence of Deaths.*

Hypoglycemia was associated with high mortality (p = 0.006). Table 4 shows the correlation between biological abnormalities at entry and the occurrence of deaths. For the etiology of coma, stroke (p = 0.001), metabolic disorders (p = 0.007) and alcoholic coma (0.02) were significantly associated with patient mortality. Table 5 recalls the correlation between the causes of coma and the pejorative evolution. Few patients had shared Two or More aetiologies.

Biological abnormalities	Patients not deceased (N = 53)	Deceased patients (N = 88)	Total (n = 141)	Percentage (%)	P-value
Glycemia					
Less than 0.5g / l	13	7	20	14,18	0,006*
Between 0.5-2g / l	26	53	79	56,03	0,19
> 2g/l	14	28	42	29,79	0,49
Blood count					
Anemia	5	4	10	7,09	0,2
Leucocytosis	18	18	36	25,53	0,07
Leucopenia	1	1	02	1,41	0,71
Serum electrolytes					
Hyponatremia	13	16	29	20,57	0,36
Hypernatremia	3	4	7	4,96	0,76
Hypokalaemia	7	15	22	15,60	0,54
Hyperkaliémie	2	5	7	4,96	0,61
Hypochlorémie	7	9	16	11,35	0,59
Hyperchlorémie	3	1	4	2,84	0,11

***Table 4:** Correlation between biological abnormalities at entry and the occurrence of deaths.*

Etiologies comas	Patients not deceased (n = 53)	Deceased patients (n = 88)	Total (n = 141)	Percentage (%)	P- value
Stroke	19	56	75	53,19	0,001*
Metabolic disorders	22	18	40	28,37	0,007*
Septic shock	5	14	19	13,48	0,27
Alcoholic coma	13	09	22	15,60	0,02*
Severe malaria	0	2	2	1,42	0,27
Meningoencephalitis	1	2	3	2,13	0,87

***Table 5:** Correlation between etiologies of comas and pejorative evolution.*

Results

In our series, nontraumatic coma accounted for 4.91% of emergency room admissions. This incidence is similar to the study conducted by Grobia., *et al.* in Côte d Ivoire. They observed in their study 300 cases of impaired consciousness on 6875 admissions, or 5.02% [6]. In the United States, this pathology accounts for 3% of emergency room admissions [3].

The average age of our patients was 55.93 +/- 15.25 years. The study of Raveloson., *et al*. conducted in 2009 in the same department found an average age of 52.33 years [7]. In Africa, Kouamé., *et al*. found an average age of 51.4 years [8]. In our series, we observed a female predominance (54.61%) with a sex ratio of 0.83 intersecting the observation of Darchy., *et al*. (sex ratio 0.66) [9]. In contrast, the male gender predominated in most studies [8,10,11].

HTA (57.14%), alcoholism (46.43%) and diabetes (15.60%) were the most observed medical history in our study. The history of hypertension was correlated with the occurrence of death in our study (p = 0.003). It is a major risk factor for cardiovascular morbidity and mortality worldwide, according to several authors [12].

The presence of hypertension (p = 0.02) and spO_2 < 95% (p = 0.008) at admission were significantly associated with the occurrence of death. According to Sacco., *et al*. hypoxia during a coma is a factor of poor prognosis [13]. In their study, Raveloson., *et al*. found that dehydration, hyperthermia above 40°C, high blood pressure, polypnea beyond 45 cycles per minute, low SpO_2, tachycardia greater than 140 per minute or bradycardia less than 40 per minute were factors of poor prognosis [7]. The recent study by Adelin., *et al*. found a significant risk of death in patients with a low Glasgow score (p = 0.01), a high Ambulatory Severity Index (IGSA) score (p = 0.02), a high temperature (p = 0.03) and an increased respiratory rate (p = 0.03) [14]. In our series, we did not observe a significant difference in death in patients with a Glasgow score of less than 5 and patients with a score between 5 and 8. However, according to several studies, there is a significant risk of death in patients with a Glasgow score between 3 and 5 [15-17].

In our series, the delay of management greater than or equal to 24 hours (p = 0.02), the sudden onset of comas (p = 0.03), the presence of pupillary abnormalities (p = 0.006), motor deficit (p = 0.008), and signs of cerebral involvement (p = 0.01) were significantly associated with the occurrence of death. According to the study carried out by Levy., . on 500 American patients, the mortality rate was 100% in patients without pupillary reflexes for 24 hours, with motor deficit and without ocular movements (mortality at day 7) [18]. Bates., *et al.* found that recovery was good if patients could talk after 24 hours or had nystagmus after caloric intake [19]. Regarding the delay in treatment, only 15% of patients had a good evolution for comas lasting more than 24 eures [18]. In 2002, Sadig., *et al.* found a 75% mortality rate for comas lasting longer than 72 hours [20].

A blood glucose lower than 0.5 g/l was correlated with the death in our study (p = 0.006), which matches the data observed by Adelin., *et al*. who incriminated hypoglycemia in the occurrence of death of patients with a non-traumatic coma (p = 0.02) [14].

Stroke was the main cause of the comas observed in our study (53.19%) followed by metabolic disorders (28.37%), alcoholic coma (15.60%) and septic shock (13.48%). The etiologies of comas observed in our study were similar to the study conducted by Esquevin., *et al*. in 2013. In their series, stroke represented 54% of cases and 31% of disorders of consciousness were due to metabolic disorders [21]. According to a meta-analysis conducted by Horsting., *et al*. in 2015, stroke was the cause of comas in 6 to 54% of cases [22]. In Africa, the etiology of coma is dominated by infection [15,23,24].

In our series, stroke (p = 0.001), metabolic disorders (p = 0.007) and alcoholic coma (0.02) were significantly associated with patient mortality. According to several studies, the mortality rate of comas secondary to stroke is very high, ranging from 60 to 95% [16,21-25]. According to Sacco., *et al*. the prognosis is intermediate for comas of metabolic origin, septic and secondary to focal brain injury [13].

The mortality rate of our study was 62.42%. This result is similar to data in the literature, which puts it between 25 and 87% [22].

Conclusion

Non-traumatic coma is an uncommon pathology in the intensive care unit of the Befelatanana Hospital. This is a serious condition with a high mortality rate. Through this study, we were able to identify factors influencing mortality in non-traumatic comas in our hospital. The discovery of these mortality factors will allow us to define prevention axes and refine the patient management protocol.

State of Current Knowledge on the Subject

- In the literature, the most common causes of non-traumatic coma are vascular (6 - 54%), post-anoxic (3 - 42%), toxic (< 1 - 39%) and metabolic (1 - 29%).

- The mortality rate varies from 25 to 87%. Mortality is highest for coma of vascular origin (60 - 95%) and post-anoxic coma (54 - 89%) compared to comas of toxic origin (0 - 39%) and other (0 - 10%).

Contribution of Our Study to Knowledge

- In our series, the mortality rate was 62.41%. Stroke (53, 19%) was the leading cause.
- Factors associated with death were history of hypertension, delayed management (greater than 24 hours), abrupt onset of coma, arterial oxygen saturation < 95%, presence of abnormalities pupillary, motor deficit and signs of cerebral involvement, hypoglycemia, as well as the metabolic, vascular and alcoholic origin of coma.

Conflict of Interest

The authors do not declare any conflict of interest.

Contributions of the Authors

All authors contributed to this study.

Thanks

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