Non Traumatic Coma in the Intensive Care Unit: Etiology and Prognosis

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ABSTRACT

Background

Impaired consciousness and coma is common reason for admission into the intensive care unit .It results from many etiological factors with varying outcome. Causes may vary in different parts of the world as is the outcome depending on the availability of appropriate care to deal with those patients.

Objective

To identify the etiological factors responsible for non traumatic coma and also evaluate if those factors influence the prognosis.

Method

This is a hospital based cross sectional study carried out at Nobel Medical College, Biratnagar between December 2019 and December 2020. All the patients who were admitted into the intensive care unit with coma due to non traumatic causes were included in the study.

Result

One hundred seven patients were enrolled in the study with mean age of the patient 54.5±19 years. There were 61(57%) male. Forty seven (43.9%) patients died while 60(56.1%) patients survived. Common etiological factors identified were impaired renal function 32(29.9%), anoxia 30 (28%), sepsis 28(26.2%), stroke 26(24.3%), metabolic derangement 21(19.6%). Coma due to sepsis was significantly associated with mortality (p=0.001) as was impaired renal function (p =0.035), cardiac disease (p=0.016) and low Glasgow Coma Scale (p=0.046). We did not find any association between age (p=0.53), gender (p=0.94) duration of coma (p=0.75) and mortality.

Conclusion

Impaired consciousness is a common problem encountered in the intensive care unit with very high mortality. Low Glasgow Coma Scale, Sepsis, impaired renal function and cardiac disease were associated with higher mortality.

KEY WORDS

Coma, Glasgow coma scale, Mortality, Unconsciousness

INTRODUCTION

Consciousness is defined as the ability to respond to external stimuli and awareness of one's self and the environment.[1] Impaired consciousness on the other hand is said to be present when a patient has reduced awareness of one's self and the environment along with decreased alertness and ability for arousal.[2] Consciousness is the function of the cerebral cortex and the reticular activating system located within the brainstem.[3,4]

Coma has been defined as a state of unresponsiveness in which patient cannot wake up and interact with the environment, even after application of vigorous alerting stimulation.[5] Two main mechanisms that have been proposed to explain coma are a diffuse insult to bilateral cerebral hemispheres and damage to the ascending reticular activating system in the brainstem. Direct insults or lesions within brainstem can damage the thalamus and ascending reticular activating system.[6,7]

Coma is a serious condition which requires immediate medical attention in the intensive care unit. Coma arises due to a variety of causes some of which may be life threatening. This poses a challenge for the physicians.[8] In general a GCS lower than 10 points is used to define coma.[9] Overall mortality of patients with non traumatic coma is 25-87% with stroke and anoxic brain damage having highest mortality.[10]

The aim of the present study is to evaluate etiology as well as determine the prognosis of nontraumatic coma as research in this area seems to be sparse in Nepal.

METHODS

This was a prospective cross sectional study conducted in the intensive care unit of Nobel Medical College. We included all the patients older than 18 years of age who were unconscious due to non traumatic causes and admitted in the intensive care unit between December 2019 and December 2020. Demographic profile including patient's age, gender, duration of unconsciousness, any identified cause of coma, neuroimaging (CT/MRI), blood investigation including complete blood count, electrolyte, blood sugar, renal function test, liver function test, thyroid function, arterial blood gas analysis, chest x-ray, electrocardiogram, echocardiogram was done in the patients according to the suspected etiology. Lumbar puncture and analysis of cerebrospinal fluid was done when meningitis or encephalitis was suspected. History of poisoning and drug abuse was recorded. Physical examination was done in all patients. We included patients with Glasgow Coma scale less than 10 at admission as this is the cut off value to define coma in most studies.[9]

Patients were assessed daily and the progress recorded until death or discharge from the hospital. Patients were excluded from the study if they had history of head injury, less than 18 years of age or could not obtain consent for the study from the family member. The study was carried out following ethical clearance from the institutional review committee.

Microsoft excel was used to enter data and analysis was done using SPSS. Descriptive statistics, Chi square test, cross tab, Pearson correlation test were used where applicable to determine the influence of various parameters on outcome. P value < 0.05 was considered significant.

RESULTS

One hundred seven patients who were admitted in the ICU were unconsciousness. The mean age of the patients was 54.5±19 years. There were more male 61(57%) as compared to female. Most of the patients came with in the first day of the illness with a mean duration before coming to hospital of 1.4±0.8 days. Similarly, mean GCS was 6.15±2.5 and mean duration of ICU stay was 7.2±7.6. Sixty (56.1%) patients recovered from the illness and were discharged from the hospital while 47(43.9%) patients died either in the ICU or within a week of going to home.

Table 1. Clinical characteristics of the patients (N=107)

Variables		Number of patients
Age in Years		54.5±19
Sex	Male	61(57%)
	Female	46(43%)
Duration before coming to hospital(Days)		1.4±0.8
GCS		6.15±2.5
Duration of ICU stay (days)		7.2±7.6
Outcome	Survived	60(56.1%)
	Dead	47(43.9%)

Most of our patients were between 40 and 80 years of age. More deaths were seen in the younger patients between 18 and 39 with more mortality than survival. However after the age of 40 there was more survival as compared to patients who died.

Table 2. Age distribution of patients

Age (Years)	Total number of patients	Survived	Dead
18-29	15(14%)	7	8
30-39	8 (7.5%)	3	5
40-49	15(14%)	8	7
50-59	20 (18.7%)	14	6
60-69	21 (19.63%)	14	7
70-79	21(19.63%)	10	11
≥80	7 (6.5%)	4	3

Table 3 shows the causes of unconsciousness and coma encountered in our patients. Common causes identified were stroke (24.3%), hypoxic or anoxic brain damage (28%)

Table 3. Etiology of unconsciousness

Etiology	Total number of patients with disease	Survived	Dead	P-value
Stroke	26(24.3%)	12	14	0.104
Anoxia	30(28%)	16	14	0.43
Diabetes	21(19.6%)	13	8	0.55
Impaired renal function	32(29.9%)	13	19	0.035
Impaired Liver function	16(15%)	9	7	0.28
Respiratory disease	22(20.6%)	12	10	0.52
Poisoning	5(4.7%)	5	0	0.043
Meningitis or encephalitis	10(9.3%)	8	2	0.109
Epilepsy	13(12%)	6	7	0.442
Metabolic	21(19.6%)	8	13	0.064
Cardiac	17(15.9%)	6	11	0.016
Sepsis	28(26.2%)	8	20	0.001
Others	6(5.6%)	5	1	0.166

due to shock and hanging (Suicidal or homicidal), acute or chronic kidney disease with uremic encephalopathy accounting for 29.9% and hepatic encephalopathy (15%). Respiratory problems including pneumonia, acute respiratory distress syndrome and acute exacerbation of COPD accounted for 20.6% of cases whereas epilepsy in the form of status epilepticus ,metabolic derangement like hyponatremia, hypoglycemia were also important causes of unconsciousness and coma. Cardiac problems leading to unconsciousness were acute myocardial infarction, heart failure, rheumatic heart disease, cardiomyopathy and cardiac arrhythmias. Sepsis was another important cause identified among the patients. Poisoning and other miscellaneous causes like acute pancreatitis, upper gastrointestinal bleeding, and surgical abdomen were met with less frequently in the unconscious patients in the ICU. Having impaired renal function, cardiac disease and sepsis were significantly associated with mortality. None of the patients with poisoning as the cause of unconsciousness died.

Table 4. GCS of the patients

GCS	Total number of patients	Survived	Death
3 and 4	31(29%)	10	21
5 and 6	39(36.4%)	25	14
7 and 8	11(10.3%)	8	3
9 and 10	26(24.3%)	17	9

Most of the patients who died had lower Glasgow Coma Scale (GCS). Lower Glasgow Coma Scale of the unconscious patients was significantly associated with mortality (p=0.046).

DISCUSSION

Unconsciousness and non traumatic coma in patients which are admitted in the general intensive care unit can be due to different causes. Those patients need to be approached with the four core components of care which include a good history taking, detailed physical examination, appropriate investigations and treatment that needs to be carried out in simultaneously.[6,11,12]

In our study, there were more male than female. Earlier studies have also reported a higher male to female ratio in medical coma.[13-15] Male Predominance could be due to presence of risk factors like smoking, alcohol consumption higher among males.[16]

In the present study, we looked into the etiological factors responsible for unconsciousness in the intensive care unit and the prognosis of those patients. Stroke, anoxic brain damage and sepsis were important common causes. Other common causes identified were metabolic abnormalities due to hypoglycemia, hyponatremia, metabolic acidosis, uremic encephalopathy due to acute or chronic kidney disease, cardiac causes, and infection of the central nervous system including meningitis and encephalitis, status epilepticus, hepatic encephalopathy and respiratory diseases. Poisoning and other miscellaneous causes like pancreatitis and surgical abdomen were less common causes of coma. A study by Forsberg et al. also found similar causes of unconsciousness.[17]

Impaired renal function was common in the unconscious patients which was associated with worse outcome (p=.035). Impaired renal function was due to acute kidney injury, chronic kidney disease and pyelonephritis or as part of multiorgan dysfunction in patients with sepsis. Similarly, patients with cardiac problem and those with sepsis also had higher mortality. Cardiac diseases encountered were myocardial infarction, heart failure, cardiomyopathy, valvular heart diseases and cardiac arrhythmias. Sepsis due to bacterial and other causes was associated with multi organ failure and septic shock resulting in greatest mortality among the identified causes with a case fatality of 71%.

We did not find any association between age (p=0.53), gender (p=0.94), duration of coma before presenting to hospital (p=0.75), anoxic brain damage (p=0.43), hepatic encephalopathy (p=0.3), respiratory problem (p=0.5), status epilepticus (p=0.4) or metabolic derangement (p=0.6), duration of ICU stay (p=0.9) and mortality. Etiology of coma has been known to affect outcome in earlier studies. Coma due to poisoning has been known to have better prognosis than due other etiologies.[18] None of our patients with coma due to poisoning died.

The metabolic non traumatic coma is a very diverse group but complications of diabetic mellitus and hepatic encephalopathy are the most important causes of metabolic

non traumatic coma. The cause of metabolic abnormality affects the outcome. Coma due to diabetic ketoacidosis is associated with mortality rate ≤ 1% while hyperglycemic hyperosmolar state is associated with mortality rates of 5-20%.[19]

It is common practice to differentiate coma caused by structural brain damage and coma due to diffuse cerebral dysfunction.[20] This distinction however may be imprecise. Patients with a stroke, brain tumor or brain abscess, can develop coma due to mass effect, cerebral edema and tissue shift or as a result of seizure. When refractory status epilepticus continues for days or weeks, patients may continue to be in a state of coma because of cortical injury even after the seizures that were responsible for the initial loss of responsiveness had been well controlled.

In the present study, we found mortality in 47(43.9%) of comatose patients. Sixty (56.1%) patients survived after the treatment. Patients with GCS of 3 and 4 had mortality of 67.7% while patients with a GCS of 9 and 10 had mortality of 34.6%. Patients with Lower GCS had significantly higher mortality than those with higher GCS (p=0.046). Lower GCS is suggestive of more serious nature of the illness with poor verbal, motor or ocular response which in turn was associated with worse outcome. Prognosis is influenced by a number of factors. One systematic review reported mortality rate of 25-87%.[10] Earlier studies have shown that patients with a lower GCS of 3-5 have greater mortality than those with a GCS of 7-10. For assessment of prognosis, GCS score acts as the best indicator for patients with coma due to non-traumatic causes.[18] Dhamija et al. found 84% mortality in patients with a GCS score of 3 to 4 GCS.[21]

Our study has some limitations. This study included patients with only non traumatic coma, so prognosis in patients with traumatic coma remained unknown. Some patients were discharged from the hospital before complete recovery because of financial issues. These patients could have different outcome if treatment was continued in hospital.

CONCLUSION

Coma is a common problem encountered in the intensive care unit with high mortality. Identification of the etiology such as impaired renal function and sepsis and taking appropriate steps to prevent and manage the disease as well as understanding the prognosis may help clinicians achieve better outcome.

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