Stroke Mortality in Intensive Care Unit from Tertiary Care Neurological Center

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ABSTRACT

Introduction: Stroke is the second most common cause of death and major cause of disability worldwide. About a quarter of stroke patients are dead within a month, about a third by six months, and a half by one year. Although the most substantial advance in stroke has been the routine management ofpatients in stroke care units, Intensive Care Unit has remained the choice for stroke patients' care in developing countries. This study explores the mortality of stroke patients in ICU setting in tertiary care neurological centre in a developing country.

Methods: We collected data of stroke patients admitted in our ICU from August 2009 to August 2010 and analyzed.

Results: Total 44 (10.25%) patients were admitted for acute stroke. Age ranged from 17-93 years. Low Glasgow Coma Scale (GCS), uncontrolled hypertension and aspiration pneumonia were common indications for admission in ICU. Total 23 (52.3%) patients had hemorrhagic stroke and 21 (47.7%) patients had ischemic stroke. Total 13 (29.54%) patients of stroke died within seven days, nine (69.23%) patients of hemorrhagic stroke died within six days, and four patients (30.76%) of ischemic stroke died within seven days and six (13.63%) patients left hospital against medical advice. All of these patients had ischemic stroke.

Conclusions: Stroke mortality in ICUremains high despite of care in tertiary neurological center in resource poor settings. Stroke Care Unit, which would also help dissemination of knowledge of stroke management, is an option for improved outcome in developing countries.

Keywords: Intensive Care Unit; mortality; stroke; stroke care unit.

INTRODUCTION

Stroke is the second most common cause of death and major cause of disability worldwide.[1] About a quarter of stroke patients are dead within a month, about a third by six months, and a half by one year.[2] Although the most substantial advance in stroke has been the routine management of patients in Stroke Care Unit (SCU), Intensive Care Unit (ICU) has remained the choice for stroke patients' care in developing countries.

Most of the acute stroke care is provided either in ICU or general medical ward in our country. Very little information is available about outcome of acute stroke patients treated in ICU as we do not have enough systematically collected data. At present, hospitals in our country are not in a position to create SCU set-up because of lack of expertise, equipments and human resources. With the recent starting of Neurology training in the country, it is thought that managing acute stroke

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patients in ICU may improve outcome. This may further strengthen the evidence that ICU may be an option for acute stroke management without the burden of initiation of SCU in developing country like ours.

This study, hence explores the mortality of stroke patients in ICU setting in tertiary care neurological centre in Nepal.

METHODS

We conducted a cross-sectional study and collected relevant data of stroke patients admitted in ICU from August 2009 to August 2010 in College of Medical Sciences Teaching Hospital, a tertiary care neurological centre after approval from the institutional ethical committee. We had total of eight bedded ICU being taken care by an experienced dedicated team including Neurologist, internist and trained nursing staffs. The details of the patients, their clinical features and imaging findings and outcome were carefully recorded. All these patients received standard neurological ICU management. For analysis all the patients taken home against medical advice were considered as "dead". Statistical Package of Social Science (SPSS) 16.0 was used to analyze the collected data.

RESULTS

The premorbid characteristics of the patients were similar except males being admitted in ICU more frequently than females (Table 1).

Table 1. Characteristics of Stroke Patients admitted to ICU.

Particulars	Admitted in ICU (n=44)	Died in ICU (n=28)	Discharged from ICU (n=16)
Age	64.045 ± 15.31	63.14 ± 16.43	65.62 ± 13
Gender [M:F]	29:15 (1.93)	20:8 (2.5)	9:7 (1.28)
Previous stroke	5	4	1
DM	2	1	1
Hypertension	14	1	3
GCS	8.43±2.15	8.07±2.22	9.06±1.91

Out of 429 patients in ICU, 44 (10.25%) patients were admitted for acute stroke. Age of patients ranged from 17-93 years. Total 29 were male and 15 were female patients. Total 23 (52.3%) patients had hemorrhagic stroke and 21 (47.7%) patients had ischemic stroke.

Low Glasgow coma scale (GCS), uncontrolled hypertension and aspiration pneumonia were common indications for admission in ICU.

The majority of patients were found to be in the age group of 50-89 years, a common age group known to have high burden of stroke (Figure 1). Total 29 (65.9%) male patients were admitted for stroke where as there were only 15 (34.09%) female patients. The majority of stroke was hemorrhagic 23 (52.3%) while ischemic stroke constituted only 21 (47.7%) of admitted stroke patients.
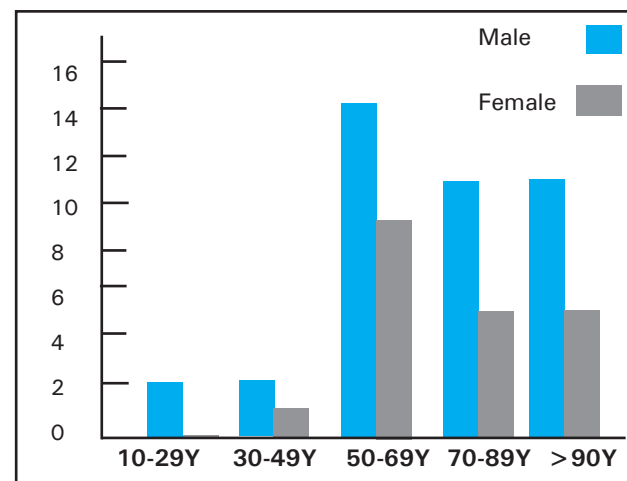

Figure 1. Age distribution.

It was observed that many patients of both the types of stroke required 2-7 days of ICU care and within this period the expected outcome had occurred (Figure 2).
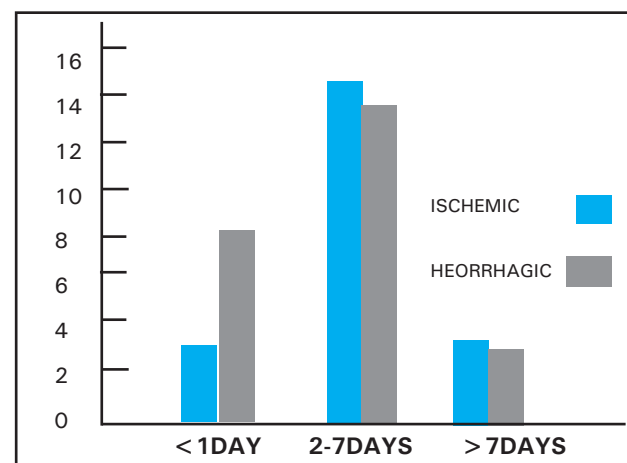
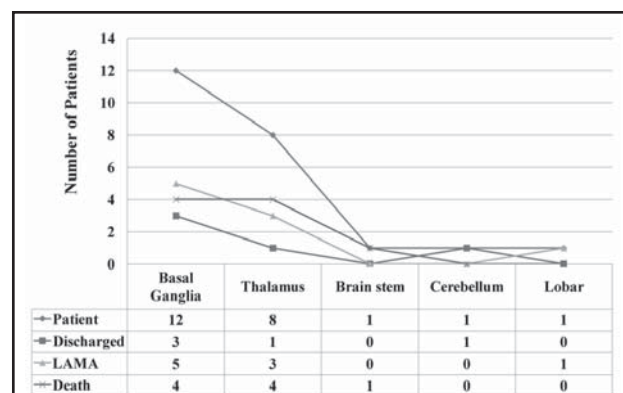**Figure 2.** Types of Stroke requiring Duration of ICU care.

Total 13 (29.54%) patients of stroke died within seven days. Nine (69.23%) patients of hemorrhagic stroke died within six days. Total four (30.76%) patients of

ischemic stroke died within seven days. Six (13.63%) patients of ischemic stroke and nine (20.4%) patients of hemorrhagic stroke left hospital against medical advice (Figure 3).
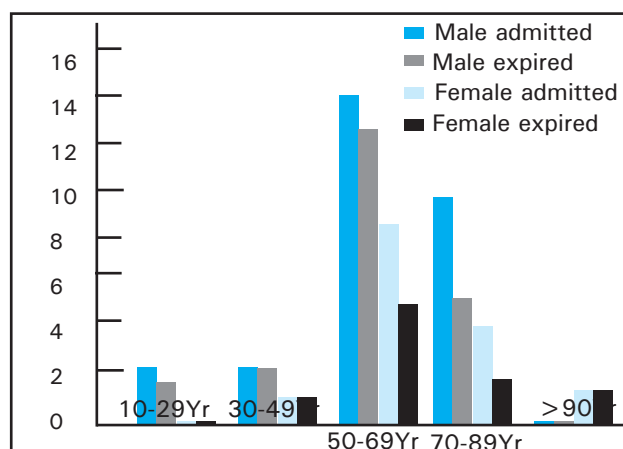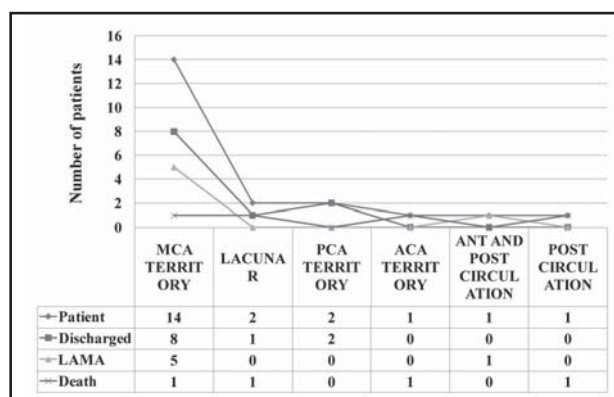

Figure 3. Stroke outcome as per age group.

Total patients died plus left against medical advice were 28 (63.63%). Total 16 (36.36%) patients were successfully discharged from ICU to the ward, of which 100% made through to be ultimately discharged alive from hospital. Seven (43.75%) were bed ridden at the time of hospital discharge (Figure 4, 5).

	Basal Ganglia	Thalamus	Brain stem	Cerebellum	Lobar
Patient	12	8	1	1	1
Discharged	3	1	0	1	0
LAMA	5	3	0	0	1
Death	4	4	1	0	0

Figure 4. Location based outcome of hemorrhagic stroke.

	MCA TERRITORY	LACUNAR	PCA TERRITORY	ACA TERRITORY	ANT AND POST CIRCULATION	POST CIRCULATION
Patient	14	2	2	1	1	1
Discharged	8	1	2	0	0	0
LAMA	5	0	0	0	1	0
Death	1	1	0	1	0	1

Figure 5. Location based outcome of ischemic stroke.

Comparison of hemorrhagic and ischemic stroke group in relation with their outcome was found to be not quite statistically significant (P = 0.059). Similarly, outcome measures in male and female patients in form of discharge or death was also insignificant (P = 0.34). Basal ganglia bleed when compared to thalamic bleed did not have statistically significant differences in outcome (P = 0.61).

Hypertension was the reason for most of the cases. Takayasu arteritis was a cause in one case.

Associated conditions that were found in our patients were Multiple Calcified Granulomas, Sub Arachnoid Hemorrhage, Aspiration Pneumonia, Alcohol Withdrawl Syndrome, Valvular Heart Disease with Atrial Fibrillation, Hepatitis B, Carcinoma Head of Pancreas and Post Tuberculosis left upper lobe fibrosis.

DISCUSSION

Stroke is a global health problem and is a leading cause of adult disability.[1] The review in trends of stroke cases in last four decades worldwide shows that in developing countries the rate of increase in incidence of stroke is almost 100% and disability due to stroke is almost seven times in developing countries than that in developed countries.[3] Increasing awareness about stroke (brain attack) amongst the people prompts them to seek medical advice, even though late because of various reasons like transport, in developing countries. Also, being a tertiary neurological center more number of patients are referred from nearby hospitals. The recent understanding from the World Stroke Organization (WSO) campaign is that 1 in 5 females (as compared to 1 in 6 male) in their lifetime will have stroke. However, we had more number of male patients likely because of the male dominated society.

Like in other studies we had more patients above 50 years and most of them had hypertension as a likely

etiology for stroke. Though the ischemic stroke is known to occur commonly, we in our part have observed that hemorrhagic stroke because of severe manifestations including low GCS, come to the hospital early and get admitted to ICU.

Both the ischemic and hemorrhagic stroke cases were found to have the destined outcome within 2-7 days as, most of them stayed for the same period in ICU. In our study, it is amazing to note that most of the patients Left Against Medical Advice (LAMA). Each of the family member are counselled to keep the patients and continue treatment but we observed that because of the financial constraints and the social belief of taking the dying person home for ceremony known as "Baitadni" after which they believe that the dead person settles in heaven forever.

In our stroke patients admitted to ICU, basal ganglia was the most common site of hemorrhagic stroke followed by thalamus with poor outcome, however no significant relation existed between the outcome of these sites of bleed. Similarly, Middle Cerebral Artery (MCA) territory infarct was the most frequent site of infarct followed by lacunar infarcts. This interpretation may not be applicable because of less number of patients studied.

ICU mortality of 73% with a one year mortality of 92% have been reported.[4] We were able to successfully manage 16 (36.36%) patients in ICU. Stroke intensive care units have been shown to have a very little impact on the outcome of patients following a stroke.[5-8] The data suggests that for the vast majority of patients suffering an acute cerebrovascular accident short term admission to an intensive care unit will not improve outcome. These findings are consistent with our study results as we were only able to save 36.36% of patients admitted to ICU.

The function of an ICU is to provide temporary physiological support for patients with potentially reversible organ failure. The management of patients following a cerebrovascular accident largely involves good nursing care and a well organized multidisciplinary rehabilitation program. A number of well conducted clinical trials have demonstrated that the mortality and functional recovery of patients following a stroke is significantly improved when these patients are cared for in a specialized stroke unit as compared to a general medical ward.[9,10] Acute medical interventions have not been established to improve outcome, and in fact may be harmful in some circumstances.[11-13] In our stroke patients, we did intervene in form of strict control of

Blood pressure in hemorrhagic stroke, Central Venous Pressure measurement, Endotracheal Intubation but none of them underwent surgical intervention. We do not use steroid in hemorrhagic stroke. Despite of these interventions, the stroke patients did not show any improved outcome.

In a study by Paul Marik, 43% of patients of stroke admitted to ICU died. With number of other observations in the same study, reversible medical conditions requiring acute physiological support, or patients who require a life saving intervention, and have a reasonable prognosis for meaningful survival are recommended to be admitted to an ICU following a stroke.[14] Majority (63.63%) of our patients either died or left hospital against medical advice. This cannot be definitely attributed to lack of care, but cultural beliefs, lack of education, and financial problems had contributed to this outcome and this holds true for any developing countries.

Management of patients within an SCU is known to reduces mortality by about 20% and improves functional outcome by about the same amount.[10] The mechanisms by which SCU management improves outcomes remain uncertain. The widespread introduction of SCUs have been emphasized in planning health systems, especially in developing countries with high rates of death.[1]

Despite of many important messages provided by our study, our study did have inherent limitation of the type of study we conducted. We actually do not know what happened to the patient who went home against medical advice and the biochemical and other parameters were not included in our study which could have affected the outcome in ICU.

CONCLUSIONS

Stroke mortality in ICU remains high despite of standard care in tertiary neurological center in resource poor settings. SCU, which can focus more comprehensive management of stroke and also help dissemination of knowledge of stroke management, may be an option for improved outcome in tertiary care centre of developing countries like Nepal.

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