

Evaluation of Clinical Features and Outcomes of Stroke Patients in the Internal Medicine Intensive Care Unit: A Single-Center Study

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Introduction: Stroke is among the preventable and treatable diseases. Developed countries have tried to take measures to reduce the risk factors causing stroke and have partially reduced them. Since the infrastructure and opportunities of developing countries are limited, there may be problems in reducing stroke. Although stroke patients are generally treated in neurological intensive care units in developed countries, this is limited in developing countries. We aimed to evaluate the follow-up and treatment process of stroke patients followed in medical intensive care units.

Materials and Methods: In this study, the data were obtained from the medical records of stroke patients in the medical intensive care unit (MICU) of the Hospital. Risk factors and mortality rates of patients were evaluated. The study was carried out between January-June 2018.

Results: The mean age of the patients who participated in our study was 79 ± 7.9 . Both groups were similar in the way of age. While the age of the ischemic stroke was 80.4 ± 7.7 , the hemorrhagic stroke was 80.8 ± 8.4 and the p-value was 0.47. We found the median duration of stay in the intensive care unit as 16.5 days in ischemic stroke and 2-to-30 days interquartile range (IQR). Intensive care mortality was 24 (35.3%) in all strokes, while this rate was 16 (%23.5) in ischemic stroke and 8 (%11.8) in hemorrhagic stroke.

Conclusion: The ischemic stroke rate was close to developed and developing countries. However, we found this rate lower in hemorrhagic stroke. In our country, larger and multicenter studies are needed in medical intensive care units.

Keywords: Stroke, intensive care, mortality

Introduction

Stroke is the second most frequent among the diseases causing mortality and the third in morbidity in the World. And it's also among the high social cost diseases (1). In a study of Akkoc et al found neurologic patients were the

first rank among patients in the intensive care unit with a ratio of 17% (2). In their study on ischemic stroke, Feigin et al. found that the ratio in developed countries was less than that of developing countries, respectively

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(67% and 82%). Intracerebral hemorrhage in hemorrhagic stroke was found 22% in developed countries and 11% in developing countries, subarachnoid hemorrhage was found 7% in developed countries and 3% in developing countries (3). Among developed countries, subarachnoid hemorrhage is about twice that of developing countries. Stroke risk factors in developing countries may differ from developed countries (4).

In a study conducted as a single-center study in Turkey, hemorrhagic stroke was found to be 11.1% and the risk factors were found as hypertension (23.1%), diabetes (12.1%), smoking (31.9%) (5). In a larger study in the Aegean region, hypertension 63% and hypercholesterolemia 37% were found as the most common risk factors (6). In developed countries, it has been shown that stroke risk factors can be reduced with lifestyle changes. Epidemiological data on stroke in developing countries is limited (7). Guides recommend following stroke patients in neurological intensive care units (8). Stroke patients may be admitted to medical intensive care units due to the insufficiency of the neurological intensive care unit number in Turkey. And also the data on the monitoring and treatment process of stroke patients is limited both in service and intensive care unit conditions in Turkey (9). Determining the status of stroke patients with high mortality and morbidity, even in developed countries, in the intensive care unit can help to prepare the necessary environment for their treatment.

Therefore, in our study, we aimed to evaluate stroke characteristics, patients' demographic characteristics and clinical results in the medical intensive care unit (MICU).

Materials and Methods

This study was conducted between 01.01.2018 and 30.06.2018 in MICU after obtaining ethical approval from the university ethical committee (152/2017). In this MICU located in a training and research hospital has 12 intensive care bed capacity, intensive care specialists and internal medicine research assistants work. In this study, we evaluated medical records patients with stroke diagnosis for a month staying in MICU. We divided the patients into two groups as ischemic stroke and hemorrhagic stroke. We evaluated causes, comorbidities, demographic features, mechanical ventilation needs, hospital stay and mortality rates of patients.

Statistical Analysis

Descriptive statistics were presented as count and percentages for the categorical variables. A Chi-square test was performed to determine the relationship between these variables. Statistical significance level was considered as 5% and SPSS (v13) statistical program was used for all statistical computations.

Results

Of the 68 patients included in our study, 48 (69.6%) were ischemic stroke and 20 (29.4%) were hemorrhagic stroke. The mean age of stroke patients was 79 ± 7.9 and both groups were similar in terms of age. The mean age was $\pm$ sd (standard deviation) in ischemic stroke, 80.4 ± 7.7 , and was 80.8 ± 8.4 in hemorrhagic stroke ($p=0.47$). 37 patients who participated in our study were male, the body mass index was 78.2 ± 12.7 in ischemic stroke and 69.9 ± 15.6 in hemorrhagic stroke. The most common comorbidity in patients was hypertension [41 (60%)]. The median number of chronic diseases was 2. Most of the patients 46 (67%) were patients with a history of living in the

urban area (Table-1). We found the total number of patients needed for mechanical ventilation as 50(73.5%). While 34 (68%) of these patients were ischemic stroke, 16 (32%) were of hemorrhagic stroke. We found the median duration of stay in intensive care as 16.5 days and interquartile range (IQR) 2 to 30 days in ischemic patients.

The length of stay in the intensive care unit was 19.5 days in the hemorrhagic stroke, and the IQR was 5-30 days.

Discussion

From this study we conducted as a single-center study in Turkey, we have obtained the data about the patients stayed in MICU with the diagnosis of stroke. We found the ratio of

Table-1. Demographic data and mortality rates of patients

Variables	Stroke (n:68)	Ischemic stroke (n:48)	Hemorrhagic stroke (n:20)
Age, mean±sd	79±7,9	80,4± 7,7	80,8±8,4
Height, mean±sd	166,6±9,4	167,2±9,1	165,2±10,2
Bmi, mean±sd	75,8±14,1	78,2±12,7	69,9±15,6
Gender, male, n(%,)	68 (100)	37 (54,4)	31 (45,6)
Ethnicity, n(%) Turkish Kurdish Arabic	46 (67,6) 13 (19,1) 9 (13,2)	36 (75) 6 (12,5) 6 (12,5)	10 (50) 7 (35) 3 (15)
Place of residence, n(%) City Rural area	46 (67,6) 22 (32,4)	35 (72,9) 13 (27,1)	11 (55) 9 (45)
Income, n(%) <1604 1604-3000 3000-5000 > 5000	34 (50) 21 (30,9) 9 (13,2) 4 (5,9)	24 (50) 13 (27,1) 7 (14,6) 4 (8,3)	10 (50) 8 (40) 2 (10) 0 (0)
Comorbid disease, median (IQR)	2 (0-7)	2 (0-7)	1 (0-5)
Subtype of stroke, n(%) Cardioembolic Great vessel Unknown	21 (45,8) 5 (10,4) 22 (45,8)	21 (45,8) 5 (10,4) 22 (45,8)	- - -
Subtype of stroke, n(%) Intracerebral hemorrhage Subarachnoid hemorrhage	5 (25) 15 (75)	- -	5 (25) 15 (75)
The length of stay in ICU, median (IQR)	17 (2-30)	16,5 (2-30)	19,5 (3-30)
Number of days connected to mechanical ventilation, median (IQR)	4 (0-30)	4 (0-30)	3,5 (0-20)
Mortality	24 (35,3)	16 (23,5)	8 (11,8)

Abbreviations: IQR: inter quartile range. Place of residence, n (%) city rural area

ischemic stroke in patients with stroke was 69.6%, and the ratio of hemorrhagic stroke was 29.4%. We found the ratio of mechanical ventilatory needs in patients stayed with stroke diagnosis was 73.6%. Of the patients who required mechanical ventilatory support, 32% were hemorrhagic stroke patients and 62% were ischemic stroke patients. We found the mortality ratio of 23.5% in ischemic stroke patients and 11.8% in hemorrhagic patients. In a study conducted in the Aegean region of Turkey, the mean age of patients was found 62.3 ± 12 years, and these results are lower than our study (6). This may be due to the longer stay of older patients in intensive care units. In the interstroke study conducted with 22 countries, the age difference between developed countries and underdeveloped countries was found, the average age of all countries was 62.2 years, 66.7 years in Western Europe, North America, Austria, 63.9 years in Eastern and Central Europe and the Middle East, 65.8 years in South America, 61.9 years in China, 59.6 years in South America, 56.6 years in Southeast Asia, 58.7 years in Africa. In underdeveloped countries, age was found quite low compared to developed countries (10). In our study, we found hypertension as the most common risk factor.

According to a Meta-analysis conducted in the underdeveloped and developing countries, hypertension was found to be the most common risk factor for stroke. The median value of hypertension was found at 36% (11). In a large-scale study in Europe, the median value of stroke was found 79% in Finland, 76.5% in Croatia, 65.4% in Italy, 77.2% in the Netherlands, 70.3% in Sweden (12). These values were higher than the value we found. In our study, we found 73.5% of the ratio

of patients connected to the mechanical ventilator. In a study they conducted in Erzurum, Arslan et al. (9) found the ratio of patients receiving mechanical ventilation support as 62.1%. The rate of patients receiving mechanical ventilator support is higher in our patients than in theirs. In contrast, the mortality rate in Arslan et al. (9) study is higher than in our study. In a study conducted in Lebanon, the 1-month mortality ratio was 14.1%. In a study conducted in Mongolia, a developing country, the mortality rate was found 25% (13). These ratios are close to our study's values. In a study conducted by Avan et al. (14) evaluated the frequency of stroke and its mortality internationally, and found increased stroke ratio in middle income developing countries and decreased in high-income countries. They found that the mortality rate decreased gradually in both group countries. Turkey is between the high-midlevel developing countries according to the World Bank (15). In high-income countries, the mortality of ischemic stroke in intensive care units was found 21% (16). This ratio is close to the ratio we found. In a study conducted in Spain, mortality ratio was higher in severe hemorrhagic stroke and was 46.7% (17). This ratio is higher than the ratio we found. In Africa, month mortality in ischemic stroke was found at 33%. The ratio was lower in hemorrhagic stroke and was found to be 18% (18). These ratios are close to the ischemic stroke ratios we found and are higher than the ratios of hemorrhagic stroke. In developed countries, ischemic stroke and hemorrhagic stroke mortality decreased more with the decrease of risk factors, and with the use of increased new techniques. In the middle and low level developing countries, the mortality ratio of ischemic stroke did not

increase, but the mortality ratio of hemorrhagic stroke increased (19). Our study is a study conducted in MICU. The infrastructure of neurological intensive care units is different from MICU's (20). This study may provide information about the patients admitted to the MICU's due to the shortage of neurological intensive care units. However, the results of this single-center study in a limited time need to be supported with larger-scale studies.

Our limitations regarding the study, this study is a single-center study. Therefore, there may be differences in risk factors arising from regional differences. The number of cases could be higher. Large-scale multi-center studies on this subject will be very precious.

Conclusion

We found the mortality rate of stroke patients admitted to MICU's close to those in developed countries and lower than in developing countries. But the mortality ratio in hemorrhagic stroke we found was lower than both in developed and developing countries. To generalize the results of this study, there is a need to supported larger-scale studies.

Conflict of Interest

The author declares that he has no competing interests.

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