

Stroke in Adults; a Monocentric Experience

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ORIGINAL RESEARCH ARTICLE

Abstract

Objective: Evaluation of the characteristics and the main features of patients with ischemic stroke.

Methods: We identified 1587 ischemic stroke patients recorded between 01.07.2017 and 30.06.2018 in archive of Emergency Department of Emergency University Hospital of Bucharest.

Results: 2.9% of cases had first stroke under the age of 45 years. The age of the patients was higher in the 2018 compared to 2017 groups, in both genders. The interval of time between hospital presentation and CT scan (123.16 min vs. 156,24 min, $p = 0,005$) were shorter in 2018 compared to 2017.

Women with hypertension and transient ischemic attack have the stronger risk of stroke when compared to men (O.R.=2,09, $p=0,005$). A previous stroke event was identified in 51,68% of patients. The highest risk of stroke recurrence, for both women (O.R.=6,25, $p<0,00001$) and men (O.R.=4,73, $p<0,00001$), was calculated for patients who had a history of both stroke and transient ischemic attack. Death was recorded for 14.49% of patients with stroke.

Conclusion: We highlighted some features of risk factors for stroke onset and evolution in Romanian patients with ischemic stroke.

Keywords: stroke, hypertension, diabetes, atrial fibrillation

I. INTRODUCTION

Stroke develops in long-lasting exposed patients to risk factors. The predisposition for stroke, its prevalence, as well as mortality presented significant variations in the last decades [1,2,3] which seems to be greatly affected by society, geographical regions and age [4,5,6]. Updated information regarding the predisposing factors is useful for improving prevention strategies and disease management. Despite of the progress achieved in last decades stroke remains an important worldwide cause of mortality and morbidity [7]. Its prevalence in Romania (3.3% in 2006) was considered to be several times higher than the global prevalence (0.2%) and age related [8,9].

The Romanian National Thrombolysis Protocol aimed to improve performance indices for management of patients with Acute Stroke who present to the Emergency Department (ED). Specific intravenous thrombolytic treatment for stroke was available in Emergency Department (ED) of University Emergency Hospital of Bucharest (UEHB) since 2014. It is estimated that this program and better recognition of the disease by the population may influence the characteristics of patients with stroke who present at the ED.

AIM

To estimate the characteristic of patients with ischemic stroke recorded in the ED of UEHB.

II. MATERIAL AND METHODS

This retrospective study covered all Romanian patients with ischemic stroke admitted to the UEHB, excepting those under the age of 18 and those with acute hemorrhagic stroke. Stroke diagnosis was based on clinical evaluation and native or angio-CT -scan. Based on date of hospitalized presentation these patients were distributed in 2017 (01.07 - 31.12.2017; $n = 819$) and 2018 (01.01-30.06.2018; $n = 768$) groups. Several traditional risk factors for stroke have been retrieved from the hospital archives with the ethics commission approval (Table 1). This study was conducted following the ethical principles of the Declaration of Helsinki.

Table 1. The characteristics of patients recorded at presentation to hospital (data are presented as median or percent values).

Gender	51,22	48,78
Age at onset	73,77±11,89	67,77±11,84***
BMI kg/m ²	27,34±5,29	26,57±5,13
Alcohol ^a	4,58 / 91,60 / 3,82	28,27 / 65,33 / 6,40***

Smokers ^a	14,5 / 82,70 / 2,80	41,07 / 57,60 / 1,33***
Patients with previous stroke	75,5±11,04	68±10,67
Awakens with stroke symptoms ^a	10,94 / 76,08 / 12,98	12,53 / 76,80 / 10,67
Pre-hospital interval (hours) ^b	11,40±7,05	11,16±7,12
Presented at hospital (0.00-7.59h / 8.00-15.59h / 16-23.59h)	8,85 / 53,26 / 37,89	15,37 / 52,07 / 32,56**
Autonomous / partially autonomous / dependent / not known	33,09 / 56,21 / 7,13 / 3,57	37,73 / 54,39 / 3,75 / 4,13*
Antiplatelets Aspirin / Clopidogrel ^a	31,04 / 65,39 / 3,56	30,13 / 68,27 / 1,60
Anticoagulants ^a	15,01 / 81,68 / 3,31	12,80 / 86,13 / 1,07
Statin ^a	23,92 / 72,77 / 3,31	27,20 / 71,73 / 1,07
Antihypertensive drugs ^a	65,39 / 31,30 / 3,31	49,33 / 49,33 / 1,33***
Beta-blockers ^a	40,97 / 55,47 / 3,56	31,73 / 67,20 / 1,07*

Statistical significance (the cases with "not known" variant of characteristic were not included in analysis): *p<0,05; **p<0,001; ***p <0,00001. ^a yes / no / not known; ^b Estimate for subjects who came at hospital in the first 24 hours after the onset of symptoms.

III. RESULTS AND DISCUSSION

A. Results

Most of the cases with ischemic stroke admitted to the ED of UEHB lived in Bucharest City and in Ilfov county (73.7%) whereas others had the residence in 17 other Romanian counties. The age of the patients from the 2018 was significantly higher compared to those from 2017 group (median age: 73±11.58 vs 71±12.77 years; p <0.05). In each of these groups the age of women was higher compared to that of men (2017: 66,88±11,90 vs 73,03±12,86; p <0,00001; 2018: 68,88±11,71 vs 74,56±10,71; p <0,0001).

At hospital presentation 2.96% (2.21% in 2018; 3.54% in 2017) of cases were under the age of 45 years old (young adults). The percent of autonomous subject at hospital presentation was higher in 2018 than in 2017 in both genders (women: 61.83 vs 6,19%; men: 70,67 vs 6,77%, p<0,00001). In addition, the comorbidities were not similarly distributed in patients from 2017 and 2018 groups (Table 2, Table 3).

Table 2. Percent distribution of DM, AF, HT, stroke and TIA in 2018 and 2017 subgroups of subjects stratified by gender (the analysis excluded cases for which these data were not available).

Comorbidities	Women 2018	Women 2017	Men 2018	Men 2017
DM	24,05	38,79	25,8	39,39**
AF	17,3	37,1*	24,4	25,15

HT	64,32	32,15*	75,4	22,18*
Stroke	22,7	85,04*	19,31	82,67*
TIA	2,43	32,46*	2,91	30,93*

Statistical significance: *p<0,001; **p <0,0001.

Table 3. Percent distribution of comorbidities and the risk of stroke for patients stratified according to gender (the analysis excluded cases for which these data were not available).

Comorbidities	Women	Men	Statistical differences
DM and AF	15,89	9,95	O.R.=1,71; 95%CI: 1,13-2,58*
DM and Stroke	34,58	33,74	n.s.
DM and TIA	11,54	8,50	n.s.
DM and HT	36,61	26,25	O.R.=1,62; 95%CI: 1,17-2,25**
AF and Stroke	31,50	23,41	O.R.=1,5; 95%CI: 1,1-2,06*
AF and TIA	9,21	5,81	O.R.=1,64; 95%CI: 1,01-2,66*
AF and HT	38,93	24,88	O.R.=1,92; 95%CI: 1,44-2,57***
Stroke and TIA	22,47	20,58	n.s.
Stroke and HT	56,52	43,17	O.R.=1,71; 95%CI: 1,21-2,42**
TIA and HT	15,44	8,01	O.R.=2,09; 95%CI: 1,25-3,53**

Statistical significance: *p<0,05; **p <0,01; ***p <0,00001; n.s.= not significant.

Transient ischemic attack (TIA), diabetes mellitus (DM) and atrial fibrillation (AF) significantly increased the risk of stroke recurrence in both man and women (Table 4).

Table 4. The risk of recurrent stroke in patients which have DM, AF or TIA (the analysis excluded cases for which these data were not available).

Disease	Previous stroke	First stroke	Statistical differences
Women with DM	40,44	23,29	O.R.=2,24; 95%CI: 1,62-3,08**
Women with AF	35,10	24,93	O.R.=1,63; 95%CI: 1,19-2,25*
Women	42,31	69,36	O.R.=0,32; 95%CI: 0,24-

with HT			0,44**
Women with TIA	27,55	5,74	O.R.=6,25; 95%CI: 3,8-10,27**
Men with DM	39,09	22,35	O.R.=2,23; 95%CI: 1,6-3,1**
Men with AF	26,21	14,00	O.R.=2,18; 95%CI: 1,49-3,21**
Men with HT	37,03	54,97	O.R.=0,48; 95%CI: 0,35-0,66**
Men with TIA	24,08	6,29	O.R.=4,73; 95%CI: 2,88-7,76**

Statistical significance: *p<0,01; **p<0,0001.

Pre-hospital interval for subjects who arrived at hospital in the first 24 hours after the onset of stroke symptoms (median 11,26±7,29 hours) was shorter in 2018 compared to 2017 (median 4,29±6,18 vs 14,35±6,25 hours, p<0,00001). It was similar in women and men from the 2018 (median 4,12±6,32 vs 4,44±6,04, p>0,05) or 2017 (median 15,06±6,38 vs 14,13±6,10, p>0,05) groups. The proportion of patients who arrived at hospital in the first 4 hours after the onset of symptoms significantly increases in 2018 compared to 2017 (46,36% vs 8,30%, p<0,00001).

Interval of time between hospital presentation and CT scan was statistically significantly shorter in 2018 compared to 2017, in both male (median interval: 62±211,20 vs 81±265,12 min, p<0,00003) and female (59±236,14 vs 84±219,14 min, p<0,00001) and also in autonomous (median: 58±224,43 vs 123±332,25 min; p<0,00004) or in partially autonomous (median: 63±218,33 vs 80±229,65 min, p<0,001) patients. The percent of patients for which this interval exceeded 4 hours decreased significantly in 2018 relative to 2017 (9,42% vs 14,41%, p=0,002).

Stroke led to death of 14,49% of investigated patients. The men who died from the 2018 were significantly older (77,42±9,90 vs 69,97±10,98 years, p=0,002) and had more frequent hypertension (HT) (61,40% vs. 41,30%, p<0,05) than those from 2017. HT was more common in men who died in 2018 than in 2017. Other comorbidities (e.g. atrial fibrillation, DM or previous stroke) were similarly distributed in men from these groups.

Death of women with stroke from 2018 and 2017 groups occurred at similar ages (average: 79,84 vs. 79,91 years, p>0,05). They had a more frequent history of stroke (29,21% vs 13,04%, O.R. = 2,75, 95% CI: 1,04-7,27, p<0,05) and less frequently AF (atrial fibrillation) (28,09% vs 50%, O.R. = 0,39, 95% CI: 0,19-0,82, p<0,05) compared to the 2017 group. History of HT and DM were similar in the 2018 and 2017 groups.

B. Discussion

Stroke prevalence, management and evolution present significant worldwide differences, especially between countries with different degrees of economic development. Ischemic stroke represents 80-85% of all cases of stroke recorded worldwide.

We conducted a retrospective study to acquire new knowledge about the characteristics of ischemic stroke in

Romanian patients hospitalized in UEHB between 01.07.2017 and 30.06.2018. Women were statistically older compared with men from 2018 (74,56 vs 68,88 years old; p<0,0001) or 2017 (73,03 vs 66,88 years old; p<0,00001) groups. The cases of stroke under the age of 45 years identified in our study (2.9%) are much rarer than those reported for other populations (6.4%-15%) [10,11,12].

The onset of stroke symptoms was detected at home for 88.93% of cases (91.35% women vs 86.40% in men, p<0,05). Lifestyle (e.g. smoking and drinking habits) and cardiovascular treatments before the onset of stroke symptoms showed significant differences related to the patients' gender (Table 1).

DM, AF, HT or a previous episode of ischemic stroke, independent or in association with other risk factors, increase the risk for stroke several times and can predispose to more disabling forms of disease [13,14,15]. Concordant results were observed in our study. A significant percent of patients from UEHB had a previous stroke (51.68%) or DM (31.67%). In our group the patients with both AF and ischemic stroke (25.81%) was more frequent than in patients from USA (20.76%) [16]. Pavaloiu (2017) estimated that high blood pressure represents the most frequent risk factor that was present in 73% of patients with stroke. In our study this risk factor was present in 51.08% of patients with ischemic stroke. Women with both HT and TIA have a higher risk of stroke when compared to men (O.R.=2,09, p=0,005) (Table 3). Patients who had a history of both stroke and TIA had the highest risk of stroke recurrence in both women (O.R.=6,25, p<0,00001) and men (O.R.=4,73, p<0,00001) (Table 4).

More than half (52.68%) of the subjects included in the study arrived at the hospital between 8.00-15.59 and the fewest (12.04%) presented between 0-7.59 hours interval. Neither in the subgroup of men, nor in the subgroup of women there were not noticed significant age differences between the subjects that occurred in the three-time intervals of the day. These results are partially in accordance with previous reports that indicated that the highest incidence of all type of stroke occurs during the morning (6.01-12.00) and the minimum values occurs during the night (00.01-06.00) [17].

In patients admitted at hospital in the first 24 hours after the stroke onset the pre-hospital interval decreases significantly in 2018 compared to 2017 subgroup in men (median time 117,04 vs 165,23 min, p = 0,006) but not in women (median time 129,44 vs 148,09 min, p>0,05). Other researchers also stressed out that after onset of stroke women presented later to the ED [18,19,20]. The proportion of patients arrived at hospital in the first 4 hours after the onset of symptoms significantly increases in 2018 than in 2017 (46.36% vs 8.30%, p<0,00001).

The time between presentation and CT scan was significantly shorter in 2018 compared to 2017 (median: 60 vs. 83 min, p<0.00001). It was also observed that the percent of patients for which this interval exceeded 4 hours decreased significantly in 2018 relative to 2017 (9,42% vs 14,41%, p=0,002). The time between presentation and CT were not influenced by gender, degree of autonomy at hospital

presentation or age of patients, as it was reported in some studies [21]. The assiduous concern of ED medical staff to quickly recognize the signs and symptoms suggestive for an acute stroke, to place these patients in the red triage code and to perform the necessary clinical consultation and paraclinical investigations (e.g. blood tests, EKG, CT scan) are elements that can contribute to the differences observed between 2017 and 2018. The pre-hospital interval and early diagnosis of stroke are of great importance for clinicians because the therapeutic window is narrow. It was speculated that decreasing the interval between presentation and CT could shorten the time to start the thrombolytic treatment. However, some data indicated that in ED it is not a suitable marker for eligibility of patients to treatment or for estimated the quality of stroke treatment [22].

Stroke is one of the most important cause of disabilities (up to 30% of patients are permanently disabled after their stroke) and death (especially for people older than 60 years of age) [22,23,24]. In our group 5.7% of patients were disabled at presentation; the percent was significantly higher in subgroup of women than in men (7.13% vs 3.75%, O.R.=1,96, p<0,01).

The mortality attributed to stroke in Romania was reported previously to be several times higher than in other countries and the ischemic stroke crude mortality rates during 1994-2017 was 10,9 [9,25]. The in-hospital mortality calculated for this study (14.49%) is in the range of values reported by other researchers [26,27].

A high number of factors can influence in hospital mortality of patients with stroke. In our group the percent of in-hospital deaths was much higher in 2018 than in 2017 (19.01% vs 10.26%; p<0.00001), in both genders. The men who died were significantly older (77.42 vs 69.97 years, p<0.01) and were more frequent hypertensive (61.40% vs. 41.30%, p <0.05) in 2018 than in 2017 group. Deceased women in the 2018 group had a more frequent history of stroke (29.21% vs 13.04%, p<0.05). The administration of intravenous thrombolytic treatment represents a very important step for the evolution of patients with acute ischemic stroke, regarding quality of life, as well as their survival. This treatment was constantly applied since 2014 in UEHB and since the year 2018 it was applied the National Protocol for Intravenous Thrombolysis, developed by the Romanian Society of Neurology.

IV. CONCLUSION

We investigated data of a relatively homogenous group of patients with ischemic stroke that was admitted to the UEHB between 01.07.2017 - 30.06.2018. The analysis of hospitalized cases highlighted some features of risk factors for stroke onset and evolution (e.g. gender, age at onset, comorbidities). It should be mentioned that in our group 5,7% of patients were disabled at presentation, 2,96% were young adults and a history of both stroke and TIA confers the highest risk of stroke recurrence.

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