The Relationship between Age and Affected Cerebral Vessels in Ischemic Stroke Patients

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Cite this article as: Çınarlık MA. The Relationship Between Age and Affected Cerebral Vessels in Ischemic Stroke Patients. Eurasian J Emerg Med 2017; 16: 162-4.

Abstract

Aim: This study aimed to analyze the relationship between the age and the radiological findings in patients who admitted to University of Health Science Okmeydani Training and Research Hospital Emergency Department with cerebrovascular disease between January 2015 and January 2016. Ischemic stroke has a major importance due to its high mortality and morbidity. Ischemic stroke is the third leading reason of deaths in the world. It is also an important reason for long-term disability besides mortality.

Materials and Methods: This study is a retrospective study and covers 352 patients who admitted to our Emergency Department with cerebrovascular disease between January 2015 and January 2016.

Results: Patient information system was searched as covering the study period. Information of age and radiologically affected cerebral artery at first admission were recorded. Obtained data were recorded in study form. With our analysis, we detected meaningful relationship between the age and the posterior circulation ischemic stroke. The study was performed with 352 patients in University of Health Science Okmeydani Training and Research Hospital between January 2015 and January 2016. Quantitative data were reported as average ± standard deviation; and categorical data were reported as number or percentage. In all statistical analysis, $p<0.05$ was accepted as statistically meaningful difference. SPSS 22 for Windows was used for statistical analysis.

Conclusion: In our study, we detected a meaningful relationship between the age and the posterior circulation ischemic stroke similar to the literature. Additionally, in the result of our study, we detected posterior circulation strokes are younger than middle cerebral artery and anterior cerebral artery strokes.

Keywords: Age, cerebrovascular circulation, ischemia, stroke

Introduction

Stroke stands for a focal neurologic syndrome that occurs suddenly due to cerebrovascular disease (1). World Health Organization defines stroke as "Suddenly occurred symptoms due to focal or global malfunctions of cerebrum that might result in death" (2, 3). Almost 80%–85% of stroke cases are with ischemic origin, and 10%–15% of them are hemorrhagic (2).

Despite all successful improvements of its treatment, acute stroke is still the third most common reason of mortality and morbidity after heart diseases and malignancy (3, 4). Besides its mortality, it causes economic and psychosocial outcomes that affect individuals, families, and communities. For these reasons, prevention and treatment of stroke is an important public health problem.

Risk factors of ischemic cerebral vascular diseases such as diabetes mellitus, hypertension, atrial fibrillation, smoking, and coronary artery diseases are well-defined by too many international multicentric researches (5).

Recent studies suggest new approaches to acute ischemic stroke in early stages that decrease rates of mortality and morbidity due to

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Received: 13.05.2017 • **Accepted:** 25.05.2017 • **Available Online Date:** 09.10.2017
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DOI: 10.5152/eajem.2017.07269

stroke, and we assume that knowing the effects of risk factors on prognosis and treatment of acute strokes will contribute to decreasing mortality and morbidity levels of patients who are managed in the emergency department.

There are several studies on all the risk factors, but there is limited source of studies that shows the relationship between age and affected vessels in ischemic stroke.

In this study, we aimed to analyze the relationship between age and the affected cerebral vessels by using both clinical records and radiological findings in patients who admitted to our emergency department with ischemic stroke between January 2015 and January 2016.

Materials and Methods

Patients admitted to our training and research hospital emergency department between January 2015 and January 2016 who has one of the I63, I64, I65, I66, I67, I68, I69, and G46 diagnoses codes inside ICD-10 medical coding system were included in this retrospective study. Approval was obtained from the Institutional Ethics Board before beginning the study.

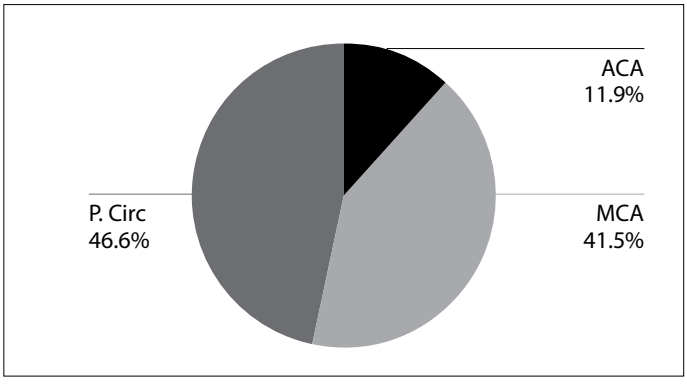

Figure 1. Image showing affected vessels' distribution in ischemic stroke
P. Circ.: Posterior Circulation; ACA: Anterior Cerebral Artery; MCA: Middle Cerebral Artery

Hospital electronic medical record system and hospital archive files were used to get information about patients' clinic and radiologic findings. All patients older than 18 years and diagnosed and coded to ICD-10 system with ischemic stroke were included in this study.

Patients diagnosed with hemorrhagic infarct were excluded. Patients who had no radiological finding on their diffusion magnetic resonance imaging (MRI) imaging and whose ischemic lesion could not exactly define which cerebral vessel it belongs to were also excluded. Some of the patients had more than one cerebral vessel affected and hence were excluded from this study.

Under these certain criteria, included patients were grouped as: anterior cerebral artery (ACA) affected, middle cerebral artery (MCA) affected, and posterior circulation (P. Cir.) affected.

Statistical analysis

Statistical analysis was performed by using IBM Statistical Package for the Social Sciences (IBM SPSS Statistics, Armonk, NY, USA) 22 for Windows. The normality of distribution was assessed with Shapiro–Wilks test. To compare groups, the Mann-Whitney U test was used for the analysis of non-parametric continuous variables. The Pearson correlation test was used for the detection of correlation between quantitative variables. Chi-square test was used for the detection of correlation between qualitative variables. The cut-off values of parameters were identified using the analysis of receiver operating characteristic (ROC) curves for the differentiation of groups. For all statistical tests performed, $p<0.05$ was considered to be statistically significant.

Results

For the time period of our study's retrospectively analyzed data, between the age of 20 and 95 years, 352 patients were admitted to our emergency department with diagnosis of acute ischemic stroke and were included in our study according to the inclusion criteria.

A total of 164 (46.6%) of the analyzed stroke patients had affected vessel in P. Cir, 146 (41.5%) had MCA affected, and 42 (11.9%) had ACA affected. Median age of patients was 70 years (Figure 1).

Table 1. Relationship between age and affected vessels in ischemic stroke

				ACA			MCA			P.CIRC.		p
Age		Mean±SD		71.3±13.2			68.4±13.9			65.2±14.4		
		Med (Min-Max)	75	36.0-88.0		70	24.0-95.0		66	20.0-94.0		0.010
Age	20-29	n-%		0	0.0%		3	2.1%		1	0.6%	
	30-39	n-%		1	2.4%		1	0.7%		4	2.4%	
	40-49	n-%		3	7.1%		10	6.8%		22	13.4%	
	40-59	n-%		3	7.1%		21	14.4%		28	17.1%	
	60-69	n-%		7	16.7%		34	23.3%		38	23.2%	
	70-79	n-%		15	35.7%		40	27.4%		39	23.8%	
	80-89	n-%		13	31.0%		32	21.9%		29	17.7%	
	90 ≤	n-%		0	0.0%		5	3.4%		3	1.8%	

Kruskal-wallis (Mann-Whitney U test). P. Circ.: Posterior Circulation; ACA: Anterior Cerebral Artery; MCA: Middle Cerebral Artery

The ACA-affected group had the highest median value of age with 75, followed by the MCA-affected group with a median value of 70. The P. Cir group had the lowest median value with 66. Results of statistical analyses of the data showed that ages of P. Cir patients were significantly lower than ages of both the MCA and ACA patients ($p<0.05$) and that the ages of the MCA-affected patients were significantly lower than ACA-affected patients ($p<0.05$) (Table 1).

Discussion

It is a fact that more than 70% of stroke patients are older than the age of 65 years (6). In several studies, the mean value of stroke patients' ages was analyzed. It was found to be 70±11 years by Yoneda et al. (7), 65.3±8.2 years by Reganon et al. (8), 64±3 years by Williams et al. (9), 63.5±13.6 years by Hakbilir et al. (10), and 68.6±14.6 years by Gürger at al. (11) Our study supported these numbers with mean age value of 67.3±14.2 years.

Although according to a study made by Kumral et al. (12) in 2002, the MCA-affected group were two-thirds of all analyzed patients, and it is responsible for 90% of anterior circulation infarcts; in our study, MCA-affected patients were only 41.5% of all ischemic stroke patients. Unlike this particular study, the ACA-affected group had the highest mean value of age with 71.3±13.2 years. In the same study, isolated ACA-affected patients were 3%, but in our study, ACA-affected patients had higher rate among all ischemic stroke patients with 11.9%.

Musolino et al. (13) found that P. Cir infarcts ratio among young adult patients were significantly higher than older patients. Our findings supported that study. We found that mean age value of P. Cir–affected ischemic stroke patients was 65.2±14.4 years and just like the study referenced above, P. Cir–affected patients were significantly ($p<0.05$) younger than ACA- and MCA-affected patients.

Study limitations

The limitations of this study were in common with other radiological imaging–based studies. Difficulty to have exact definitions of some radiological images and poor quality of imaging due to multiple factors have limited our study.

Conclusion

Our study showed that younger ischemic stroke patients are much likely to have their P. Cir cerebral vessels affected. After all neurological examinations made, emergency physicians should keep in their minds that it is much possible for younger patients to have P. Cir infarcts, and due to its higher mortality and morbidity, clinical decisions have to be made quickly.

Although there are several numbers of studies that are based on clinical findings of ischemic stroke patients, there are very limited isolated studies that analyzed affected vessels according to radiological findings. And some significant differences were observed between our study and referenced studies above. So, it is required to make more studies that are based on radiological finding instead of clinical findings to have a common idea about ischemic stroke patients.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of University of Health Science Okmeydanı Training and Research Hospital.

Informed Consent: Informed consent is not necessarry due to the restrospective nature of this study.

Peer-review: Externally peer-reviewed.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

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