



CAROTID ATHEROSCLEROTIC DISEASE AND RISK FACTORS IN PATIENTS WITH ISCHEMIC STROKE – STUDY REPORT –

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Keywords: ischemic stroke, carotid atherosclerosis, stroke risk factors

Abstract: Ischemic stroke (IS) is the second frequent vascular disease after myocardial infarction, with different clinical and etiological aspects and various risk factors. Large vessel atherosclerotic disease is the most frequent IS causing pathology, followed by cerebral microangiopathy and cardioembolic events. Cervical arteries Doppler ultrasonography helps identifying the subtype of IS, and by revealing the vascular status of the patient, guides the therapeutic decision and secondary IS prevention. The aim of this paper is to present the results of an observational, retrospective, analytical study on a number of 174 patients with acute IS evaluated by Doppler carotid ultrasound in CVASIC Research Centre of Academic Emergency Hospital of Sibiu from January to December 2018. **Materials and methods:** All patients with IS admitted in our centre received a Doppler carotid ultrasound evaluation. We observed the degree of carotid stenosis, presence of atherosclerotic risk factors and their influence. **Results:** The mean age of patients was 71.3 years (36 to 92 years range). 16 (9.19%) patients presented occlusion of internal carotid artery (ICA) on the same side as stroke, 37 (21.26%) had severe carotid stenosis (>70%), 31 (17.81%) presented moderate stenosis (50-70%), the remaining patients had mild or no stenosis. 129 (74,13%) patients presented arterial hypertension, 51 (29.31%) patients had diabetes mellitus, 14 (8.04%) were smokers, 81 (46.56%) had dyslipidemia. **Conclusions:** A large number of patients had severe carotid stenosis and occlusion. The most common risk factor was arterial hypertension, followed by dyslipidemia and diabetes mellitus. Continuous medical education of population at risk regarding good nutrition principles and healthy lifestyle are needed to reduce the social costs of ischemic stroke.

INTRODUCTION

Stroke represents one of the leading causes of morbidity and mortality worldwide. In particularly, ischemic stroke (IS) is second frequent vascular disease after myocardial infarction, with different clinical and etiological aspects and various risk factors. Large vessel atherosclerotic disease is the most frequent IS causing pathology, followed by cerebral microangiopathy and cardioembolic events.(1)

Cervical arteries Doppler ultrasonography helps identifying the subtype of IS, and by revealing the vascular status of the patient, guides the therapeutic decision and secondary IS prevention.(2)

Severe and moderate carotid stenosis (more than 50% stenosis) is a common finding, affecting one in five patients presenting with ischemic stroke or transient ischemic attack. A careful multidisciplinary team discussion (neurologist, cardiologist, vascular surgeon specialist team) may avoid unnecessary intervention and should be the standard of care.(2,3)

AIM

The aim of this study was to evaluate the role and impact of carotid artery atherosclerotic disease in the cerebral stroke's etiopathology, as well as conducting a detailed analysis of vascular risk factors encountered in these patients.

The causal relationship between the risk factors and severity of atherosclerosis of cervical-cerebral blood vessels was also an objective in this case study.

MATERIALS AND METHODS

We conducted an observational, retrospective, analytical study of all 174 patients with acute IS admitted in CVASIC Research Centre of Academic Emergency Hospital of Sibiu from January to December 2018.

In all patients we performed a standardised Doppler carotid ultrasound evaluation. Also, all the patients received a careful and detailed evaluation of their risk factors and personal antecedents regarding earlier cardiac ischemic or cerebral events.

The primary objective was to establish correlations between the degree of atherosclerotic large vessel disease and localization of stroke. The secondary objective was to determine possible casualty links between vascular risk factors, carotid damage severity and stroke extend.

RESULTS

The average age of the 174 patients with ischemic stroke who were investigated using ultrasound was 71.3 years with a minimum of 36 years and a maximum of 92 years. The ischemic stroke occurred most frequently in patients above 60

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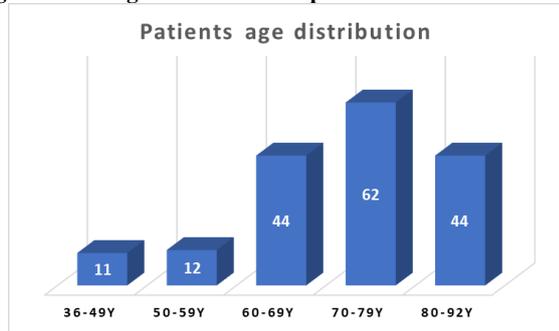
Article received on 12.10.2019 and accepted for publication on 02.12.2019

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years, the highest level of incidence being noticed in the eighth decade with a number of 62 patients.

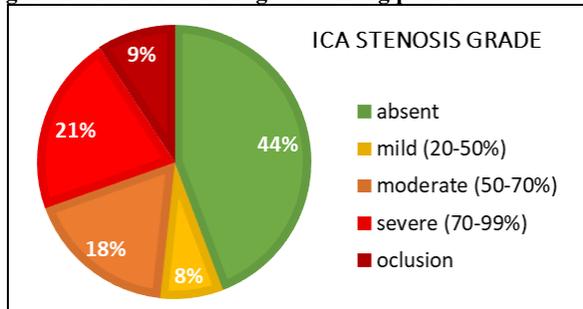
The distribution by gender was equal M:F=1:1 and the distribution according to their origin was urban:rural=1,1:1. Location of the ischemic stroke was on the right side for a number of 72 patients (41,37%) and on the left side for a number of 102 patients (58,62%).

Figure no. 1. Age distribution of patients with stroke



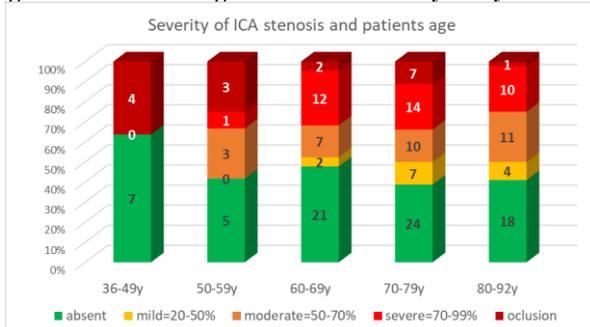
On the same side as stroke, 16 (9.19%) patients presented occlusion of internal carotid artery, 37 (21.26%) had severe carotid stenosis (>70%), 31 (17.81%) presented moderate stenosis (50-70%), the remaining patients had mild or no stenosis.

Figure no. 2. ICA stenosis grade among patients



A number of 10 (5.74%) patients presented an internal carotid artery (ICA) severe stenosis on the contralateral side of stroke, while 24 (13.8%) patients presented a moderate stenosis. The cumulative analysis relating the level of carotid stenosis and patient's age indicated an increase in vascular impairment directly proportional with age.

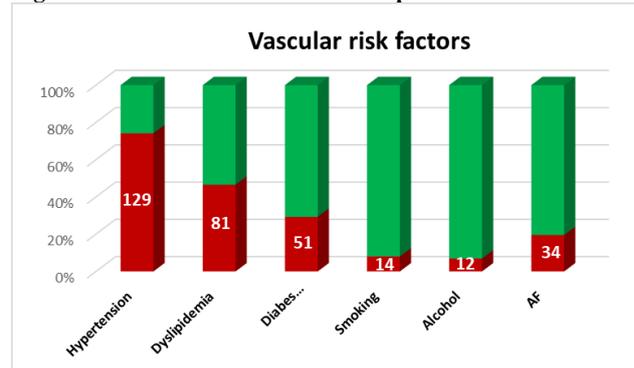
Figure no. 3. Patient age vs. stenosis severity analysis



Vascular risk factors were most common, 129 (74,13%), dyslipidemia 81 (46,56%), diabetes mellitus 51 (29,31%), smoking 14 (8,04 %) etc. (figure no. 4)

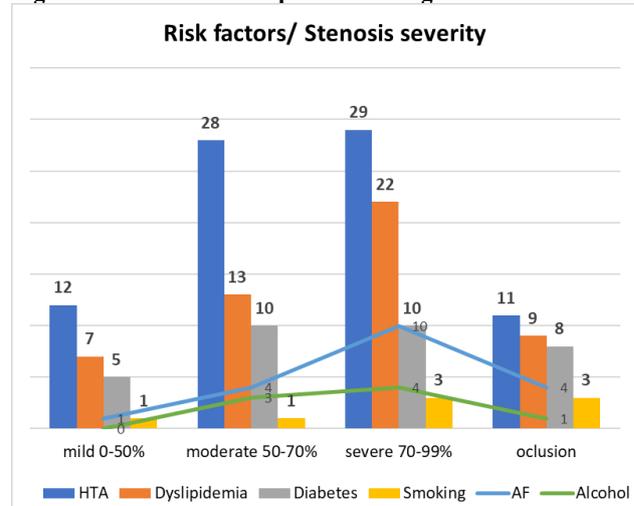
A number of 51 (29,31%) patients presented in their history ischemic stroke, 12 (6,89%) patients anterior myocardial infarction. 12 patients were evaluated as "overweight" (body mass index –BMI >30).

Figure no. 4. Vascular risk factors in patients



Analysing the incidence of vascular risk factors encountered and their relation with the stenosis grade of the patients, we observed the high probability of those to present arterial hypertension, dyslipidemia, diabetes mellitus as they have a higher degree of vascular damage. Patients with carotid occlusion had another risk factors profile what was expected considering particular aspects of this pathology.

Figure no. 5. Risk factors profile and degree of stenosis



DISCUSSIONS

Almost 10% of the patients included in our study presented an ICA occlusion on the same side/ipsilateral and a fifth of them presented a severe stenosis (over 70%) of the symptomatic ICA according to international recommendations. Approximately 45% of the patients presented stenosis, over 50% on the ICA on the same side of the ischemic stroke.

Our study data sustains and confirms the conclusions of other research teams that show large-vessel atherosclerosis being an important cause of stroke, with cervical ICA stenosis being significantly more common than cervical ICA occlusion or intracranial atherosclerotic disease.(2)

In our study, like in other studies, stroke attributed to extracranial ICA occlusion occurs at approximately half of the rate of stroke due to severe ICA stenosis.(2)

In a study on about 2707 patients published in 2019, Cheng and collaborators, found significant stenosis (higher >50%), in almost 19% of investigated patients. To mention that almost half of the investigated patients were asymptomatic, in those who were symptomatic (with stroke) carotid stenosis taken into consideration was ipsilateral and contralateral.(3)

The high percentage of symptomatic patients with moderate-severe carotid affectionation can also be a limitation of

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our study due to a rigorous selection of patients with stroke reaching our centre.

The age of patients was correlated with the severity of cervical artery lesions. A high incidence of moderated and severe stenosis was observed among patients aged between 60-89, the probable cause being atherosclerosis. Furthermore, it was observed a high number of ICA occlusion on the same side as the ischemic stroke among relatively young patients aged between 40-60 years, the cause was in most cases artery dissection.

Similar to data found by other researchers, we observed that patients with significant carotid stenosis were more likely to have hypertension, hypercholesterolaemia, diabetes and ischaemic heart disease.(2,3)

Those pathological associations with synergic effect on the development of atherosclerosis on large vessels results in current strategies of curative treatment and secondary prevention of ischemic stroke.(4,5)

For the secondary prevention of ischemic stroke, the last guide of Romanian Society of Neurology (after ESO GUIDE 2008) specifies (recommendations Class I Level A):

- It is recommended for patients to receive antithrombotic/antiplatelet therapy;
- Where it is possible, it should be administered the following combination: aspirin+dipyridamole or clopidogrel given alone. Aspirin given alone or triflusal given alone can be an alternative;
- The combination between aspirin and clopidogrel is not recommended for patients who suffered a recent AVCI, except for the patients with specific indications.
- Endarterectomy is recommended for patients with a stenosis percentage between 70-99% in centres where the complication rate is below 6%.
- Angioplasty or stenting are recommended for selected patients.(6, 7)

CONCLUSIONS

A large number of patients with acute ischemic stroke had severe carotid stenosis and occlusion.

In the relatively young patients (under 60 years old), the carotid occlusion has been caused by arterial dissection.

In the patients aged over 60 years old, the incidence of atherosclerotic carotid stenosis increased. The most common risk factors for large vessel atherosclerotic disease were arterial hypertension, followed by dyslipidemia and diabetes mellitus.

Continuous medical education of population at vascular risk regarding good nutrition principles and healthy life style are needed to reduce the social costs of ischemic stroke.

There is needed for better therapeutic strategies to be implemented in our clinic regarding medical management of the patients with stroke to improve the quality of recovery and as well the quality of our patient's life after stroke.

Conflict of interest

There is no conflict of interest for any of the authors regarding this paper.

Informed consent

An informed consent was obtained from the patient included in this study.

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