



Original Research

The Review of Transient Ischemic Attack Patients: An Experience of a Clinic about Diagnosis and Follow-up

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Abstract

Objectives: Transient Ischemic Attack (TIA) is due to a temporary lack of adequate blood and oxygen to the brain. TIAs typically last less than 24 hours. 10-15% of ischemic stroke patients have a history of TIA. 18% of them experience an ischemic stroke within 90 days, and the ABCD2 scoring system is used to estimate the risk. Our study aims to investigate the risk factors, the etiology, the lesion occurrence on MRI and the near-term risk of stroke of patients on whom TIA was diagnosed.

Methods: In this study, 124 patients were included between January 2012 and January 2018. Sixty-eight of the 124 patients were male. The history of patients was questioned; systemic and neurological examinations were made. The stroke risk factors and TIA duration were noted and ABCD2 scores were calculated. All the patients' blood samples, including glucose and lipid profile, were studied. They received CT, DWI MRI, electrocardiography, transthoracic echocardiography, ultrasound and/or MR angiography of the cervical arteries.

Results: One hundred twenty-four patients were included in this study, and 56 patients were female. The mean age was 63.04 ± 16.77 . Hypertension was the most common risk factor (50.8%). Twenty-seven patients were on antithrombotic; six patients were on anticoagulant therapy, while 91 patients were not receiving any antiaggregant therapy. ABCD2 scores were significantly higher on the antithrombotic therapy group ($p=0.019$). In 52 patients ABCD2 score was below 4, and in 72 patients, the score was greater than 4. In 67.7% of patients, no etiology was found. An ischemic lesion was detected in 16.9% of the patients. 58 % of the patients were discharged on anticoagulant therapy. Five patients developed ischemic stroke.

Conclusion: The risk factors of ischemic stroke and TIAs are similar factors. The etiology of TIAs cannot be found out in most of the patients. Thus, the patients are discharged with oral anticoagulant treatment.

Keywords: Stroke; transient ischemic attack; therapy.

Please cite this article as "Kılıç Çoban E, Senadım S, Yılmaz A, Küçüköğlü H, Köksal A, Ataklı D, et al. The Review of Transient Ischemic Attack Patients: An Experience of a Clinic about Diagnosis and Follow-up. Med Bull Sisli Etfal Hosp 2020;54(1):83–87".

Transient ischemic attack (TIA) is an entity characterized by short-term symptoms of acute, focal cerebral or monocular dysfunction that develops due to insufficient blood flow. Generally, episodes lasting less than 24 hours are considered as TIA. TIA is present in 10-5% of patients with ischemic stroke.^[1-4] Eighteen percent of these patients

experience a stroke within the first three months and half of them within the first 48 hours.^[5] The importance of this condition is that secondary prophylactic therapies to be initiated can prevent stroke. Therefore, the risk of near-term stroke in patients is determined by ABCD2 scoring (age, blood pressure, type of TIA, duration) after TIA, so possible

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Submitted Date: March 21, 2018 **Accepted Date:** June 22, 2018 **Available Online Date:** March 25, 2020

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secondary prevention and treatment of patients can be performed.

The pathophysiological mechanism that causes permanent loss of neurological function in stroke is similar in TIA. Therefore, the process of planning and initiating the examination and treatment in TIA should be performed as rapidly as possible.

Neuroimaging plays an important role in the diagnostic evaluation of the transient ischemic attack. Since the symptoms of TIA are short-lived, the probability of detecting normal computed tomographic findings is very likely.^[6] Although Magnetic Resonance (MR) is an expensive modality, it has a higher diagnostic sensitivity. According to the classical definition, the infarct area has been shown in 46-81% of patients diagnosed with TIA.^[7,8]

Our aim in this study is to reveal the risk factors in TIA patients, to review the tests that can be performed to identify the etiology, to reveal the presence of lesions and to determine the frequency of strokes developed during the 90-day follow-up of the patients.

Methods

A total of 124 patients, including 68 (54.8%) males, and 56 (45.2%) females, between 29-93 years of age, who were admitted to our hospital between January 2012 and January 2018 with a diagnosis of TIA, were enrolled in this study.

Patients with a focal neurological deficit that resolved within 24 hours without any explicable reasons other than cerebrovascular events were considered as having TIA. Detailed anamnesis was obtained from all patients who applied to our hospital with TIA symptoms for the first time, and their neurological and systemic examinations were performed.

Duration of TIA, presence of Diabetes Mellitus (DM), admission systolic and diastolic blood pressures, and clinical findings, and the ages of the patients, the presence of hemiparesis, or speech disorder (if any) were recorded, and ABCD2 scores were calculated.

Fasting blood glucose level, triglyceride, HDL, LDL, and total cholesterol values were analyzed in the blood samples taken in the morning after 12 hours of fasting in all patients within 24 hours after hospitalization.

Computed tomography (CT) of the brain and Diffusion-weighted MR ((DWI-MR) were performed in all patients. Hyperintense images were evaluated as DWI-MR- positive in sections obtained during DWI sequences.

Electrocardiography, transthoracic echocardiography, carotid and vertebral artery Doppler ultrasonography and/or MR angiography were performed for all patients for the purpose of etiological examination. Transesophageal echo-

cardiography was performed in 19 patients and rhythm Holter monitoring was performed in 40 patients.

The statistical analysis of the data in our study was carried out using Fisher's χ^2 test in qualitative data with the SPSS 16.0 program. The limit of significance was chosen as $p < 0.05$ for all statistical evaluations. Ethics committee approval number 141 was obtained from the ethics committee of our hospital for this study. Since the study was designed as a retrospective trial, and identification of the patients was not specified, patient consent was not obtained. There is no conflict of interest in our study.

Results

A total of 124 patients were included in this study. Of these 124 patients, 56 were female, and 68 were male, and the mean age of all cases was 63.04 ± 16.77 . Hypertension was the most common risk factor, which was present in 63 (50.8%) of the patients. When the 12-hour fasting blood cholesterol levels measured after the hospitalization of the patients were examined, hypercholesterolemia was detected in a total of 54 (43.5%) patients. There was atrial fibrillation in 17 (13.7%), and DM in 26 (21%) patients (Table 1). While 91 patients (73.4%) did not receive any antiaggregant treatment during their emergency application, 27 patients (21.8%) were receiving antithrombotic therapy and six patients (4.8%) anticoagulant therapy. ABCD2 scores of the patients receiving antithrombotic therapy were significantly higher than the patients who did not ($p = 0.019$).

The ABCD2 scores calculated after hospitalization of the patients included in this study were divided into two groups as 0-3 and ≥ 4 . ABCD2 scores of 52 (42%) patients were below 4, while 72 (58%) patients were 4 or above.

As a result of the etiological examinations of the patients, the etiology could not be determined in 84 (67.7%) patients. Cardioembolic stroke was detected in 27 (21.7%), large artery disease in 10 (0.08%), and mixed etiology in three patients.

In 21 (16.9%) patients, acute ischemic lesions were detected in DWI MR.

More than half (58%) of the patients were discharged with oral anticoagulant treatment. Recurrent ischemic stroke occurred in five patients during a 3-month follow-up period.

Discussion

TIA carries and/or heralds an early stroke. Ischemic stroke and TIA share the same pathophysiological mechanisms and etiology. However, while stroke that brings on permanent functional loss attracts more attention in the society, TIA, which can be the precursor of stroke, may be ignored.

Table 1. Characteristic features of TIA patients

Age	63.04±16.77
Sex, n (%)	
Female	56 (45.22)
Male	68 (54.8)
Medical History	
Hypertension, n (%)	
Yes	63 (50.8)
No	61 (49.2)
Diabetes, n (%)	
Yes	26 (21)
No	98 (79)
Hyperlipidemia, n (%)	
Yes	54 (43.5)
No	70 (56.5)
Atrial Fibrillation, n (%)	
Yes	17 (13.7)
No	107 (86.3)
Coronary artery disease, n (%)	
Yes	10 (8.19)
No	114 (91.9)
Treatment received during TIA, n (%)	
Antiplatelets	27 (21.8)
Anticoagulants	6 (4.8)
No treatment	91 (73.4)
ABCD2 score, n (%)	
<4	52 (41.9)
≥4	72 (58.1)
Presence of a lesion, n (%)	
Yes	21 (16.9)
No	103 (83.1)
Treatment after TIA, n (%)	
Antiplatelets	52 (41.9)
Anticoagulants	72 (58.1)
Etiology, n (%)	
Cardioembolic	27 (22)
Atherothrombotic	10 (8)
Mixed	3 (2)
Undetermined etiology	84 (68)

TIA: transient ischemic attack; ABCD2 score: Age, Blood pressure; Clinical features, History of diabetes; Duration of transient ischemic attack.

The presence of HT has negative effects on both stroke and TIA. In the presence of hypertension, the frequency of stroke increases fourfold and it is reported to be related to hypertension in approximately 60-75% of the cases.^[9] Hypertension is a risk factor that leads to the development of diseases in both large and small arteries. In the Turkish Multicenter Stroke Study (MST), 62.7% of the patients who experienced ischemic strokes showed they had a history of hypertension.^[10] In our study, it was the most common risk

factor in half of the patients (50.8%).

In our study, hyperlipidemia ranked second in frequency as a risk factor of TIA with a rate of 43.5%. Hyperlipidemia causes an increase in the incidence of coronary heart disease. Although hyperlipidemia is accepted as a definite modifiable risk factor in ischemic stroke, a similar relationship is not observed in stroke and non-embolic ischemic stroke because the stroke has heterogeneous characteristics.^[11-13] However, in some studies, OR was found as 1.7 for TIA and minor stroke in individuals with blood total cholesterol levels above 232 mg/dl.^[14]

DM was detected in 21% of our patients who had TIA. Diabetes, which is found in 8% of the society, is one of the risk factors for stroke. A large artery disease develops in 80% of type 2 diabetic patients and it is accompanied by hypertension in 60% of the patients. Prospective studies show that the presence of DM increases the incidence of stroke. For example, in the Framingham study, regardless of age, the risk of acute brain infarction in both sexes was found to be twice as high compared to non-diabetic patients.^[14]

Atrial fibrillation is the most common cause of cerebral embolism, but it is a treatable stroke precursor. It is observed in 16% of TIA cases.^[3] Similar to the literature, AF was detected in 13.7% of our patients. According to the literature, the risk of stroke or acute coronary syndrome varies between 12% and 20% in the first three months after TIA or minor stroke.^[15, 16] Today, the triage of patients is made according to the stroke risk calculated based on ABCD2 scores. If the ABCD2 score is 4 or above, it is recommended that TIA patients should be taken to emergency care within the first 24 hours, starting from the onset of symptoms.^[17]

In our study, ABCD2 scores of 72 patients (58%) was calculated as 4 and above, all of them were taken to emergency care units and hospitalized in our clinics for further examination. ABCD2 scores were found to be statistically significantly higher in patients told that they were receiving regular antithrombotic treatment during emergency admissions. Indeed, patients with high ABCD2 scores were already on antithrombotic treatment because they had ischemic stroke risk factors, such as hypertension and DM. On the other hand, increased ABCD2 scores in more than half of our patient population and most of them still had TIA under antithrombotic therapy suggest that a cardioembolic etiology may be responsible for their symptoms.

In our study, etiology was not detected in 67.7% of patients as a result of the examinations performed to clarify the etiology of TIA. All patients underwent many imaging modalities, including electrocardiography, transthoracic echocardiography, carotid and vertebral artery Doppler ultrasound and/or MR angiography. Although large vessel atheroscle-

rosis could be ruled out in all patients, advanced examinations (rhythm Holter monitoring, and transesophageal echocardiography) for the investigation of cardioembolic stroke could be applied to a limited number of patients. Therefore, the responsible etiology in 67.7% of the patients could not be determined.

Preventive treatment is administered to patients undergoing TIA according to the underlying etiology to protect them from recurrent strokes. The main prophylactic strategies are as follows: antiaggregant therapy in atherothrombotic stroke, anticoagulant therapy in cardioembolic stroke, endarterectomy and endovascular therapy in selected cases.^[3] Long-term anticoagulant therapy has been shown to be effective only in patients who have undergone TIA due to nonvalvular atrial fibrillation. In general, anticoagulant therapy is a suitable treatment method in cases with a mechanical heart valve, recent myocardial infarction, left ventricular thrombi, dilated cardiomyopathy, and marantic endocarditis.^[18] However, our treatment strategy in TIA is to initiate oral anticoagulant therapy within the first three months after TIA, especially in patients whose etiology has not been elucidated yet.

Oral anticoagulant therapy was initiated in 72 (58.1%) of the patients included in our study. In the 90-day follow-up of our patients, it was observed that five patients had an ischemic stroke and three were under antithrombotic treatment. Although no statistical significance was found between the treatment our patients received and the risk of stroke, this result suggested that our patients with undetected TIA might have cardioembolic etiologies.

In studies conducted, diffusion-weighted MR applied to TIA patients within the first 24 hours revealed abnormalities in 37% of patients.^[19] The acute ischemic lesion can be detected in 20-50% of patients with TIA by DWI MR.^[20-22]

In our study, the acute ischemic lesion was detected in 16.9% of the patients. In a study by Redgrave et al.,^[23] it was found that although DWI MR- positivity correlated with ABCD and California clinical scores in predicting the risk of stroke after onset of TIA in 200 TIA patients, any relation was not found between ABCD2 scores and the presence of lesions ($p=0.396$). In our study, when the development rates of stroke in DWI MR- positive and negative patients within 90 days were compared, any statistically significant results could not be obtained. Currently, there is no data available that DWI MR is better than clinical scores in predicting the emergence of a possible stroke.^[23] Purroy et al.^[24] applied MR to 83 TIA patients within seven days from the onset of symptoms, and any lesions in DWI MR were not detected in 67.5% of the patients. At the end of the mean follow-up period of 389 days, new vascular events developed in 19.3%

of the cases, and they showed that DWI MR- positivity was also the predictor of new vascular events.

Conclusion

In this study we aimed to reveal the risk factors in TIA patients, to review the tests that can be performed to determine the etiology, the presence of lesions and the rate of newly developed stroke during the 90-day follow-up of the patients; we specified that as with ischemic stroke hypertension, hyperlipidemia and diabetes are the most common risk factors in TIA, and although large artery disease can be excluded in all patients during hospitalization, cardioembolic etiologies could be identified in a limited number of patients. Most of the patients were discharged with oral anticoagulant treatment, and although not statistically significant, the risk of developing ischemic stroke during 90 days of follow-up is lower in patients under oral anticoagulant therapy.

Disclosures

Ethics Committee Approval: The study was approved by the Local Ethics Committee.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – E.C.; Design – E.C.; Supervision – A.S.; Materials – E.C.; Data collection &/or processing – E.C., S.S., A.Y., D.A., A.K., H.K.; Analysis and/or interpretation – E.C.; Literature search – E.C.; Writing – E.C.; Critical review – E.C.

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