Mosul Journal of Nursing

www.mjn.mosuljournals.com

Transient ischemic attacks: a single institutional experience

DOI: 10.33899/mjn.2020.167520

https://mjn.mosuljournals.com/article_167520.html

Article information

Article history:
Received June 8, 2020
Accepted July 2, 2020
Available online December 23, 2020

Aso Sabir Skeikh bezeni [1] ***Ashti Mohammad Amin Said*** [2] ***Yasin Kareem Amen*** [3]
Shewaaz Shamsaulddin Taha [4]

Abstract

Background: Transient ischemic attack (TIA) is a neurological emergency. About 15-30% of strokes are preceded by TIAs. We aimed to evaluate the risk factors developing TIAs, assess all patients with diffusion weighted MRIs, and to initiate early treatment to prevent completed strokes.

Method: This cross-sectional observational study was conducted from December 1, 2018, to October 31, 2019. Eighty patients, who developed TIAs and who had attended the Rizgary Teaching Hospital's emergency department and its neurology outpatients' clinic at Erbil, Iraq, were enrolled consecutively. All patients underwent thorough medical and neurological examinations, the ABCD2 score was calculated in all patients, and an extensive battery of investigations, including an emergency brain CT scan and MRI with diffusion-weighted images (DWI) were done. After securing the diagnosis of TIA, all patients were treated with antiplatelets or anticoagulants in addition to other medications, as needed .

Results: The mean age of patients was 56.63 (±SD of 11.6 years). The most common risk factor was hypertension (53.7%) followed by diabetes and smoking. The commonest presentation was acute hemiparesis followed by hemianesthesia. DWI sequences demonstrated acute ischemic infarctions in 15 (18.7%) patients .

[1] Assistant Professor of Community Medicine, Shekhan Technical College of Health, Duhok olytechnic University. Corresponding author: masood.abdulkareem@dpu.edu.krd
[2] Medical Research Center, Hawler Medical University, Kurdistan Region, Iraq Verified email
[3] Anaesthesia department, Medical Technical Institute, Erbil Polytechnic University.
[4] .

Conclusion: TIAs targeted people younger than expected by other international studies. DWI of the brain is more sensitive than conventional brain MRI sequences in detecting the acute ischemic changes in patients with TIAs.

Keywords: TIA, stroke, ischemia, MRI, DWI

Introduction

A transient ischemic attack is a transient episode of neurological dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction.[1] The incidence of TIA, for example, in the United States, has been estimated to be about 200 000-500 000 per year, with a population prevalence of 2.3% that translates into 5 million individuals.[2,3]Thus, the actual prevalence of this condition may be considerably larger.[4] There are an estimated 800,000 acute completed ischemic strokes per year in the United States, and it is estimated that 15-30% are preceded by a transient ischemic attack.[5,6] The Cardiovascular Health Study estimated a prevalence of TIA in men of 2.7% for 65-69 years of age and 3.6% for 75-79 years of age, while for women, TIA prevalence was 1.6% for 65-69 years of age and 4.1% for 75-79 years of age. In the younger Atherosclerosis Risk in Communities cohort study, the overall prevalence of TIAs was found to be 0.4% among adults 45-64 years of age.[1] TIA reduces survival by 4% in the first year and by 20% within 9 years.[6]

Patients and methods:

This cross-sectional observational study was conducted from December 1, 2018, to October 31, 2019. Eighty patients, who developed TIAs and who had attended the Rizgary Teaching Hospital's emergency department and its neurology outpatients' clinic at Erbil, Iraq, were enrolled consecutively. Sixty males and 20 females, aging from 27-83 years were the patients .

A detailed history was taken from the patients, their caregivers, or next of kin and thorough physical and neurological examinations were carried out by neurologists and neurology trainees. All patients underwent an extensive battery of investigations: complete blood counts, ESR, blood sugar, urea and electrolytes, serum lipids, liver functions, serum TSH, 12-lead ECG, transthoracic echocardiography, and carotid Doppler ultrasound. Investigations for connective tissue diseases and thrombophilia were done in young patients (<40 years) with no obvious vascular risk factors. Cranial non-contrast CT scan at time of the emergency department visit was done in all patients and a 1.5 tesla cranial MRI with DWI was done within 48 hours of the TIA onset .

All patients were treated acutely with aspirin 300 mg (if the patient was not on aspirin or other antiplatelet). Patients who were already taking aspirin were treated with clopidogrel (300 mg followed 75 mg per day). Patients with atrial fibrillation and those with antiplatelet failure were acutely anticoagulated with heparin followed by warfarin. Patients who were hypertensive or diabetic were treated accordingly. All patients received a statin before their hospital discharge. Patients who had demonstrated acute ischemic lesions on the DWI sequences underwent another brain MRI with DWI after 2 months.

The data were analyzed by an independent statistician using Statistical Package for Social Sciences version 19.0. The Chi-square test of association was used to compare proportions. Fisher's exact test

was used in the analysis of contingency tables. The Student's t-test was used to compare the means values of the two groups. The Binary logistic regression analysis was used when values were dependent variables in both groups, and factors that were significantly associated (via Chi-square) with stroke were entered as independent variables into the model. A P-value of ≤ 0.05 was considered statistically significant.

Results:

Out of 80 patients, there was male predominance with a male to female ratio of 3:1 (60 males and 20 females), with an age ranging from 27-83 years, (mean age was 56.63 ±SD of 11.63years). Peak age in male patients was in sixth decade while in female patients was in fifth decade. Table 1 shows the age and gender distribution in TIA patients.

Table 1: Age and gender of the TIA patients (n=80).

Age (years)	Male	Female	Total	Percentage
20-29	2	1	3	3.75
30-39	3	0	3	3.75
40-49	9	6	15	18.75
50-59	15	7	22	27.5
60-69	22	3	25	31.25
70-79	8	3	11	13.75
80-89	1	0	1	1.25
Total	60	20	80	100

TIA symptoms were as follows: unilateral weakness in 31 patients, followed by unilateral sensory deficit in 25 patients, speech difficulty (dysphasia or dysarthria) in 11 patients, vertigo in 10 patients, and facial paresthesia in 2 patients. The least common symptom was amaurosis fugax (one patient, as shown in table 2). The mean duration of symptoms was 42.66 minutes (ranging from 3 minutes to 4 hours).

Table 2: Frequency of symptoms in TIA patients (n=80).

Symptoms	Frequency	Percentage
Unilateral weakness	31	38.75
Unilateral sensory deficit	25	31.25
Speech difficulty	11	13.75
Vertigo	10	12.5
Facial paresthesia	2	2.5
Amaurosis fugax	1	1.25
Total	80	100.0

During routine cardiovascular system examination, we found that out of 80 patients, 3 patients (3.75%) had carotid bruit (table3). At presentation, 64 patients had no neurological signs on examination, 10 patients had unilateral pyramidal

weakness, 3 patients had speech problem (dysphasia or dysarthria), 2 patients had unilateral sensory impairment, and one patient had nystagmus.

Table 3: Neurological signs in TIA patients (n=80).

Signs	Frequency	Percentage
No sign at presentation	64	80
Unilateral pyramidal weakness	10	12.5
Speech difficulty (dysphasia or dysarthria)	3	3.75
Unilateral sensory impairment	2	2.5
Nystagmus	1	1.25
Total	80	100.0

No patient had an ABCD2 score of zero. Many patients (23 ones) had a score of 2. Figure 1 shows the ABCD2 score of TIA patients.

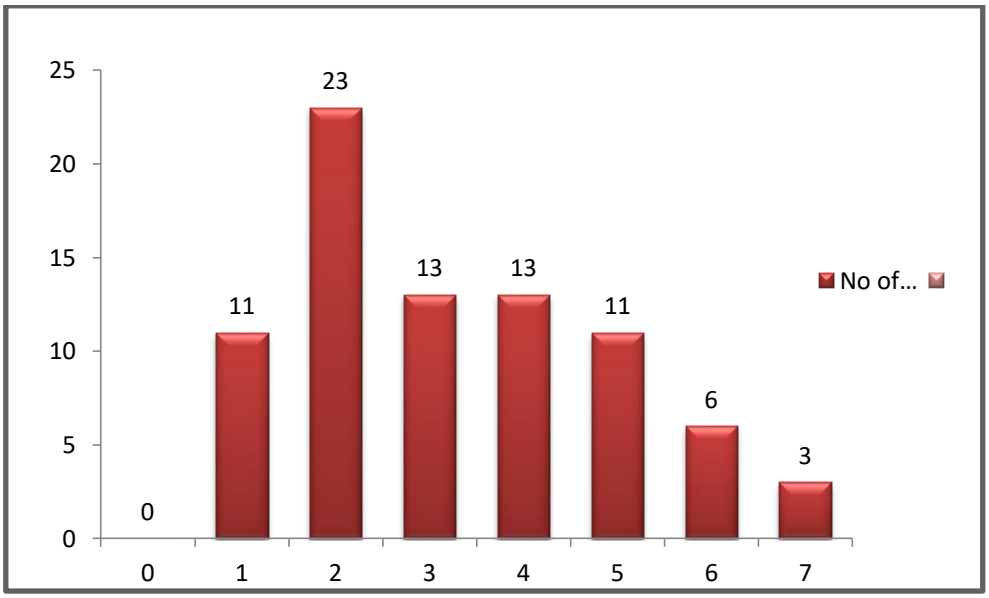

Figure 2: ABCD2 score of TIA patients

Among 80 patients, 43 (53.75%) patients were hypertensive, 9 patients were on regular antihypertensive drugs, 4 patients were on diet control, others were irregularly taking treatment, 24 (30%) patients were diabetic, only 3 of them on regular treatment, 23 (28.75%) patients were smoker, ranging from 15-60 cigarettes/day. Fourteen (17.5%) patients had hyperlipidemia, 13 (16.25%) had history of TIA, 12 (15%) patients had history of ischemic heart disease, 5 (6.25%) had previous stroke, 3 (3.75%) patients had AF, family history of TIA was positive in 2 (2.5%) patients aging 27, 28 years respectively, and one (1.25%) patient had dilated cardiomyopathy whose age was 28 years (table 4).

Table 4: Risk factors of TIA.

Risk factors	Frequency	Percentage
Hypertension	43	53.75
Diabetes mellitus	24	30
Smoking	23	28.75
hyperlipidemia	14	17.5
TIA	13	16.25
IHD	12	15
Stroke	5	6.25
AF	3	3.75
Family history of TIA	2	2.5
Dilated cardiomyopathy	1	1.25

The mean random blood sugar was 139.14mg/dl, ranging from 70-410 mg/dl. The mean total serum cholesterol level was 137.3 mg/dl, ranging from 70-420 mg/dl. The mean serum triglyceride level was 149 mg/dl, ranging from 30-610mg/dl. Resting ECG abnormalities were found in 16 patients in the form of left ventricular hypertrophy, ischemic heart disease, atrial fibrillation, and left bundle brunch block, as shown in table 5.

Table 5: Resting 12-lead ECG findings in the TIA patients (n=80).

ECG	Frequency	Percentage
Normal	64	80
Left ventricular hypertrophy	7	8.75
Ischemic heart disease	5	6.25
Atrial fibrillation	3	3.75
Left bundle brunch block	1	1.25
Total	80	100

Echocardiographic abnormalities were seen in 34 (42.5%) patients in the form of hypertensive heart disease, ischemic heart disease (IHD), left ventricular hypertrophy, and dilated cardiomyopathy, as shown in table 2.6.

Table 6: Transthoracic echocardiographic findings in the TIA patients (n=80).

Echocardiography	Frequency	Percentage
Normal	46	57.5
Hypertensive heart disease	19	23.75
Ischemic heart disease	10	12.5
Left ventricular hypertrophy	4	5

Dilated cardiomyopathy	1	1.25
Total	80	100

Carotid Doppler studies showed right-sided internal carotid artery stenosis in 3 patients of 20%, 46%, 65% respectively, and left-side internal carotid artery stenosis in 2 patients (which were 50% and 70% respectively). In 3 patients, the carotid stenosis was symptomatic and in 2 patients it was asymptomatic. Table 7 shows the frequency of internal carotid artery stenosis in TIA patients.

Table 7: Frequency of internal carotid artery stenosis by Doppler ultrasonography (n=80).

Carotid doppler study	Frequency	Percentages
Normal	75	93.75
Right internal carotid artery stenosis	3	3.75
Left internal carotid artery stenosis	2	2.5
Total	80	100

The results of brain CT scan of 5 participants showed old infarction as they had previous history of stroke, otherwise all CT scans were normal, while DWI of the brain revealed ischemic lesions in 25 patients, in 5 patients the ischemic lesions were irrelevant to the clinical symptoms (old infarction), in the other 20 patients the ischemic lesions were relevant to the clinical symptoms, after two months, the follow up DWI was done for those patients, there were resolution of the ischemic lesions in 15 patients while in 5 patients the ischemic lesions persisted, they regarded as infarction and already excluded from the study. Conventional MRI showed ischemic lesions in 10 patients (5 patients with previous stroke and 5 patients were regarded as infarction).

Table 8: Brain imaging findings in the TIA patients (n=80).

CT scan	Conventional MRI	DWI
positive =5	Positive =5	positive =20
old infarction=none	Old infarction=none	old infarction=5
		TIA=15
Negative =75	Negative =75	Negative =60

Thirteen patients were already on aspirin, 6 patients with previous IHD (100 mg par day), 4 patients with previous TIA (300 mg per day) and 3 patients with previous stroke (300 mg per day), one of a previously stroke patient was on clopidogrel 75 mg per day, 3 patients (1 IHD and 2 TIAs) were on a daily dual antiplatelets of aspirin 100 mg and clopidogrel 75mg, and 2 patients were on

warfarin 3 mg per day, one of them with a history of 5 strokes and the other was IHD. Those patients who were on aspirin, their treatment changed to clopidogrel 75mg per day , those patients who were on clopidogrel 75 mg, a combination of aspirin and clopidogrel and who had atrial fibrillation were anticoagulated with heparin and warfarin, and those received warfarin 3 per day mg the dose had been increased to 5 mg per day according to international normalized ratio (table 9).

Table 9: Treatments of TIA patients

Drugs	Frequency	Percentage
Recent treatment		
Aspirin (300mg)	58	72.5
Clopidogrel (75mg)	13	16.25
Warfarin	9	11.25
Old treatment		
No treatment	61	76.25
Aspirin	13	16.25
clopidogrel	1	1.25
Aspirin and clopidogrel	3	3.75
Warfarin	2	2.5
Total	80	100

After 2 days of follow up we found that 2 cases of TIA developed stroke who were male patients aged 50, 63 years respectively, one with rapid AF who refused to be admitted to the hospital and he didn't receive treatment, the other was with ABCD2 score of 7. Within 1-3 months, only 22 patients came back for follow up and there were no stroke or recurrent TIA in those patients.

Discussion:

In this study we found that, mean age of TIA patients in our locality was 56.63±11.63years which is less than the mean age of other localities, possibly due to low mean age of people in our population, or may be due low health education regarding diet, lack of exercise, and noncompliance to the drugs that are given for controlling of risk factors. Kleindorfer *et al* 2005 and Inoue *et al* 2004 found that aging is a risk factor for TIA (>60years).[7,8]

Men had a significant higher incidence of TIA when compared with women; this is consistent with previously published studies by Kleindorfer *et al* 2005 and Calvet *et al* 2007.[7,9] Hemiparesis was the most common presenting symptom, this is comparable with previous study by Inoue *et al* 2004,[39]the mean duration of

symptoms was 42.66 minutes, in 66 patients the duration of symptoms was less than one hour this is consistent with previously published study by Calvet *et al* 2007.[9]

The most common risk factor was hypertension, this agrees with other studies by Inoue *et al* 2004, Sheehan *et al* 2010, Hill *et al* 2004 and Lisabeth *et al* 2004,[8,10-12] other risk factors like smoking (28.8%), IHD (15%), were near to the results of previously published studies by Inoue *et al* 2004 and Tsivgoulis *et al* 2006.[8,13] Twenty four (30%) patients were diabetic, which is similar to that of Purroy *et al* 2007,[14] hyperlipidemia was found in 14 (17.5%) patients, this is near to 19.2% by Kimura *et al* 2004 and Cucchiara *et al* 2006.[15,16]

There was previous TIA in 16.25% patients, in a study by Hankey 2003[17] he found that the risk of recurrent TIA within one year is about 12%, in our patients the rate is more than that which could be due to ignorance of the treatments, lack of exercise or unhealthy dietary program. In this study the frequency of patients with AF was 3.75%, in a previous publication by Lavallee *et al* 2007[18] had found that 5% of TIA is due to AF. In this study we found that 6.25% TIA due to carotid stenosis.[19] In a previously published study by Poisson *et al* 2010 found that 10% of TIA is due to carotid stenosis. There were ischemic lesions in DWI of 18.75% patients; this was nearly within the range (13.5%-25%) of previously published studies.[19-26]

Two patients (2.5%) developed stroke after 2 days of TIA, one patient was AF and doesn't receive treatment, the other was with ABCD2 score=7, this is expected because patients with higher ABCD2 score caries higher risk of stroke, in previous studies by Giles *et al*, Purroy *et al*, Sheehan *et al*, and Verro mentioned that 2 days stroke risk after TIA was 3%-4.9% and with ABDC2 score of 7 was 4.4%.[21,27-29]

Thirteen (16.25%) patients who were on aspirin they developed TIA, this may be due ignorance of the drug and aspirin by itself prevent recurrent vascular events by 13-22% as in previously published study by Halkes *et al*, Ovbiagele, Diener *et al*, and Dengler *et al*.[30-33] Among our patients; 33 patients were with ABCD2 score between 4-7, which is high score and carry high risk of stroke, better to be hospitalized for 24hours,[34,35] but our patients neglect their symptoms as TIA is transient and most of the patients (80%) when arrive to the hospital their symptoms and signs already resolve.

In conclusion, transient ischemic attack is a common neurological emergency in Erbil. In our city, TIA occurred in younger patients than other areas. Hypertension was the most important risk factor for TIA

followed by diabetes mellitus and smoking. Unilateral weakness was the most common symptom of TIA followed by unilateral sensory deficit. Diffusion weighted MRI of the brain is more sensitive than conventional MRI in the detection of ischemic changes in patients who present with TIA.

References:

Al-khaled M, Eggers J. MRI findings and stroke risk in TIA patients with different symptom durations. Neurology. 2013;80:1920-6.

Amarenco P, Labreuche J, Lavallée PC. Patients With Transient Ischemic Attack With ABCD2 <4 Can Have Similar 90-Day Stroke Risk as Patients With Transient Ischemic Attack With ABCD 2 ≥4. Stroke. 2012;43(0039-2499):863-5.

Benjamin EJ, Muntner P, Alonso A, et al. Heart Disease and Stroke Statistics-2019 Update: A Report From the American Heart Association. Circulation. 2019;139(10):e56-e528.

Calvet D, Lamy C, Touzé E, et al. Management and Outcome of Patients with Transient Ischemic Attack Admitted to a Stroke Unit. Cerebrovasc Dis. 2007;24:80-5.

Crisostomo RA, Garcia MM, Tong DC. Detection of Diffusion-Weighted MRI Abnormalities in Patients with Transient Ischemic Attack Correlation With Clinical Characteristics. Stroke. 2003;34:932-7.

Cucchiara BL, Messe SR, Taylor RA, et al. Is the ABCD score useful for risk stratification of patients with acute transient ischemic attack? Stroke. 2006;37:1710-4.

Dengler R, Diener HC, Schwartz A, et al. Early treatment with aspirin plus extended-release dipyridamole for transient ischaemic attack or ischaemic stroke within 24 h of symptom onset (EARLY trial): a randomised, open-label, blinded-endpoint trial. Lancet Neurol. 2010;9:159-66.

Diener HC, Bogousslavsky J, Brass LM, et al. Aspirin and clopidogrel compared with clopidogrel alone after recent ischaemic stroke or transient ischaemic attack in high-risk patients (MATCH): randomised, double-blind, placebo-controlled trial. Lancet. 2004;364:331-7.

Easton JD, Saver JL, Albers GW, et al. Definition and Evaluation of Transient Ischemic Attack. Stroke. 2009;40:2276-93.

Gattellari M, Goumas C, Garden F, et al. Relative Survival After Transient Ischaemic Attack: Results From the Program of Research Informing Stroke Management (PRISM) Study. Stroke. 2012;43(0039-2499):79-85.

Giles MF, Rothwell PM. Risk of stroke early after transient ischaemic attack: a systematic review and meta-

analysis. Lancet Neurol. 2007;6:1063–72.

Halkes PH, Gray LJ, Bath PM. Dipyridamole plus aspirin versus aspirin alone in secondary prevention after TIA or stroke: a meta-analysis by risk. J Neurol Neurosurg Psychiatry. 2008;79:1218-23.

Hankey GJ. Long-Term Outcome after Ischaemic Stroke/Transient Ischaemic Attack. Cerebrovasc Dis. 2003;16:14-9.

Hill MD, Gladstone DJ. Patients With Transient Ischemic Attack or Minor Stroke Should Be Admitted to Hospital. Stroke. 2006;37:1137-8.

Hill MD, Yiannakoulias N, Jeerakathil T, et al. The high risk of stroke immediately after transient ischemic attack: A population-based study. Neurology. 2004;62:2015-20.

Inatomi Y, Kimura K, Yonehara T, et al. DWI abnormalities and clinical characteristics in TIA patients. Neurology. 2004;62:376-80.

Inoue T, Kimura K, Minemats K, et al. Clinical Features of Transient Ischemic Attack Associated with Atrial Fibrillation. J Stroke Cerebrovasc Dis. 2004;13:155-9.

Jagoda A, Chan YY. Transient Ischemic Attack Overview: Defining the Challenges for Improving Outcomes. Ann Emerg Med. 2008;52:S3-S6.

Johnston SC, Fayad PB, Gorelick PB, et al. Prevalence and knowledge of transient ischemic attack among US adults. Neurology. 2003; 60:1429-34.

Kimura K, Kazui S, Minematsu K, et al. Analysis of 16,922 Patients with Acute Ischemic Stroke and Transient Ischemic Attack. Cerebrovasc Dis. 2004;18:47-56.

Kleindorfer D, Panagos P, Pancioli A, et al. Incidence and short-term prognosis of transient ischemic attack in a population-based study. Stroke. 2005;36:720-3.

Lavallee PC, Meseguer E, Abboud H, et al. A transient ischaemic attack clinic with round-the-clock access (SOS-TIA): feasibility and effects. Lancet Neurol. 2007;6:953-60.

Lisabeth LD, Ireland JK, Risser JM, et al. Stroke risk after transient ischemic attack in a population-based setting. Stroke. 2004; 35: 1842-6.

Marx JJ, Mika GA, Thoemke F, et al. Diffusion weighted magnetic resonance imaging in the diagnosis of reversible ischaemic deficits of the brainstem. J Neurol Neurosurg Psychiatry. 2002;72:572-5.

Ovbiagele B. Antiplatelet therapy in management of transient ischemic attack: overview and evidence-based rationale. J Emerg Med. 2008;34:389-96.

Peter D, Panagos MD. Transient ischemic attack (TIA): the initial diagnostic and therapeutic dilemma. American Journal of Emergency Medicine. 2012; 30:794-9.

Poisson SP, Johnston SC, Sidney S. Gender Differences in Treatment of Severe Carotid Stenosis After TIA. Stroke. 2010;41:1891-5.

Purroy F, Begué R, Quílez A. The California, ABCD, and Unified ABCD2 Risk Scores and the Presence of Acute Ischemic Lesions on Diffusion-Weighted Imaging in TIA Patients. Stroke. 2009;40(0039-2499):2229-32.

Purroy F, Montaner J, Carlos A. Patterns and Predictors of Early Risk of Recurrence After Transient Ischemic Attack With Respect to Etiologic Subtypes. Stroke. 2007;38(0039-2499):3225-9.

Schulz UG, Briley D, Meagher T, et al. Diffusion-Weighted MRI in 300 Patients Presenting Late With Subacute Transient Ischemic Attack or Minor Stroke. Stroke. 2004;35:2459-65.

Sheehan OC, Kyne L, Kelly LA, et al. Population-Based Study of ABCD2 Score, Carotid Stenosis, and Atrial Fibrillation for Early Stroke Prediction After Transient Ischemic Attack: The North Dublin TIA Study, Stroke. 2010;41(0039-2499):844-50.

Sheehan OC, Kyne L, Kelly LA, et al. Population-Based Study of ABCD2 Score, Carotid Stenosis, and Atrial Fibrillation for Early Stroke Prediction After Transient Ischemic Attack: The North Dublin TIA Study, Stroke 2010; 41(0039-2499):844-50.

Sonni A, Thaler DE. Transient ischemic attack: Omen and opportunity. Cleve Clin J Med. 2013;80:9.

Tsivgoulis G, Spengos K, Manta P, et al. Validation of the ABCD score in identifying individuals at high early risk of stroke after a transient ischemic attack: a hospital-based case series study. Stroke. 2006;37:2892-7.

Verro P. Early risk of stroke after transient ischemic attack: back to the future. CMAJ. 2004;7:170.