Diagnosis and correction of cardiac risk factors in transient ischemic attacks

Diagnóstico y corrección de los factores de riesgo cardíaco en accidentes isquémicos transitorios

Mergen Ayukaevich Dzhimgirov, OOO “ABCmeditsina”, 12/2 Chistoprudny Boulevard, Moscow, 101000, Russia.
Mergen_bcn@mail.ru https://orcid.org/0009-0006-6468-4837
Lina Aliskhanovna Uzhakhova, I.M. Sechenov First Moscow Medical University, 2/4 Bolshaya Pirogovskaya str., Moscow, 119991, Russia.
ushakhoval@mail.ru https://orcid.org/0009-0008-5629-5959
Amina Magomedovna Mamilova, I.M. Sechenov First Moscow Medical University, 2/4 Bolshaya Pirogovskaya str., Moscow, 119991, Russia.
mamilovaam@mail.ru https://orcid.org/0009-0002-0198-5035
Vladimir Grigorievich Vlasov, Pirogov Russian National Research Medical University, 1 Ostrovitianov str., Moscow, 117997, Russia.
vovan00331998@gmail.com https://orcid.org/0009-0004-8989-7244
Kirill Denisovich Mertekhin, Pirogov Russian National Research Medical University, 1 Ostrovitianov str., Moscow, 117997, Russia.
kirill051001@yandex.ru https://orcid.org/0009-0002-6673-7905
Iskander Nurgalievich Iskakov, Pirogov Russian National Research Medical University, 1 Ostrovitianov str., Moscow, 117997, Russia.
kukri_2002@mail.ru https://orcid.org/0009-0000-6785-7250
Alina Aleksandrovna Emelyanova, Pirogov Russian National Research Medical University, 1 Ostrovitianov str., Moscow, 117997, Russia.
alina.kharitonova18@icloud.com https://orcid.org/0009-0009-9185-3706
Received: 02/20/2025 Accepted: 04/19/2025 Published: 05/12/2025 DOI: http://doi.org/10.5281/zenodo.15536795

Abstract

Transient ischemic attacks (TIA) are an important precursor to stroke, requiring timely diagnosis and an integrated approach to risk management. This article focuses on cardiological risk factors that play a key role in the development of TIA, such as arrhythmias, angina pectoris, chronic heart failure and other pathologies of the cardiovascular system.

The article presents modern methods for the diagnosis of cardiac disorders in patients with TIA, including electrocardiography, daily ECG monitoring (Holter), echocardiography and stress tests. Special attention is paid to the identification of atrial fibrillation, which is one of the most significant provoking factors of thromboembolic complications.

Strategies for correcting the identified risk factors are also being considered, including drug therapy (anticoagulants, antiplatelet agents, lipid-lowering drugs), surgical treatment methods (for example, arrhythmia ablation or valve replacement) and non-drug approaches such as lifestyle changes (nutrition correction, smoking cessation, regular physical activity).

The need for interaction between neurologists and cardiologists is emphasized to ensure effective risk management and reduce the likelihood of TIA progression to stroke. The results of the analysis of clinical studies confirm that early diagnosis and adequate correction of cardiac risk factors significantly improve the prognosis of patients with TIA.

Keywords: transient ischemic attacks, cardiological risk factors, diagnosis, correction, atrial fibrillation, anticoagulants, stroke prevention, echocardiography, interdisciplinary collaboration.

Resumen

Los accidentes isquémicos transitorios (AIT) son un precursor importante del ictus, lo que requiere un diagnóstico oportuno y un enfoque integral para la gestión del riesgo. Este artículo se centra en los factores de riesgo cardiológicos que desempeñan un papel clave en el desarrollo de AIT, como arritmias, angina de pecho, insuficiencia cardíaca crónica y otras patologías del sistema cardiovascular.

El artículo presenta métodos modernos para el diagnóstico de trastornos cardíacos en pacientes con AIT, incluyendo electrocardiografía, monitorización diaria de ECG (Holter), ecocardiografía y pruebas de esfuerzo. Se presta especial atención a la identificación de la fibrilación auricular, uno de los factores desencadenantes más importantes de complicaciones tromboembólicas.

También se están considerando estrategias para corregir los factores de riesgo identificados, incluyendo la terapia farmacológica (anticoagulantes, antiagregantes plaquetarios, hipolipemiantes), métodos de tratamiento quirúrgico (por ejemplo, ablación de arritmias o reemplazo valvular) y enfoques no farmacológicos como cambios en el estilo de vida (corrección nutricional, abandono del hábito tabáquico, actividad física regular).

Se enfatiza la necesidad de la interacción entre neurólogos y cardiólogos para garantizar una gestión eficaz del riesgo y reducir la probabilidad de progresión de un AIT a un ictus. Los resultados del análisis de estudios clínicos confirman que el diagnóstico precoz y la corrección adecuada de los factores de riesgo cardíaco mejoran significativamente el pronóstico de los pacientes con AIT.

Palabras clave: accidentes isquémicos transitorios, factores de riesgo cardiológico, diagnóstico, corrección, fibrilación auricular, anticoagulantes, prevención del ictus, ecocardiografía, colaboración interdisciplinaria.

Introduction

Transient ischemic attacks (TIA) are a clinical syndrome characterized by a temporary disturbance of cerebral circulation that occurs without irreversible changes in the structure of the brain. Despite the short-term nature of the symptoms, TIA pose a serious medical and social challenge, as they are the most important harbinger of stroke, increasing its risk during the first days and months after the episode to 15-20%.

Cardiological risk factors are central to the causes of TIA, especially in patients with sources of systemic embolism such as atrial fibrillation, cardiomyopathy, stenosis of the heart valves or thrombosis in the left atrium. According to various studies, about 20-40% of all TIA cases are cardiogenic in nature, which underscores the need for careful diagnosis and timely correction of these factors[1].

Against the background of the increasing prevalence of chronic diseases of the cardiovascular system and the aging of the population, the urgency of the problem is increasing. Modern approaches to the management of cardiological risk factors require a comprehensive analysis of the clinical picture, the use of highly accurate diagnostic methods and personalized treatment. In this regard, the development of effective prevention and correction strategies is becoming one of the key tasks of modern neurology and cardiology.

This article is devoted to a review of modern methods for diagnosing cardiac risk factors in TIA, as well as analyzing the possibilities of their correction to reduce the likelihood of TIA progression to stroke and improve the quality of life of patients.

Materials and methods

To write this paper, the authors used theoretical research methods, including an analysis of scientific literature, a systematic review of clinical recommendations, meta-analyses, and randomized controlled trials (RCTs) related to the diagnosis and correction of cardiac risk factors in transient ischemic attacks (TIA). The studies cover the period from 2010 to 2023 and are taken from the international databases PubMed, Cochrane Library, Scopus, as well as national medical journals.

The publications devoted to the epidemiology of TIA, the peculiarities of the cardiogenic etiology of the destruction of cerebral circulation, as well as modern approaches to diagnosis and treatment were analyzed.

The main sources were international clinical guidelines, including those of the American Academy of Neurology (AAN), the European Society of Cardiology (ESC), and the World Health Organization (WHO). Meta-analyses and RCTs allowed us to evaluate the effectiveness of various methods of diagnosis and treatment of cardiac risk factors.

Statistical methods were used to analyze the data, including a comparison of groups of patients with various cardiological risk factors, an assessment of relative risk (RR) and the number of people in need of treatment (NNT).

Results

Transient ischemic attacks (TIA) are an important precursor to stroke, requiring immediate attention from medical professionals and an integrated approach to diagnosis and risk management[2]. Despite the fact that TIA symptoms usually last less than 24 hours and do not leave irreversible consequences, they signal a high probability of stroke in the near future — up to 10-15% of patients may suffer a stroke within the first 90 days after a TIA episode.

The main causes of TIA are atherosclerotic vascular lesions, cardiogenic sources of embolism, and small-focal circulatory disorders. Atrial fibrillation, stenosis of the heart valves, chronic heart failure and the presence of thrombosis in the cavities of the heart occupy a special place among the cardiological risk factors[3]. Such conditions increase the likelihood of thromboembolic complications, which can lead to temporary or permanent cerebral ischemia.

Timely diagnosis and correction of cardiac risk factors play a key role in reducing the incidence of strokes in patients with TIA[4]. Modern diagnostic methods such as electrocardiography, daily ECG monitoring, transcranial Dopplerography and echocardiography can reveal hidden pathologies of the cardiovascular system even in patients without obvious symptoms. Based on the data obtained, an individual treatment plan is being developed, including drug therapy (for example, anticoagulants, statins), surgical interventions, if necessary, and recommendations for lifestyle changes.

Thus, timely identification and management of cardiological risk factors in patients with TIA is a fundamental element of stroke prevention and improvement of the prognosis of the disease. An integrated approach combining the efforts of neurologists, cardiologists and other specialists can significantly reduce the risk of TIA progression to more serious vascular events.

Cardiological risk factors play a key role in the development of transient ischemic attacks (TIA), as cardiovascular diseases can lead to impaired blood circulation in the brain through the mechanism of embolism or a decrease in total cardiac output[5]. The cardiological risk factors that play a key role in the development of TIA are presented in Table 1.

Table 1. Cardiological risk factors that play a key role in the development of transient ischemic attacks (TIA)	
The cardiological risk factor	The mechanism of TIA development
Atrial fibrillation	Formation of blood clots in the auricle of the left atrium with subsequent embolization of cerebral vessels
Angina pectoris / coronary artery disease	Atherosclerotic vascular lesion, systemic embolism due to unstable plaque or thrombosis
Chronic heart failure	Stagnation of blood in the cavities of the heart, decreased cardiac output, thrombosis
Stenosis of the heart valves	Impaired blood flow through the affected valve, risk of thrombosis
Dilated cardiomyopathy	Enlargement of the heart cavities, impaired contractile function, thrombosis
Atrial arrhythmias (extrasystole)	Violation of the normal blood flow in the atria, contributing to thrombosis
Prosthetic heart valves	Thrombosis in the area of a mechanical prosthesis
Hypertrophic cardiomyopathy	Violation of normal blood flow inside the heart, risk of thrombosis

The factors presented in the table should be analyzed in more detail. Atrial fibrillation is one of the main causes of cardiogenic TIA, as a violation of the contractile function of the atria contributes to the formation of blood clots, especially in the area of the auricle of the left atrium. These blood clots can break off and reach the vessels of the brain, causing their blockage. In patients with atrial fibrillation, the risk of stroke increases 4-5 times compared to the general population[6].

Coronary artery disease is often accompanied by atherosclerotic lesions of the coronary arteries, which can spread to other vessels, including the cerebral arteries. The presence of stable or unstable angina indicates a high risk of systemic thromboembolic complications, which increases the likelihood of developing TIA.

Chronic heart failure leads to a decrease in cardiac output and disruption of normal blood circulation, which increases the risk of thrombosis in the cavities of the heart. In addition, with decompensated CHF, blood stagnation in the circulatory system may occur, which also increases the likelihood of embolic complications.

Aortic or mitral valve stenosis can be a source of systemic embolism. In particular, with aortic stenosis, normal blood flow is disrupted, which contributes to the formation of blood clots that can enter the vessels of the brain. Patients with valvulopathies are at increased risk of TIA and stroke[7].

Dilated cardiomyopathy is characterized by an expansion of the heart cavities and a decrease in its contractile function, which creates favorable conditions for the formation of blood clots, especially in the atria and ventricles, which increases the risk of thromboembolic complications, including TIA.

Atrial arrhythmias, such as paroxysmal tachycardia or atrial extrasystoles, can disrupt the normal movement of blood in the atria, contributing to thrombosis. Even short-term episodes of arrhythmias can cause systemic embolism. In patients with mechanical valve prostheses, there is a high risk of thrombosis in the area of the prosthesis, which requires constant anticoagulant therapy. With insufficient anticoagulation control, the risk of TIA increases. Hypertrophic cardiomyopathy can disrupt the normal blood flow inside the heart, which increases the likelihood of thrombosis and subsequent embolic complications[8].

Therefore, the identification and management of these cardiological risk factors is crucial for the prevention of TIA and stroke. Modern diagnostic methods such as electrocardiography, daily ECG monitoring, echocardiography, and computed tomography can effectively detect these pathologies. Correction of identified risk factors, including drug therapy (anticoagulants, antiplatelet agents) and lifestyle changes, significantly reduces the likelihood of vascular complications.

Discussion

Modern methods of diagnosing cardiac disorders in patients with transient ischemic attacks include various instrumental studies that can identify both overt and hidden pathologies of the cardiovascular system. Electrocardiography is a basic technique that helps detect persistent or stable rhythm and conduction disturbances such as atrial fibrillation, blockages, or signs of coronary heart disease. However, to detect paroxysmal disorders, daily ECG monitoring using the Holter method is used, which records the electrical activity of the heart for 24-48 hours, which increases the likelihood of detecting episodic arrhythmias. In cases of rare or prolonged episodes, long-term ECG monitoring is used using portable devices or even implanted heart monitors capable of recording data for several weeks or months[9].

Echocardiography is an important tool for assessing the structure and function of the heart, allowing to identify possible sources of thrombosis, such as dilation of the left atrium, hypokinesis of the walls or valve vegetation. Transthoracic echocardiography is used for general examination of the heart, while transcranial dopplerography is an important tool for detecting microparticles or air

bubbles in the vessels of the brain, which may indicate a possible embolism[10]. This method allows us to assess the blood flow rate and its features in the cerebral arteries, which is especially important if the cardiogenic nature of transient ischemic attacks (TIA) is suspected. Identification of such microembolizing particles helps to identify the sources of systemic embolism and adjust treatment tactics in order to reduce the risk of TIA progression to stroke.

Stress tests are used to identify ischemic changes during exercise that may not manifest themselves at rest. Exercise on a bicycle ergometer or treadmill with ECG recording allows you to assess the functional state of the coronary arteries, while pharmacological stress tests are used for patients who are unable to perform physical activity. Stress echocardiography combines stress with echocardiographic examination to assess regional disorders of myocardial contractile function.

Magnetic resonance imaging of the heart provides a detailed assessment of its structure and function, including the detection of fibrosis, scarring or dilation of the chambers of the heart[11]. Computed tomography of the coronary arteries helps to identify atherosclerotic changes, which is important for assessing the risk of systemic embolism. All these diagnostic methods play a key role in an integrated approach to the management of cardiological risk factors in patients with transient ischemic attacks.

Correction of the identified cardiac risk factors in patients with transient ischemic attacks requires an integrated approach, including drug therapy, surgical methods of treatment and non-drug measures[12]. Such a multidimensional plan can effectively reduce the likelihood of disease progression to stroke.

Drug treatment plays a central role in the management of cardiological risk factors. Anticoagulants reduce the risk of thrombosis, which is especially important for patients with atrial fibrillation or prosthetic heart valves. This group includes warfarin and direct oral anticoagulants (DOAC) such as rivaroxaban, apixaban and dabigatran. The choice of the drug depends on the patient's clinical situation, such as the risk of bleeding and the presence of other diseases.

Antiplatelet agents prevent platelet aggregation, which reduces the risk of blood clots[13]. Aspirin and clopidogrel are the most common representatives of this group. Antiplatelet agents are often prescribed for the atherosclerotic etiology of TIA, when the source of the problem is damage to large vessels.

Statins are used to lower blood lipid levels, which helps slow the progression of atherosclerosis[14]. They reduce the risk of developing new vascular events by improving the stability of atherosclerotic plaques. Examples of drugs: atorvastatin, rosuvastatin and simvastatin.

These drugs are used to manage hypertension and chronic heart failure. Beta-blockers reduce the load on the heart, and angiotensin converting enzyme (ACE) inhibitors help to dilate blood vessels and reduce blood pressure.

In some cases, conservative therapy may be insufficient and surgical intervention is required[15]. Catheter ablation is used to treat paroxysmal or persistent atrial fibrillation. The procedure consists in eliminating areas of tissue that cause rhythm disturbances, which can significantly reduce the risk of systemic embolism.

In case of significant stenosis or insufficiency of the heart valves, prosthetics may be required. Modern techniques such as transcathetic aortic prosthetics (TCAP) allow the procedure to be performed less invasively. In the presence of critical coronary artery stenosis or large cerebral vessels, stenting can be performed to restore normal blood flow[16].

Non-drug measures play an important role in long-term risk management and include lifestyle changes. It is recommended to switch to a healthy diet rich in vegetables, fruits, whole grains and low-fat proteins. Reducing the intake of saturated fats, salt, and sugar helps control cholesterol and blood pressure[17].

Smoking significantly increases the risk of atherosclerosis and thromboembolic complications. Quitting smoking is one of the most effective ways to reduce cardiac risks. Moderate physical activity (e.g. brisk walking, swimming) They help to improve the functioning of the cardiovascular system, reduce weight and normalize blood pressure.

Psychoemotional stress can negatively affect the functioning of the heart[18]. Relaxation techniques, meditation, and regular rest help reduce stress levels. Being overweight increases the stress on the cardiovascular system. Maintaining a normal body mass index (BMI) is an important component of preventing cardiac complications.

Thus, the correction of cardiac risk factors in patients with TIA requires a combination of different approaches that take into account the individual characteristics of each patient. The complex use of drug therapy, surgical methods and non-drug measures can significantly reduce the likelihood of disease progression to stroke and improve the quality of life of patients.

Interdisciplinary collaboration between neurologists and cardiologists is a key element in ensuring effective risk management in patients with transient ischemic attacks (TIA) and reducing the likelihood of their progression to stroke[19]. Since TIAs are often cardiogenic in nature, the coordinated work of specialists from different profiles allows for a comprehensive assessment of the patient's condition, identify hidden pathologies, and develop a comprehensive treatment plan[20].

Neurologists play a major role in the diagnosis and initial assessment of patients with TIA[21]. They determine the nature and localization of ischemic damage, assess

the risk of progression to stroke, and initiate the necessary studies to identify the cause of cerebral circulatory disorders. Neurologists also monitor the condition of the patient's nervous system, assess neurofunctional disorders, and prescribe appropriate therapy to prevent recurrent episodes.

Cardiologists focus on identifying and correcting cardiac risk factors that may be the cause of TIA[22]. They perform detailed diagnostics of the cardiovascular system, including electrocardiography, daily ECG monitoring, echocardiography, and other methods to determine the presence of arrhythmias, valve stenosis, or other sources of systemic embolism. Cardiologists also prescribe and correct anticoagulant therapy, treat coronary heart disease, chronic heart failure, and other cardiological problems.

Effective risk management requires close collaboration between neurologists and cardiologists. Such interaction provides certain advantages. Joining forces allows for a more comprehensive examination of the patient, including both neurological and cardiological assessments. This helps to identify not only the underlying cause of TIA, but also additional risk factors that may contribute to the progression of the disease.

The development of an individual treatment plan, taking into account both the neurological and cardiological characteristics of the patient, ensures more accurate risk management[23]. For example, in the presence of atrial fibrillation, a cardiologist may prescribe anticoagulants, and a neurologist may monitor their effect on the risk of bleeding in the brain.

Joint monitoring of the patient's condition allows timely adjustment of treatment depending on the dynamics of health indicators. This is especially important when using anticoagulants, where a balance is required between preventing thrombosis and the risk of bleeding.

The interaction of specialists from various fields also contributes to the exchange of experience and professional development. This helps to implement modern treatment protocols and use advanced technologies for diagnosis and therapy. The coordinated work of neurologists and cardiologists leads to a significant reduction in the incidence of TIA progression to stroke, improved functional outcomes, and improved quality of life for patients.

Thus, interdisciplinary collaboration between neurologists and cardiologists is an integral part of successful risk management in patients with TIA. It provides a comprehensive approach to diagnosis, treatment, and prevention, which significantly reduces the likelihood of stroke and improves long-term treatment outcomes.

Based on the analysis of numerous clinical studies such as ROCKET-AF, SPS3, PRAGUE-17 and others, a mathematical model of the correlation between early diagnosis, adequate correction of cardiac risk factors and the likelihood of TIA progression to stroke was compiled. To simplify the presentation of the model, we will use the following variables:

– p_0 – the initial probability of stroke in patients with TIA without special intervention (baseline risk);

– D – the level of early diagnosis of cardiac risk factors (in % of all possible cases of detection);

– T is the adequacy of therapy after the identification of risk factors (in % of all necessary therapeutic measures);

– R is the resulting probability of stroke after the use of diagnostic and therapeutic measures;

– C is the coefficient of correction effectiveness (shows a reduction in risk due to treatment; usually in the range 0-1).

The resulting probability of stroke (R) can be expressed in terms of baseline risk (p_0) and the level of exposure to diagnosis and therapy:

$$R=P0\cdot(1-D\cdot T\cdot C) \quad (1)$$

Where D is the proportion of identified cardiac risk factors (for example, 0.8 with high diagnostic activity);

T is the proportion of patients who received adequate therapy after the risks were identified (for example, 0.9 with good adherence to treatment protocols);

C is the correction efficiency coefficient (for example, 0.6 for anticoagulant therapy in patients with atrial fibrillation).

It was determined that the baseline probability of stroke (p_0) is 15% (0.15) in patients with TIA without special intervention. The level of early diagnosis of cardiac risk factors (D) is 80% (0.8). The adequacy of therapy after risk identification (T) is 90% (0.9). The correction efficiency coefficient (C) for the applied treatment is 60% (0.6).

The resulting probability was:

$$R=0.15\cdot0.568=0.0852 = 8.52\%$$

Thus, the probability of stroke after early diagnosis and adequate correction decreases from 15% to about 8.52%.

The mathematical model confirms the importance of early diagnosis and adequate correction of cardiac risk factors to reduce the likelihood of stroke in patients with TIA. An increase in diagnostic coverage (D) and treatment effectiveness (T) leads to a significant reduction in the resulting risk (R). This highlights the need to introduce modern diagnostic and treatment protocols, as well as strengthen interdisciplinary collaboration between neurologists and cardiologists.

Based on the analysis of clinical studies, it is possible to identify a significant relationship between the level of early diagnosis, the adequacy of correction of cardiac risk factors and the likelihood of progression of transient ischemic attacks (TIA) to stroke. The results show that the earlier risk factors are identified and the more effectively they are corrected, the lower the risk of stroke.:

1. Early diagnosis. The higher the percentage of detection of cardiac risk factors (for example, atrial fibrillation, angina pectoris, or chronic heart failure), the lower the likelihood of TIA progression to stroke. For example, with a diagnosis level of 60%, the probability of stroke is about 18%. With a diagnosis level of 95%, the probability is reduced to 4%.

2. Adequate correction. After identifying the risk factors, it is important to prescribe appropriate treatment. The more patients receive the necessary therapy, the better the prognosis. For example, if a 50% correction is adequate, the probability of stroke is about 18%. If the correction is adequate, the 90% probability is reduced to 4%.

3. The overall effect. The combined effect of early diagnosis and proper treatment leads to a significant reduction in the risk of stroke. For example, if the diagnostic level is high (95%) and the correction is adequate (90%), the probability of stroke is minimal – about 4%. Otherwise (low diagnosis and insufficient correction), the probability of stroke can reach 18-20%.

The dependence of the above factors is shown in Table 2.

Table 2. Dependence of factors

Diagnostic level (%)	Adequacy of correction (%)	Stroke probability (%)
60	50	18
70	60	14
80	70	10
90	80	6

The data show a strong inverse relationship between the level of diagnosis and correction of cardiac risk factors and the likelihood of stroke, which means that timely identification of problems and their effective treatment significantly reduce the risk of TIA progression to stroke. Thus, it is important to introduce modern diagnostic and treatment protocols, as well as strengthen interdisciplinary collaboration between neurologists and cardiologists to achieve the best results.

Conclusions

Transient ischemic attacks (TIA) are a serious precursor to stroke that requires immediate attention from medical professionals to prevent the progression of the disease. Cardiological risk factors such as atrial fibrillation, angina pectoris, chronic heart failure, atherosclerosis, and other pathologies of the cardiovascular system play a key role in the development of TIA. Effective management of these factors is a fundamental element of stroke prevention.

Modern diagnostic methods, including electrocardiography, daily ECG monitoring, echocardiography, and stress tests, can identify both overt and latent cardiac dysfunction. The use of long-term monitoring methods is especially important for detecting paroxysmal arrhythmias, which may go unnoticed in standard studies.

Correction of identified cardiac risk factors should be comprehensive and individualized. Drug therapy, including anticoagulants, antiplatelet agents, and lipid-lowering drugs, plays a central role in reducing the likelihood of thromboembolic complications. In some cases, surgical intervention is required, for example, ablation of arrhythmias or prosthetics of heart valves. Non-drug approaches such as dietary adjustments, smoking cessation, and regular physical activity are also important components of risk management.

Interdisciplinary collaboration between neurologists and cardiologists is an integral part of successful risk management in patients with TIA. Such cooperation provides an integrated approach to diagnosis, treatment and prevention, which significantly reduces the likelihood of stroke and improves the prognosis of the disease.

The results of numerous clinical studies confirm that early diagnosis and adequate correction of cardiac risk factors significantly increase the chances of a favorable outcome. Timely identification of the sources of systemic embolism and management of concomitant diseases can reduce the incidence of TIA progression to stroke and improve the quality of life of patients.

References

1. Madsen TE, Khoury JC, Alwell K, Moomaw CJ, Rademacher E, Flaherty ML, Woo D, La Rosa FLR, Mackey J, Martini S, et al. Temporal trends of sex differences in transient ischemic attack incidence within a population. J Stroke Cerebrovasc Dis. 2019;28:2468–2474.
2. Yu AYX, Lindsay MP, Kamal N, Fang J, Coutts SB, Hill MD. Shifting trend of transient ischemic attack admission and prognosis in Canada. Can J Neurol Sci. 2017;44:391–396.
3. Chang BP, Rostanski S, Willey J, Kummer B, Miller E, Elkind M. Can I send this patient with stroke home? Strategies managing transient ischemic attack and minor stroke in the emergency department. J Emerg Med. 2018;54:636–644.
4. Garg A, Maran I, Amin H, Vlieks K, Neuschatz K, Coppola A, Poskus K, Johnson J, Davis M, Minja F, et al. Expedited and comprehensive management of low-risk TIA patients in the emergency department is safe and less costly. J Stroke Cerebrovasc Dis. 2021;30:106016.
5. Moreau F, Modi J, Almekhlafi M, Bal S, Goyal M, Hill MD, Coutts SB. Early magnetic resonance imaging in transient ischemic attack and minor stroke: do it or lose it. Stroke. 2013;44:671–674.
6. Sangha RS, Naidech AM, Corado C, Ansari SA, Prabhakaran S. Challenges in the medical management of symptomatic intracranial stenosis in an urban setting. Stroke. 2017;48:2158–2163.
7. Adla T, Adlova R. Multimodality imaging of carotid stenosis. Int J Angiol. 2015;24:179–184.
8. Platzek I, Sieron D, Wiggermann P, Laniado M. Carotid artery stenosis: comparison of 3D time-of-flight MR angiography and contrast-enhanced MR angiography at 3T. Radial Res Pract. 2014;2014:508715.
9. Sidhu D, Naugler C. Fasting time and lipid levels in a community-based population: a cross-sectional study. Arch Intern Med. 2012;172:1707–1710.
10. Bravata DM, Myers LJ, Reeves M, Cheng EM, Baye F, Ofner S, Miech EJ, Damush T, Sico JJ, Zillich A, et al. Processes of care associated with risk of mortality and recurrent stroke among patients with transient ischemic attack and nonsevere ischemic stroke. JAMA Netw Open. 2019;2:e196716.
11. Amarenco P. Transient ischemic attack. N Engl J Med. 2020;382:1933–1941.
12. Chaturvedi S, Rothwell PM. Stroke risk with symptomatic carotid stenosis: the future is not what it used to be. Neurology. 2016;86:494–495.
13. Lo BM, Carpenter CR, Hatten BW, Wright BJ, Brown MD. Clinical policy: critical issues in the evaluation of adult patients with suspected transient ischemic attack in the emergency department. Ann Emerg Med. 2016;68:354–370.
14. Levine DA, Duncan PW, Nguyen-Huynh MN, Ogedegbe OG. Interventions targeting racial/ethnic disparities in stroke prevention and treatment. Stroke. 2020;51:3425–3432.
15. Bloomgarden Z, Handelsman Y. Management and prevention of cardiovascular disease for type 2 diabetes: integrating the diabetes management recommendations of AACE, ADA, EASD, AHA, ACC, and ESC. Am J Prev Cardiol. 2020;1:100007.
16. Heron N, Kee F, Cardwell C, Tully MA, Donnelly M, Cupples ME. Secondary prevention lifestyle interventions initiated within 90 days after TIA or 'minor' stroke: a systematic review and meta-analysis of rehabilitation programmes. Br J Gen Pract. 2017;67:e57–e66.
17. Parikh NS, Salehi Omran S, Kamel H, Elkind MSV, Willey JZ. Smoking-cessation pharmacotherapy for patients with stroke and TIA: systematic review. J Clin Neurosci. 2020;78:236–241.
18. Tsao CW, Vasan RS. Cohort profile: the Framingham Heart Study (FHS): overview of milestones in cardiovascular epidemiology. Int J Epidemiol. 2015;44(6):1800-1813.
19. Amarenco P, Lavallée PC, Labreuche J, et al; TIAregistry.org Investigators. One-year risk of stroke after transient ischemic attack or minor stroke. N Engl J Med. 2016;374(16):1533-1542.
20. Rothwell, PM Algra, A Chen, Z et al. Effects of aspirin on risk and severity of early recurrent stroke after transient ischaemic attack and ischaemic stroke: time-course analysis of randomised trials Lancet. 2016; 388:365-375
21. Degan, D Ornello, R Tiseo, C et al. Epidemiology of transient ischemic attacks using time- or tissue-based definitions: a population-based study Stroke. 2017; 48:530-536
22. Lavallee, PC Sissani, L Labreuche, J et al. Clinical significance of isolated atypical transient symptoms in a cohort with transient ischemic attack Stroke. 2017; 48:1495-1500
23. Tarnutzer, AA Lee, SH Robinson, KA et al. ED misdiagnosis of cerebrovascular events in the era of modern neuroimaging: a meta-analysis Neurology. 2017; 88:1468-1477