South American Publishing

SAP Primary Care. 2025;1:43
doi: 10.62486/pc202543

ORIGINAL

Cardioembolic cerebral infarction due to atrial fibrillation: clinical epidemiological profile

Infarto cerebral cardioembólico por fibrilación auricular: perfil clínico -epidemiológico

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Submitted: 29-08-2025 | Revised: 22-11-2025 | Accepted: 29-12-2025 | Published: 30-12-2025

ABSTRACT

Introduction: The relationship between neurological and cardiovascular processes has been widely substantiated from strict pathophysiological and biochemical bases in both systems. Atrial fibrillation is responsible for 25% of ischemic strokes of cardioembolic origin, however in a significant volume of patients whose admission occurs due to an initial or recurrent event of cerebral infarction, the existence of this condition is unknown and its diagnosis is made during admission. Objective: To characterize patients with cardioembolic cerebral infarction secondary to atrial fibrillation. Methods: Cross-sectional descriptive study of 162 patients admitted to the neurological service with a diagnosis of ischemic stroke. The sample was made up of 42 patients with coexisting atrial fibrillation. Parameters of age sex, quantitative neurological damage, associated comorbidities and compromised arterial territory were studied. Results: Atrial fibrillation was found in 25.9% of cases, with a predominance of the male sex, the average age of the patients was 73.4 years (SD=8.5), reaching a prevalence of 32% in people over 75 years of age, the main personal pathological history was arterial hypertension and smoking, a greater involvement of the left cerebral artery was detected for 38.09% and moderate motor deficit predominated. Conclusions: It is necessary to perform serial electrocardiographic monitoring of patients with cerebral ischemic strokes as part of the follow-up policies to anticipate complications and avoid recurrence.

Keywords: Cardioembolic disease; Atrial fibrillation; Cerebral infarction; Stroke.

RESUMEN

Introducción: La relación entre los procesos neurológicos y cardiovasculares ha sido ampliamente fundamentada desde estrictas bases fisiopatológicas y bioquímicas en ambos sistemas. La fibrilación auricular es responsable del 25% de los ictus isquémicos de origen cardioembólico; sin embargo, en un volumen importante de pacientes cuyo ingreso se produce por un evento inicial o recurrente de infarto cerebral, se desconoce la existencia de esta condición y se hace su diagnóstico durante el ingreso. Objetivo: Caracterizar los pacientes con infarto cerebral cardioembólico secundarios a fibrilación auricular. Métodos: Se realizó un estudio observacional descriptivo de corte transversal de 162 pacientes ingresados en el Servicio de Neurología con diagnóstico de ictus isquémico. La muestra se conformó por 42 pacientes con fibrilación auricular coexistente. Los parámetros estudiados fueron edad, sexo, daño cuantitativo neurológico, comorbilidades asociadas y territorio arterial comprometido. Resultados: Se constató la fibrilación auricular en un 25,9 % de los casos, con predominio del sexo masculino. La edad media de los pacientes fue de 73,4 años +_ 8,5 años, alcanzando una prevalencia de 32% en mayores de 75 años. Los principales antecedentes patológicos personales fueron la hipertensión arterial y el tabaquismo. Se detectó una mayor afectación de la arteria cerebral media izquierda para un 38,09% y predominó el déficit motriz moderado. Conclusiones: Es necesario la realización de monitoreo electrocardiográfico seriado a pacientes con ictus isquémicos cerebrales como parte de las políticas de seguimiento para prever complicaciones y evitar la recurrencia.

Palabras clave: Enfermedad cardioembólica; Fibrilación auricular; Infarto cerebral; Ictus.

INTRODUCTION

Atrial fibrillation (AF) is among the main causes of ischemic stroke of cardioembolic origin, especially in the elderly population, and is associated with more severe events, recurrence, and cognitive impairment. (1,2) Globally, cerebrovascular disease is the third leading cause of morbidity and mortality worldwide, the second leading cause of mental disability, and the leading cause of motor disability in adults. (3)

In emergency departments, it is common to see cases where the presence of risk factors such as advanced age, high blood pressure, diabetes mellitus, smoking, and alcoholism point to the possibility of arterial occlusions in situ due to intraluminal thrombi. (4)

However, in many cases, these same risk factors are associated with the onset of underlying cardiac arrhythmias that are unknown to the patient. (5,6) These constitute risk factors that increase the likelihood of developing a first stroke and subsequent recurrences after an event when appropriate therapies are not applied to stop the advancement of fragments considered emboli toward the cerebral vascular tree. (7)

The presence of atrial fibrillation is heterogeneous; it can occur in the presence or absence of demonstrable heart disease. It is characterized by a series of uncoordinated atrial contractions with ineffective ventricular filling, resulting in a rapid and irregular heart rhythm. (8,9) The most common form in the elderly population is persistent atrial fibrillation. (10)

Although the diagnosis is based on the electrocardiogram and supplemented by echocardiography and although validated scales (CHADS-VASc for thromboembolic risk; HAS-BLED for hemorrhagic risk) are available to guide anticoagulation therapy, a significant number of patients are diagnosed with AF only after suffering a stroke. (11) However, a significant number of patients have not been previously diagnosed and are identified only once a cerebrovascular event has occurred. (12)

The objective of this study was to characterize patients with cardioembolic cerebral infarction secondary to atrial fibrillation and identify the associated factors, presentation patterns, and degree of resulting disability.

METHODS

An observational, descriptive, cross-sectional study of patients admitted with a diagnosis of ischemic cerebrovascular disease to the Neurology Department of the Miguel Enríquez Teaching Hospital between January and December 2025 was conducted.

The sample consisted of 162 patients who were admitted with a confirmed diagnosis of cerebral infarction and aged between 25 and 97 years.

A sample of 42 patients who were found to have atrial fibrillation upon admission was studied.

Individual data (age, sex, toxic habits, and personal medical history) were collected from hospital records.

The diagnosis of cerebral infarction was made through a computed axial tomography imaging study using Shimadzu single-slice equipment, in addition to a basic investigation protocol for stroke patients.

Atrial fibrillation was determined using 12-lead electrocardiographic recordings taken upon arrival at the hospital and 72 hours after admission.

A quantitative assessment of the focal neurological defect was performed using the National Institutes of Health Stroke Scale upon the patient's arrival in the neurology ward. The scale consists of 12 parameters to be evaluated during the neurological physical examination, with a score ranging from 1 to 42, with the highest score indicating the most severe condition. These parameters are defined as follows: NIHSS score of 2–5 points: mild neurological damage; NIHSS score of 6–15 points: moderate neurological damage; NIHSS score of 16–20 points: severe neurological damage; and NIHSS score greater than 20 points: serious neurological damage.

SPSS version 22 statistical software was used for data processing, and descriptive statistics were used to calculate absolute and relative frequencies for qualitative variables and the mean and standard deviation for the quantitative variable of age. The results are presented in a contingency table and figures.

RESULTS

Among the 162 patients in the department with a confirmed diagnosis of cerebral infarction, 42 had active atrial fibrillation at the time of admission, representing 25.9% of the total number of patients.

Of these, 26 were male (61.9%), while 16 were female (38.1%).

Although stroke patients ranged in age from 35 to 97 years, the minimum age at which atrial fibrillation was reported was 64 years, with a mean age of 73.4 ± 8.5 years. The greatest number of patients detected were in the 70–79 years age group in both sexes, accounting for 52.4% of all patients detected.

In terms of medical history, only 7 patients had a previous history of arrhythmia detected and studied by the cardiology service, representing 16.7% of the total sample. The remaining patients were unaware that they had cardiac arrhythmia at the time of detection.

Among the comorbidities recorded, the most frequent was high blood pressure, which was recorded in 39 patients (92.9%), which was the main cerebrovascular risk factor. The second most important factor was diabetes mellitus in 18 patients (42.9%), followed by ischemic heart disease, dyslipidemia, chronic kidney disease, and respiratory infections such as community-acquired pneumonia, which were present as coexisting elements in the patients' medical history or recorded in the studies conducted. Among the vascular risk factors, 12 (28.6%) were smoking, and 5 (5) were alcoholism. (Table 1)

Table 1. Associated diseases and risk factors.

Diseases and risk factors	Total patients	%
High blood pressure	39	92.9
Diabetes	18	42.9
Smoking	12	28.6
Ischemic heart disease	7	16.7
Dyslipidemia	6	14.3
Chronic kidney disease	6	14.3
Community-Acquired Pneumonia	5	11.9
Alcoholism	5	11.9

Source: Background information collected from medical records and protocol investigations. Own elaboration.

For the quantitative assessment of neurological deficit in patients, the National Institutes of Health Stroke Scale (NIHSS) was applied upon admission, with the results showing that a total of 17 patients had a moderate disability assessment (40.5%), while only 4 patients had a severe damage assessment (9.5%). (Figure 1)

In patients diagnosed with cerebral infarction associated with atrial fibrillation, there was a higher frequency of lesions related to involvement of the left middle cerebral artery, with a total of 15 cases (35.7%). In 8 patients, vascular damage to the right middle cerebral artery was detected, with a total of 19.0%. Lesions in the vertebrobasilar territories were found in a total of 6 patients (14.3%); however, a total of 13 patients had lesions in several arterial territories as part of the dysfunction of several areas, constituting 31%. These findings were generally consistent with the distribution of lesion locations in patients with ischemic stroke. (Figure 2)

DISCUSSION

Atrial fibrillation has become a factor in the search for the causes of ischemic stroke in the elderly population, both in the detection of the first event and in recurrences. (13)

The detection of 25.9% of patients with AF in this study is close to that obtained by other researchers in the field of epidemiology, such as López et al. (14), who reported a prevalence of 30% in patients over 65 years of age. These studies confirm that the incidence of cases is proportional to aging and that 75% of cases are detected at the time of hospital admission, often because of the occurrence of a neurological complication. (15)

The frequent coexistence of high blood pressure and diabetes mellitus in our patients reflects a common denominator: atherosclerosis. This finding coincides with the findings of Romero et al. ((16)), who highlighted advanced age, diabetes, and valvular heart disease, and with the report by Guevara et al. (5) in Ecuador, which also included smoking and the presence of carotid plaques.

A relevant finding of our study was the predominance of moderate neurological disability. These findings contrast with those of previous studies, such as those of Giner-Soriano et al. (17), who associated milder deficits with rapid access to health services and the use of latest-generation anticoagulant drugs with proven efficacy in the primary or secondary prophylaxis of a cerebral ischemic event. This discrepancy could be explained by variations in regional protocols, time of arrival at the emergency department, a more complex comorbidity profile, or differences in access to optimal prophylactic treatments. (18)

From a pathophysiological point of view, the middle cerebral artery territory is the most commonly affected and acts as a direct recipient of cardiac emboli because of its anatomical location. However, as observed in our series, it is not uncommon for emboli to fragment, leading to multivascular disease that can manifest acutely or through recurrent strokes. (19)

AF is responsible for a high rate of recurrence of cerebral infarcts and causes a large number of patients with cognitive impairment due to vascular dementia, especially when effective therapy is not implemented. (2,18)

CONCLUSIONS

Atrial fibrillation is a prevalent etiology associated with aging in elderly patients with ischemic stroke. Given its embolic pathophysiology and high risk of recurrence, early initiation and strict maintenance of effective anticoagulation are essential to modify the prognosis, significantly reducing the recurrence of ischemic cerebral events and limiting the accumulation of neurological disability and vascular cognitive impairment, which have a significant impact on the quality of life in this population. The optimal management of atrial fibrillation should be considered a priority in the secondary prevention of stroke among elderly people.

INFORMED CONSENT

The authors declare that they have obtained permission to use the diagnostic images included in this article.

REFERENCES

1. Yadava M, Fanaroff AC, Bernstein RA. Cardioembolic Stroke. Neurol Clin. 2024;42(3):651-61. https://doi.org/10.1016/j.ncl.2024.02.010
2. Morales-Bacas E, Duque-Holguera M, Portilla-Cuenca JC, Casado-Naranjo I. Fibrilación auricular y deterioro cognitivo. Rev Neurol. 2022;75(10):311-8. https://doi.org/10.33588/rn.7510.2022186
3. Lippi G, Sanchis-Gomar F, Cervellin G. Global epidemiology of atrial fibrillation: An increasing epidemic and public health challenge. Int J Stroke. 2021;16(2):217-21. https://doi.org/10.1177/1747493019897870
4. Jiménez AC. Incidencia de la fibrilación auricular como factor de riesgo de infarto cerebral en pacientes del Hospital Nacional Sergio Bernales de Collique Lima. Lima: Universidad Privada San Juan Bautista; 2021. https://repositorio.upsjb.edu.pe
5. Guevara GG. Factores de riesgo en complicaciones tromboembólicas cerebrales de pacientes con fibrilación auricular permanente no valvular. Rev Mex Neuroci. 2019;20(4). https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=86229
6. Araus A, Arteaga C, Zapata-Gómez C, Ramos-Ventura C, Méndez B, Otiniano-Cifuentes R, et al. Infarto cerebral embólico de origen no determinado: más allá de la fibrilación auricular. Neurología. 2022;37(5):362-70. https://doi.org/10.1016/j.nrl.2020.07.014
7. García ERP. Características e incidencias de la fibrilación auricular en pacientes con ictus cardioembólico. Mediciego. 2020;26(2). https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=98880
8. Joglar JA, Chung MK, Armbruster AL, Benjamin EJ, Chyou JY, Cronin EM, et al. 2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation. 2024;149(1):e1-e156. https://doi.org/10.1161/CIR.0000000000001193
9. Ruff CT, Giugliano RP. Non-vitamin K antagonist oral anticoagulants for stroke prevention in atrial fibrillation: Review of the evidence and future perspectives. J Am Coll Cardiol. 2022;80(7):683-97. https://doi.org/10.1016/j.jacc.2022.05.039
10. Mou L, Norby FL, Chen LY, O'Neal WT, Lewis TT, Soliman EZ, et al. Lifetime Risk of Atrial Fibrillation by Race and Socioeconomic Status: ARIC Study (Atherosclerosis Risk in Communities). Circ Arrhythm Electrophysiol. 2023;16(1):e011232. https://doi.org/10.1161/CIRCEP.122.011232
11. Benz AP, Hohnloser SH. Stroke prevention in atrial fibrillation: A contemporary review. Eur Heart J. 2023;44(27):2425-37. https://doi.org/10.1093/eurheartj/ehad279
12. Healey JS, Lopes RD, Granger CB, Alings M, Rivard L, McIntyre WF, et al. Apixaban for Stroke Prevention in Subclinical Atrial Fibrillation. N Engl J Med. 2024;390(2):107-17. https://doi.org/10.1056/NEJMoa2310234
13. Kleindorfer DO, Towfighi A, Chaturvedi S, Cockroft KM, Gutierrez J, Lombardi-Hill D, et al. 2021 Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack: A Guideline From the American Heart Association/American Stroke Association. Stroke. 2021;52(7):e364-e467. https://doi.org/10.1161/STR.0000000000000375
14. López-Yong AR, López-Ralón O, Balcázar-Rincón LE, Galdámez-De la Cruz JJ, Chavarría-Olarte ME. Prevalencia de fibrilación auricular en pacientes con Evento Vascular Cerebral isquémico atendidos en el servicio de Urgencias. An Med Univ. 2024;7(1):12-8. https://doi.org/10.31644/AMU.V03.N02.2024.A07
15. Kamel H, Longstreth WT, Tirschwell DL, Kronmal RA, Broderick JP, Palesch YY, et al. The AtRial Cardiopathy and Antithrombotic Drugs In prevention After cryptogenic stroke (ARCADIA) trial: Rationale and methods. Am Heart J. 2023;256:1-11. https://doi.org/10.1016/j.ahj.2022.10.082
16. Romero-Acaro F. Factores de riesgo asociados a enfermedad cerebrovascular en pacientes con fibrilación auricular, hospitalizados en el servicio de cardiología y medicina interna del Hospital Metropolitano entre enero 2013 y diciembre 2017. Quito: Pontificia Universidad Católica del Ecuador; 2020. https://repositorio.puce.edu.ec/handle/22000/17496
17. Giner-Soriano M, Casajuana M, Roso-Llorach A, Vedia C, Morros R. Efectividad, seguridad y costes de la prevención tromboembólica en fibrilación auricular. Estudio de cohortes apareado por Propensity Score. Aten Primaria. 2020;52(3):176-84. https://doi.org/10.1016/j.aprim.2019.03.010
18. Xiong X, Fan M, Ma J, Deng J. Association of atrial fibrillation and cardio-embolic stroke with post-stroke delirium susceptibility: a systematic review and meta-analysis of observational studies. World Neurosurg. 2022;166:e697-e706. https://doi.org/10.1016/j.wneu.2022.08.025
19. Saver JL, Chapot R, Agid R, Hassan AE, Jadhav AP, Liebeskind DS, et al. Thrombectomy for Distal, Medium Vessel Occlusions: A Consensus Statement on Current Knowledge and Directions for Future Research. Stroke. 2024;55(4):1106-15. https://doi.org/10.1161/STROKEAHA.123.044721

FUNDING

No financing

CONFLICT OF INTEREST

None

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