Ischemic Stroke of Cardio-Embolic Origin: Study of 42 Cases

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Abstract: *Introduction: Cardiac embolism is a major cause of ischemic strokes, which are the more common cause of disabilities acquired in adulthood, and the third leading cause of death after coronary heart disease and cancer. This is a real medical emergency. Objective: The main purpose of our study is to highlight the frequency of cardio-embolic causes in the genesis of Ischemic stroke at the University Hospital of Marrakech and therefore to support the semiological, paraclinical (biological and radiological) clinical properties, therapies and prognoses of ischemic strokes of cardio-embolic origin. Methods: We have performed a mono-centric cross-sectional study of patients with ischemic stroke, hospitalized during the period from 1 April 2019 to 31 August 2022 at the department of Cardiology in the University Hospital of Marrakech.* <u>*Results*</u>*: The prevalence of stroke was13.95% of the all strokes supported during this period. The average age of our patients was 62 years, with 41-and 90-year-old extremes. The most representative age group was higher at age 60 or 76.20% of patients. A female predominance was noted in our series53% (22 patients), with a sex ratio of 1.12. Cardiovascular risk factors were dominated by High blood pressure in 31 patients (73.81%), followed by dyslipidemia in 19 cases (45.23%). The circumstances of discovery were dominated by palpitations in 23.8% of patients, followed by dyspnea in 21.42% of patients. The neurological symptomatology at admission was dominated by consciousness disorders in 24 cases (57.14%) including 13 comatose patients (30.95%) followed by motor deficit symptoms. In the cerebral scanner, a lesion type of infarction was noted in 82.17% of cases, spontaneous hemorrhagic reshaping was found in 2 patients (4.76%) and in 15.8% of cases, the scanner was normal. the predominant location was cortical in 41.58% of patients.* <u>*Conclusion:*</u> *Cardiovascular strokes are a public health problem by the prevalence in our hospital structure, severe by disability and mortality rate; hence the value of early diagnosis and treatment will improve the functional and vital prognosis.*

Keywords: Ischemic stroke, Embolizing heart disease, Atrial Fibrillation, Valvular disease

1. Introduction

According to the World Health Organization (WHO), stroke is defined as 'the rapid development of localized or global clinical signs of brain dysfunction with symptoms lasting more than twenty-four hours leading to death, with no apparent cause other than vascular origin'. According to the WHO, strokes result from the interruption of blood flow in the brain, in connection with a ruptured blood vessel or obstruction by a clot.

Stroke is the leading cause of physical disability in adults, the second leading to dementia (after Alzheimer's disease) and the third leading cause of death after coronary heart disease and cancer. This is a real medical emergency.

They may be due to several etiologies dominated by atherosclerosis and embolic heart disease. The identification of cardio-embolic causes remains essential to prevent ischemic recurrences by an adequate anticoagulant treatment.

The main purpose of our study is to highlight the frequency of cardio-embolic causes in the genesis of Ischemic stroke at the University Hospital of Marrakech and therefore to support the semiological, paraclinical (biological and radiological) clinical properties, therapies and prognoses of ischemic strokes of cardio-embolic origin.

1.1 Patients and Methods

This is a mono-centric cross-sectional study of patients with ischemic stroke, hospitalized during the period from 1 April 2019 to 31 August 2022 at the department of Cardiology in the University Hospital of Marrakech

Clinical endpoints studied were epidemiological elements: age, gender, cardiovascular risk factors (high blood pressure, diabetes, smoking, dyslipidemia and obesity (body mass index > 25), cardiovascular history, thromboembolic diseases (phlebitis, pulmonary embolism), coronary disease (stable angina, myocardial infarction), heart failure, known embolic heart disease, rhythm disorders (atrial fibrillation, flutter) and congenital heart defects.

Different clinical aspects (revealing functional signs, neurological signs, cardiovascular signs and other associated signs), and paraclinical (electrocardiogram, Holter-electrocardiogram, biology, chest x-ray, echocardiography-doppler, transesophageal echocardiography in search of intracavitary or intra-atrial thrombus, patent foramen ovale, interauricular communication and other malformations.

The cerebral scan made it possible to make the diagnosis, to specify the size, the seat of the infarction, a hemorrhagic reshaping, and to look for signs of engagement).

Etiologies were also investigated, with the different scores (CHa2ds2-Vasc, niHss, Has-Bled) and Intra-hospital evolution were evaluated.

The parameters studied were recorded on a computerized survey sheet using the department folders.

The data analysis was performed with the SPSS software (statiscal Package For social sciences).

2. Results

From 1 April 2019 to 31 August2022, 42 patients were hospitalized at the department of Cardiology in the University Hospital of Marrakech, for an ischemic stroke with a record and prevalence of 13.95% of the all strokes supported during this period.

The average age of our patients was 62 years, with 41-and 90-year-old extremes. The most representative age group was higher at age 60 or 76.20% of patients.

A female predominance was noted in our series53% (22 patients), with a sex ratio of 1.12.

Cardiovascular risk factors were dominated by High blood pressure in 31 patients (73.81%), followed by dyslipidemia in 19 cases (45.23%).

Family High blood pressure was noted in 14 patients (33.33%) and was associated with diabetes in 10 cases (23.8%).

A history of previous stroke was found in 12 patients (28.57%).

Table 1: Baseline characteristics

	Number	Rate
Age (years)		
• >60	32	76.20%
• <60	10	23.80%
Sex		
• Male	20	47%
• Female	22	53%
Diabetes	10	23.8%
High Blood Pressure	31	73.81%
Dyslipidemia	19	45.23%
Smokers		
• Current	3	7.14%
• Ex	6	14.28%
Previous stroke	12	28.57%
Obesity	5	11.9%

Table 2: The history of heart disease identified in the study population

	Number	Rate
Ischemic heart disease	9	21.42%
Atrial fibrillation	10	23.8%
Mitral Stenosis	5	11.9%
Mitral Regurgitation	2	4.76%
Poly-valvular disease	3	7.14%
Mechanical prosthesis	4	9.52%
Previous Stroke	12	28.57%

The circumstances of discovery were dominated by palpitations in 23.8% of patients, followed by dyspnea in 21.42%of patients.

The neurological symptomatology at admission was dominated by consciousness disorders in 24 cases (57.14%) including 13 comatose patients (30.95%) followed by motor deficit symptoms

Table 3: Prevalence of circumstances of discovery in the study population

	Number	Rate
Palpitations	10	23.8%
Dyspnea	9	21.42%
Collapse	3	7.14%
Headaches	8	19%
Syncope	2	4.72%

Table 4: Neurological symptoms in the study population

	Number	Rate
consciousness disorders	24	57.14%
transient ischemic attack	9	21.42%
Speech disorders (aphasia and dysarthria)	17	40.47%
Right hemiplegia	19	45.23%
Left hemiplegia	11	26.19%
Right hemiparesis	8	19%
Left hemiparesis	12	28.57%

Left heart failure was noted in 13cases and global in 11 patients.

Cardiomegaly was found in 22 patients with an average cardio-thoracic index of 0.6 (0.50-0.75), interstitial syndrome in 29% and one pleural effusion in 2.06% of cases.

The EKG at admission revealed a sinus rhythm in27 patients, a trial fibrillation in 10 patients and atrial flutter in 5 patients

ST segment elevation with Q-wave of necrosis was noted in 8 patients and left ventricular hypertrophy was noted in 18 patients

According to 24-hours Holter-EKG, the paroxysmal a trial fibrillation was found in 16 patients.

The average ejection rate was of 59 8.56% (52-61%), it was moderately altered in 17 patients, severe in 8 patients.

The volume of the left atrium indexed >34 ml/m2 was present in 18 patients, left ventricular hypertrophy was found in 21 patients with a LV mass of 126.36 ±34.31 mg/m2.
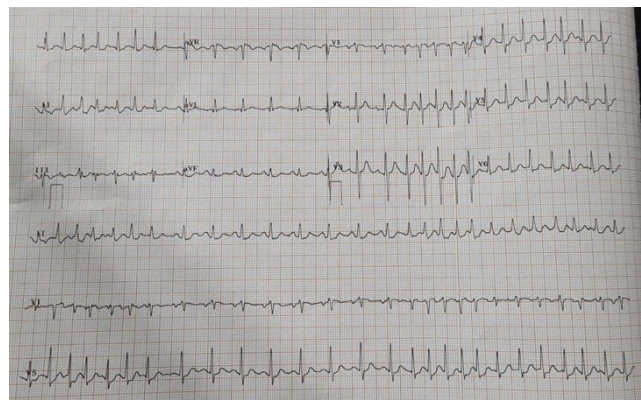

Figure 1: EKG showing complete arrhythmia by atrial fibrillation

The mitral valve disease was mitral stenosis in 5 patients (11.9%) of which 3 patients with severe stenosis

Mitral regurgitation was identified in 2 patients (4.76%) and 3 patients had Poly-valvular disease

Left intraventricular thrombus was noted in 5.9% of cases. The Mean systolic pulmonary pressure (PaPs) was 46.52 10.73 mmHg (24-71 mmHg).

Transesophageal echocardiography was performed in patients with sinus rhythm, intra-atrial thrombus was noted in 13 patients

The Arterial Doppler, no significant plaque was objectified in ourserie.

Figure 2: Mitral stenosis 2D Image on a long longitudinal long-axis parasternal incidence

The cerebral scanner, a lesion type of infarction was noted in 82.17% of cases, spontaneous hemorrhagic reshaping was found in 2 patients (4.76%) and in 15.8% of cases, the scanner was normal. the predominant location was cortical in 41.58% of patients.

CHa2ds2-Vasc score high in 29 patients (69.04%), 8 patients an intermediate score and Low in 5 patients.

According to niHss score, stroke was minor in 25.74% of patients, moderate in 12 cases and severe in 5patients (11.9%).

As for the etiological aspects, the following table shows the distribution in our series.

Table 5: The history of heart disease identified in the study population

	Number	Rate
Valvular AF	3	7.14%
Non Valvular AF	7	16.66%
Dilated cardiomyopathy	6	14.28%
Ischemic cardiomyopathy	9	21.42%
Mitral Stenosis	5	11.9%
Mitral Regurgitation	2	4.76%
Poly-valvular disease	3	7.14%
Mechanical prosthesis	4	9.52%
Infective endocarditis	1	2.38%

3. Discussion

The prevalence of cardioembolic ischemic stroke in our series was 13.95% of a VCi hospitalized at the department of Cardiology in the University Hospital of Marrakech, according to literature data, this prevalence is in Senegal around 15.33% [5], in Asia, Thurin et al [6] have found a prevalence of 22.9% and 25.7% in the United States of America [7].

This geographical disparity could be explained by the multicentre nature of country work, the availability of diagnostic and the level of education of the populations of these countries who consult at the first warning signs.

The average age of our patients was 62 years, with 41-and 90-year-old extremes. The most representative age group was higher at age 60 or 76.20% of patients.

This average age is 62 years at the from Fall [8] to Senegal. Some Moroccan studies [9] found an average age of 60.8 years. As in Algeria, a research [10] found an average age of 62.83 years with 26 and 94 year extremes and damorou [11] with an average of 59.19 years with29 and 92 year old extremes.

Extreme ages show that cardio-embolic strokes occurs at any age, however in developed countries the formed strokes occur most often 10years later than in emerging countries.

In Japan, the average age is 73.7 years [12], 68 years in France [13] and 73.1 years in Norway [14].

This gap is partly related to life expectancy, more in developed countries.

In our series, a female predominance was noted in our series53% (22 patients), with a sex ratio of 1.12, which is consistent with data from the literature [15].

Man is significantly more exposed to stroke than female before menopause. The level of risk joined very gradually that of men several years after menopause.

High blood pressure is the main factor risk in our patients (73.81%) similar to the study [10] in Algeria and Senegal by Mboup [16].

Followed by dyslipidemia, smoking, diabetes and obesity, these risk factors can be modified by conventional treatment, so they need to be tracked, identified and managed by cardiologists, generalists, internists, diabetologists and neurologists, to fight a daily battle of great magnitude by prevention and information actions knowing that more than half of hypertensives are untreated [17; 18; 19].

In our series, clinical symptomatology was dominated by consciousness disorders that have been recorded in57.14% our patients, of which Benahmed in his study found a rate of33.5% [20].

In Mauritania, Hamady [21] noted a rate of 52.2% ranging from confusion to deep coma, 27.6% and 48.2% in Kouna [22] and Balogou [23] respectively.

The motor deficit was found in 30 patients or 71.42%, 84.2% in the series of Hamady et al [21]. Balogou [23],

damorou [11] and Kouna [22] revealed motor neurological deficitin their study respectively, in 51.1%, 79.12% and96.1%.

This neurological symptomatology described joins the European and US series data [3; 7; 15].

Electrocardiogram abnormalities were dominated by supraventricular disorders: permanent atrial fibrillation and paroxysmal in 59.36% of cases.

This electrocardiogram abnormality is the most observed in the series of Koeningand Halinibut also according to the European and North-American [3; 7; 15].

According to echocardiography (transthoracic and transesophageal), thrombus was found in 5.9% of cases. Left intra-atrial thrombus was noted in 13 patients (30.95%).

As for the cerebral scanner, a lesion type of infarction was noted in 82.17% of cases, spontaneous hemorrhagic reshaping was found in 2 patients (4.76%) and in 15.8% of cases, the scanner was normal. the predominant location was cortical in 41.58% of patients. This can be explained by early use of the scanner.

The predominant location in our serie was cortical in 41.58% of patients, of which the territory of the middle cerebral artery was the most affected, found in 23.23%, these results are similar to data from the literature.

Compared to non-cardiac cerebral stroke, some characteristics seem to be more common in cardio-embolic strokes, as the existence of multiple infarctions or simultaneously affecting carotid territories and vertebrobasilar, discovery of silent cortical and subcorticalinfarction, large infarction, and the occurrence of hemorrhagic transformation.

The hemorrhagic transformation, consequence of embolism obstructing the middle cerebral artery is quite evocative of acardio-embolic mechanism, even if this type is also encountered in case of carotidstenosis

For atrial fibrillation and, this cardiac arrhythmia was found in 23.8%of our patients, 19.78% of cases in the series of damourou et al [11], 13.3% of cases in the series of Sraïri et al [25], 48.27% in Algeria [10], and 44.4% in Senegal according to Mboup and al [16]

Among these patients 93% of patients with atrial fibrillation had high blood pressure, as there is a strong correlation between the two, and their consequences on left ventricular hypertrophy which represents one of the main causes of atrial arrhythmia, including atrial fibrillation

The incidence of a trial fibrillation is high growing in the world due to the aging of the population. it is estimated between 5 and 16 million in the United States and more than a million in Japan in 2030.

It is important to detect to prevent the occurrence of cardio-

embolic stroke [19]. careful cardiac assessment and appropriate treatment are necessary.

Dilated cardiomyopathy, was noted in 14.28% our series, 13.8% at damorou [11], and 1.4% in the Kane study [26].

Left intraventricular thrombus is also a common complication of dilated cardiomyopathy (up to 60% of cases at autopsy). In the majority of cases, patients with dilated cardiomyopathy with ventricular thrombus have symptoms of congestive heart failure, which was observed in 57.14% of patients.

Damorou noted a prevalence of 13.18% the risk of stroke is about 2% in the first weeks following myocardial infarction [17]. The mechanism is usually embolic, from a thrombus formed in the left ventricle next to a dyskinetic area or within an aneurysm, the apex is particularly thrombogenic.

Anticoagulant treatment for 3 to 6 months is usually recommended for ventricularthrombus.

Following myocardial infarction, the risk of is about 1.5%/year on the long term. the mechanisms are varied (atherosclerosis, af, left ventricular dysfunction, persistent thrombus after the first month of infarction.

Valvular heart disease in our series was dominated by mitral valve stenosis (11.9%) of patients including 2 with mitral regurgitation.

In the Kane series [26] in Senegal a rate of 9.5% has was observed, 10.99% perdamorou [8] in Togo. mitral stenosis is the most common embolic heart disease.

The risk is 3 to 7 times higher when it is associated with af. the presence of a spontaneous contrast and/or significant dilation of left atrium, a history of embolic stroke justify anticoagulant therapy.

The prevalence of Infective endocarditiswas8.79% in Togoin the damorou series [11], it is responsible for at least 3% of brain stroke which may be the first manifestation.

The embolic risk may persist few weeks or months after the sterilization of the vegetations. The endothelialization may require a duration extended by about 6 months.

The original valve prosthesis embolus was noted in 4 cases in our study.

The patients with a mechanical valve are at very high risk which is higher for the mitral valve prostheses than aortic.

Anticoagulant treatment is systematically recommended with target inr depending on the position and type of valve used [27].

In our study the anticoagulant treatment based low molecular weight or standard heparin has been introduced at curative dose in 76.25%of patients, it was associated with an anti-vitamin Kacenocoumarolin absence of a contraindication.

The introduction of anticoagulants depended on the time recommended by the niHiss score.

AVK widely used in our practice daily, difficult handling with a higher hemorrhagic risk are being supplemented by new oral anticoagulants with a lower risk and equal efficiency, but due to the high cost compared to the aVK, their use in our regions remains very limited.

New oral anticoagulants (naCo): dabigatran, apixaban, rivaroxaban) are effective molecules, easy to use with fast action and less interaction.

According to the recommendations, this anticoagulant treatment is recommended in patients with stroke associated with non valvular atrial fibrillation permanent or paroxysmal [28].

The average length of hospitalization was 7 days with extremes of 1 and 15 days. the evolution was favorable in 71.3% of our patients. Mortality rate was 2.42%, which is respectively slightly lower in the Fall [8] series and damorou [11] with a rate of 21.74% and 27.4%.

This difference could be explained by the fact that our patients had less niHss, early management associated with lower co-morbidity in our patients compared the other series [29, 30].

4. Conclusion

Cardiovascular strokes are a public health problem by the prevalence in our hospital structure, severe by disability and mortality rate, hence the value of early diagnosis and treatment will improve the functional and vital prognosis.

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