Cerebrovascular accidents- epidemiological and etiological profile of patients admitted to the Mohamed VI University Hospital of Marrakech: about 300 cases

Abstract:

Introduction: Cerebrovascular stroke is a public health problem. They are dominated byischemic origin, of which cardioembolic etiology is a significant cause. The aim of our study is to determine the in-hospital prevalenceof cardiovascular disease in patients with a DVA and the diagnostic and therapeutic impact of all the complementary examinationscarried out.

Materials and method: This is a retrospective descriptive and analytical study carried out over a 7-year period (July 2017-June 2024) compiling cases of ischemic stroke admitted to the cardiology and neurology departments of the Mohamed VI University Hospital in Marrakech. Routine examinations included ECG, transthoracic cardiac echocardiography and echocardiography-doppler of the neck vessels, while transesophageal echocardiography (TEE) and Holter ECG were performed only in a select cases.

Results: Three hundred cases were collected and evaluated. The mean age of the patients was 68.3 ± 8.9 years (21-90 years), with a clear male predominance (64.3%). Eighty percent had at least one cardiovascular risk factor. A cardiovascular history of hypokinetic cardiomyopathy at the dilated stage was found in 7.6% of cases. The average consultation time was 26 hours. Clinical presentation according to NIHSS score was as follows: a score below 10 in 65% of cases, between 10 and 20 in 21% and above 20 in 14%.

ECG was abnormal in 67.6% of cases (203 patients); TTE was abnormal in 63%, with dilatation of the left atrium (LA) the main abnormality. TEE in 8% of cases revealed 3 cases of inter-atrial aneurysm with patent foramen oval, seven cases of left atrial thrombus, one left atrial myxoma, 3 cases of mitral valve wing block and 2 cases of complex aortic atheroma exceeding 4 mm in thickness. Holter ECG revealed 27 cases of transition to atrial fibrillation

Conclusion: Ischemic stroke etiologies are largely dominated by lacunar infarction and embolic heart disease, followed by atherosclerosis. This highlights the role of the cardiologist in both etiological management and in guiding the therapeutic approach. Thus, improving prognosis hinges on early diagnosis and a thorough etiological assessment before concluding a cryptogenic stroke.

Key Worlds :

Cerebral vascular accidents (CVA), Cardioembolic, Holter ECG, atherosclerosis, atrial fibrillation

Introduction:

Stroke is a public health problem. They are dominated by ischemic stroke, of which cardioembolic etiology is a significant cause. The major role of the cardiologist and neurologist is to be able to think of this origin when there are favorable imaging criteria. Stroke management has evolved because of the diagnostic precision offered by modern cerebral imaging, thrombolysis and the proven benefits of quality care in the acute phase. The aim of our study is to determine the in-hospital prevalence of cardiovascular disease in stroke patients, and the diagnostic and therapeutic impact of all complementary tests performed.

Patients and methods

This is a retrospective descriptive and analytical study conducted over a period of 7 years(July 2017-June 2024), collating cases of ischemic stroke admitted to the cardiology and neurology departments of the Mohamed VI University Hospital in Marrakech. Patient history and/or information from their relatives allowed identification of cardiovascular and systemic medical history, known cardiovascular risk factors, disease history, and the mode of onset of neurological deficits. Clinical assessment was based on the NIHSS score. A thorough and systematic search for cardio-vascular risk factors included blood glucose measurement, complete lipid profile and blood pressure monitoring (Holter monitoring). The complete cardiovascular and neurological examination was conducted after measuring key hemodynamic parameters (blood pressure using a validated automatic sphygmomanometer, heart rate, respiratory rate, and oxygen saturation using a digital pulse oximeter), and waist circumference using a measuring tape. Electrocardiogram (ECG), transthoracic echocardiography (TTE) and carotid Doppler ultrasound supplemented by transcranial Doppler, as well as hemostasis tests, complete blood count, serum electrolytes, blood glucose, and lipid profile were systematically performed for all patients. Transesophageal echocardiography (TEE) and Holter ECG were only performed subsequently when initial assessments did not conclusively rule out a cardiac origin or in patients under 45 years with persistent doubt. Treatment was either symptomatic, as part of secondary prevention, or etiological, depending on the cause.

Results:

Three hundred cases were collected and evaluated. Table 1 summarizes the main clinical characteristics of the patients. The average age of the patients was 68.3 ± 8.9 years (21-90 years), with a clear male predominance (64.3%). Eighty percent had at least one cardiovascular risk factor. A cardiovascular history of dilated hypokinetic cardiomyopathies was found in 7.6% of cases. The average consultation delay was 26 hours. Clinical presentation according to NIHSS score was as follows: score below 10 in 65% of cases, between 10 and 20 in 21% and above 20 in 14%.

Table 1: Clinical Characteristics of Patients: Cardiovascular Risk Factors and Medical History

characteristics	n = 300 cases
Mean age in years, years	68.3 ± 8.9, (21-90)
Sex ratio M/F	193/107 = 1.8
Atrial fibrillation, n (%)	63 (21)
Mitral stenosis (MR), n (%)	38 (12,6)
Mechanical valve replacement (MVR), n (%)	8 (2,6)
Dilated cardiomyopathy, n (%)	23 (7,6)
HTA or anti-HTA treatment, n (%)	192 (64)
DT or anti-DT treatment, n (%)	124 (40)
Smoking, n (%)	157 (52,3)
Dyslipidemia, n (%)	113 (37,6)
Abdominal obesity, n (%)	73 (24,3)

Cardiovascular examination revealed irregular heart sounds in 63 cases, diastolic rolling at the mitral focus in 38 cases, and a vascular murmur in 34 cases. The ECG was abnormal in 67.6% of cases (203 patients): 63 cases of atrial fibrillation, 67 cases of repolarization disorder suggestive of ischemic cardiopathy, 40 cases of ventricular hypertrophy and 33 cases of conduction disorder. TEE was abnormal in 63% of cases, identifying left atrial (LA) dilatation in 151 cases, left ventricular dilatation and/or hypertrophy in 49 cases, severe LA systolic dysfunction with EF <30% in 12 cases, 38 cases of mitral stenosis, left atrial thrombus in 8 casesand suspected mechanical valve thrombosis in 3 patients. Transesophageal echocardiography (TEE), performed in 8% of casesrevealed 3 cases of atrial septal aneurysm with patent foramen, seven cases of left atrial thrombus, one left atrial myxoma, 3 cases of of prosthetic mitral valve leaflet obstructionand 2 cases of complex aortic atheroma exceeding 4 mm in thickness. Holter ECG was performed in 54% of cases (152 patients) and revealed 27 cases of paroxysmal atrial fibrillation (AFib) and 39 cases of frequent supraventricular extrasystole.

Table 2 summarizes the main abnormalities found on carotid Doppler ultrasound, with stenoses exceeding 70% accounting for 19.6%, or 59 cases.

Anomaly	Numbers of cases	Percentage (%)
Diffuse intimal thickening	189	63
Diffuse atheromatous overload	123	41
50% < stenosis < 70%	67	22,3
Stenosis > 70%	59	19,6

Therapeutic management was based on symptomatic treatment as part of secondary prevention using antiplatelet agents, statins, control of cardiovascular risk factors, motor and speech rehabilitation. Additionally,etiological treatment included interventional or surgical interventions depending on the cause. The follow-up visits at three and six months assessed subsequent evolution according to the modified

Rankin Scaleas follows: complete recovery (score = 0) in 14%, moderate disability (score = 0-1) in 39%, moderately severe disability (score = 3-4) in 28%, severe disability (score = 5) in 10% and death (score = 6) in 9%.

Discussion:

Stroke is a significant cause of morbidity and mortality worldwide. Ischemic strokes (AVCI) account for 80% of all strokes [1], and their incidence increases with population aging [2-3]. The mechanism of this life-threatening situation is unclear and may be multifactorial [4]. There are four main pathophysiological mechanisms described, including (1) cardioembolic, (2) hypotensive (3), neurogenic stunned myocardium, and (4) dissection [4]. The criteria for suspecting a cardio-embolic cause are:multiple strokes of different ages, association with other systemic embolisms and rapid recanalization of an occluded major cerebral artery. The mean age in our series was 68.3 ± 8.9 years, which is consistent with findings from other studies in Morocco (Fez: 65.5 ± 13.9 [5], at the military hospital in Marrakech: 66.3 ± 12.5 [6]) and in France (66.3 ± 13.4 years) [7].A male predominance is reported in the majority of, including the study by Vinsonneau in France [7], the Dijon register [8] and the study at the military hospital in Marrakech[6], which is consistent with our findings. However, the study in Fes concluded with a female predominance [5].

The first step in diagnosis is to identify cardiovascular risk factors (CVRFs). The main CVRFs identified in our study are: hypertension, diabetes, smoking and dyslipidemia. Hypertension (HTA) ranks first in 64% of cases, as confirmed by the study by Vinsonneau and Sirakhé [9]. Indeed, a meta-analysis of 17 trials [10] involving approximately50,000 patients showed that a mean reduction in systolic blood pressure of 10-13 mmHg led to a 38% reduction in the risk of stroke. The risk associated with diabetes is comparableto that of hypertension, with diabetic individuals having a 1.5% annual risk of ischemic stroke [3]. In our series, 40% of patients were diabetic, aligning with findings by Bendriss et al. [3] and Srairi [11] in Morocco, who reported 41.8% and 36.78% diabetes respectively.In contrast, a Senegalese study [12] reported a lower rate at 11.76%.

Regarding the primary predisposing factor for carotid atherosclerosis, which is smoking, 52.3% of our patients were smokers, which is a relatively high rate compared to the studies of Kane et al. [13] and Bendriss et al. [3]. We observed 37.6% of patients with dyslipidemia, compared to only 10% in the study by Bendriss et al. and 10.97% in the study by Srairi et al. [11]. This difference is likely due to sample size variations.

Screening for potential cardiac causes of ischemic strokes involves cardiovascular investigations such as ECG, echocardiography (ETT), carotid Doppler ultrasound, and, secondarily, transesophageal echocardiography (ETO) and Holter ECG [14].

The ECG performed systematically in our study was pathological in 67.6% of cases, with 21% exhibiting atrial fibrillation (AF), and an additional 17.7% detected AF during

Holter ECG monitoring. A cardioembolic source, dominated by atrial fibrillation (AF), was incriminated in 17% to 46% of I strokes [3-15]. A study conducted in Mali [16] found AF in 19.78% of cases, while a study at the Military Hospital of Marrakech in 2012 identified AF in 17.3% of cases [3].

Transthoracic echocardiography (ETT) is crucial for screening for embolic heart disease (CE), and when coupled with transesophageal echocardiography (ETO), it can detect over 52% of CE cases according to various studies [7]. This enables classification of ischemic stroke origins into major and minor embolic cardiopathies [14]. In our series, major sources of embolisms were primarily AF, mitral stenosis, and dilated ischemic cardiomyopathy. Patent foramen ovale (PFO) was detected in 3 patients in our population; however, literature reports prevalence ranging from 22% to 54% of PFO in ischemic strokes using ETT with contrast or ETO [17].

In our series, only 2 cases of complex aortic atheroma were observed despite it being a high-risk vascular source of embolism. This may be due to the relatively young age of our population.

Classification according to TOAST criteria varies widely across different studies. In our study, lacunar infarctions were most common, followed by atheromatous and cardioembolic origins.

Mortality following a stroke varies, and long-term excess mortality is primarily associated with coronary risk. In our study, 27 patients died (9%). Our findings are similar to those reported by Rhissassi et al. [5] from the Moroccan series in Fes, which reported a mortality rate of 9.9%.

In our series, long-term outcomes show complete recovery without sequelae in 14% of cases, which aligns with findings from other Moroccan studies. However, this differs significantly from the study by Weber et al., which reported a 46% rate of complete recovery, likely attributed to early patient management in their series [18].

Conclusion:

The etiologies of ischemic strokes (AVCI) are predominantly lacunar infarcts and embolic cardiopathies, followed by atherosclerosis. This underscores the crucial role of the cardiologist in both etiological diagnosis and guiding therapeutic approaches. Therefore, improving prognosis primarily involves early diagnosis and a thorough etiological assessment before concluding a stroke as cryptogenic.

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