

## Ischemic stroke in the intensive care unit: About 75 cases

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### Abstract

Stroke is characterized by the sudden onset of a focal neurological deficit and is a frequent and potentially serious pathology that constitutes a medical and, sometimes, surgical emergency. The objective of this work is to elucidate the epidemiological, clinical, paraclinical, therapeutic and evolutionary aspects of the cerebral vascular accident in the environment of intensive care unit in order to define the factors of bad prognosis: This is a retrospective study including all patients hospitalized in A1 intensive care unit of HASSAN II University Hospital of Fes for acute ischemic stroke(AIS) over a period of 7 years since 2014 until 2020. We collected 75 patients over a period of 7 years (2014-2020), 55% of our patients are male, the average age is 65.52 years. Arterial hypertension, heart disease and diabetes are the main risk factors, and hemiplegia is the main focal neurological sign encountered. Sylvian cerebral infarcts (territory of the middle cerebral artery) predominate (64%), followed by the territory of the posterior cerebral artery (9.3%) and the basilar trunk (4.3%). The main prognostic factors related to mortality were: initial GCS, presence of vital distress, mechanical ventilation, inhalation, infection and cerebral involvement. A hemicraniectomy was performed in 16% of our patients with an estimated mortality of 57%.

**Stroke represents:** The first cause of acquired motor disability in adults; The second cause of major cognitive impairment after Alzheimer's disease. The improvement of the prognosis depends on the quality of primary and secondary prevention and on the rapidity of diagnostic and therapeutic management in the acute phase.

**Keywords:** Ischemic stroke; Epidemiology; Clinical; Paraclinical; Therapeutics; Prognosis

### 1. Introduction

Stroke is defined as a neurological deficit of sudden onset, due to cerebral ischemia or hemorrhage. We focus here on ischemic stroke, which accounts for approximately 75% of all strokes. Ischemic stroke is caused by localized occlusion of a vessel leading to an interruption of oxygen and glucose supply to the brain, resulting in a collapse of metabolic processes in the affected territory. The World Health Organization (WHO) defines stroke as "the presence of clinical signs of focal (or global) cerebral dysfunction of rapid onset with symptoms persisting for 24 hours or more, or leading to death with no apparent cause other than a vascular origin. The improvement of the prognosis depends on the quality of primary and secondary prevention and on the rapidity of diagnostic and therapeutic management in the acute phase.

### 2. Patient and methods

After the agreement of the local ethics committee, we performed a retrospective study in the A1 polyvalent intensive care unit department of the Hassan II University Hospital of Fez, over a period extending from 2014 to 2020. Our study included all patients admitted to the A1 intensive care unit for management of ischemic stroke retained on clinic-radiological criteria. All patients with hemorrhagic stroke, transient ischemic attack, meningeal hemorrhage, cerebral

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thrombophlebitis, and head trauma were excluded from this study. The data were collected from the files archived in the department, based on a pre-established exploitation form and the use of Excel software for the analysis of the results.

### 3. Results

During the period studied, from 2014 to 2020, the Hassan II University Hospital of Fez recorded seventy-four cases of AIS. The average age of our patients was 65 years with extremes of 21 and 90 years (Figure 1); there was a slight male predominance with a sex ratio of 1.41. Different risk factors were identified in our study (Figure 2). High blood pressure was found in 30 of our patients, i.e. in 40% of cases, and diabetes was found in 17 of our patients, i.e. 22.6% of cases. Underlying cardiac disease was found in 24 patients, a percentage of 32%.

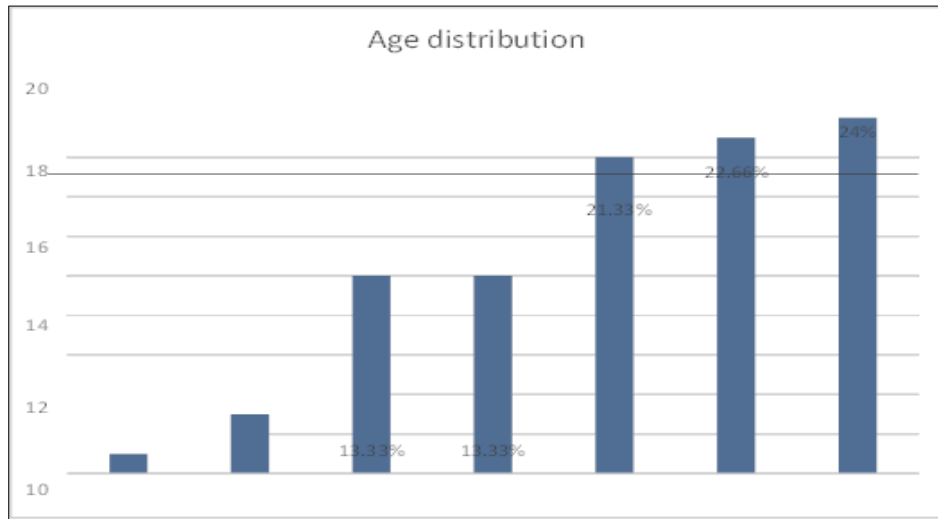


Figure 1 Age distribution

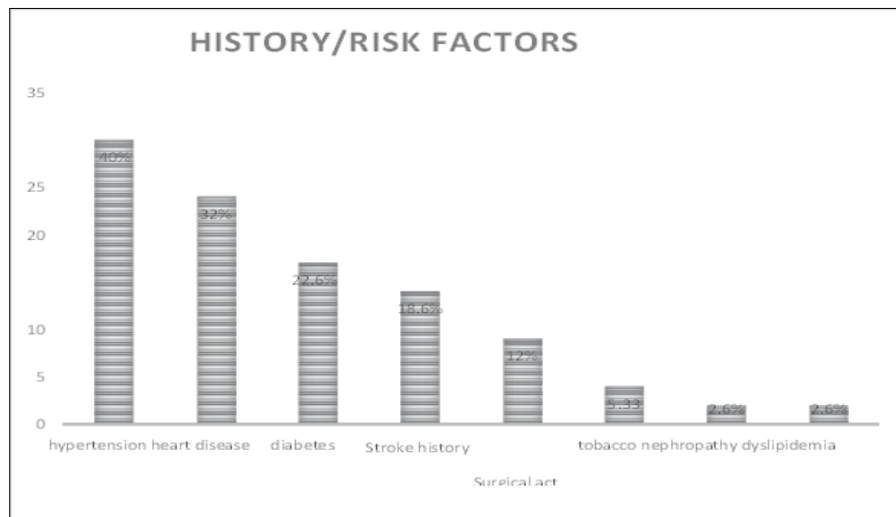
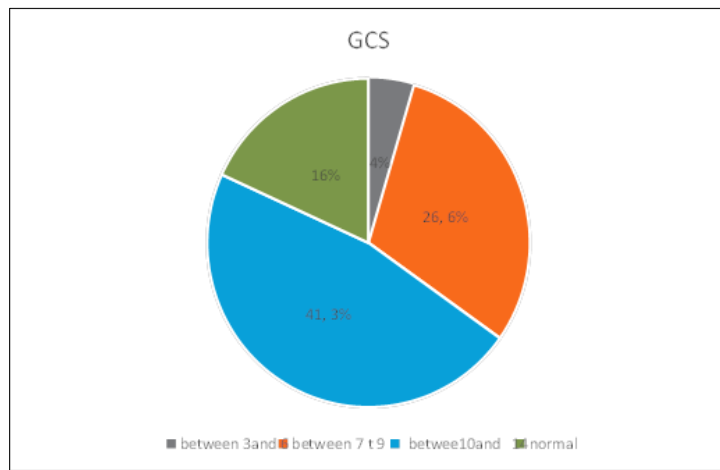


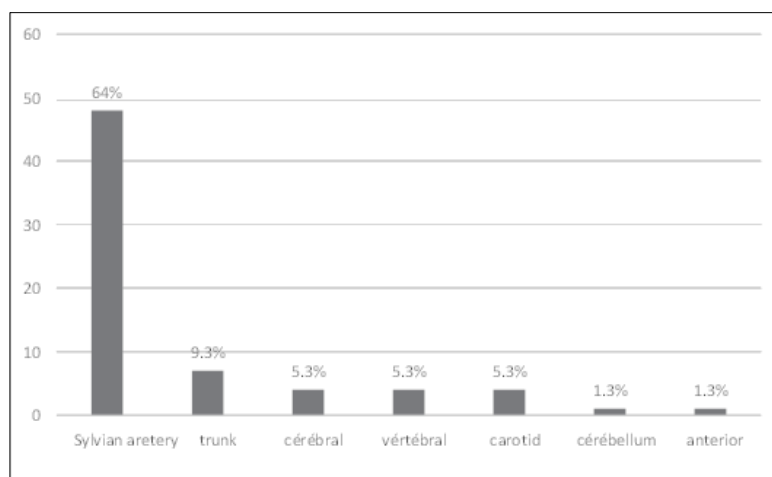
Figure 2 History/Risk Factor

Other risk factors were identified including ischemic stroke (18.6%), surgery (12%), smoking (5.3%), nephropathy (2.6%), dyslipidemia (2.6%). Functional impotence was the predominant feature, total in 60% of cases, partial in 40% of cases. 62 patients had speech suspension while 32 patients had dysarthria. The scores used were the GCS score with extremes between 3 (4%) and 15 (16%) as well as the NIHSS score in 44% of the cases (figure 3). The state of the pupils is an essential element of monitoring (without anomalies in 76.3%, anisocoria in 17.1%, mydriasis in 2.6% of the cases). Convulsions were reported in 13.1% of the cases with a sensory deficit in 33 patients.

A cerebral computed tomography (CT) was performed in all our patients, completed in 18.4% of cases by a cerebral MRI. The most affected vascular territory was the sylvian in 63.1% of the cases followed by the basilar trunk in 7 patients, the posterior cerebral artery and the internal carotid artery were affected in 5.3% of the cases (figure 4). (figure 4). The ECG revealed an ACFA in 26 patients, an echocardiography was performed in 44.7% of the cases showing the presence of an emboligenic cardiopathy in 11 patients, hypertensive in 10 patients as well as hypokinesia in 4 of them while 9 patients had an ETT without particularity. Ultrasound/CT of the supra-aortic trunks was performed in 27 patients (thrombosis in 10.6% of cases, atheromatous infiltration in 16%, arterial dissection in 6 patients). Severe DVA were admitted to the intensive care unit; they benefited from symptomatic measures: artificial ventilation with sedation by midazolam associated with fentanyl in 48% of cases. Antiepileptic treatment with sodium valproate was systematically instituted in all our patients, associated with clobazam and phenobarbital in 36 patients with status epilepticus. Antithrombotic treatment included platelet anti-aggregation in 75% of cases, anticoagulation in 55% of cases. Twelve of our patients underwent decompression surgery (16% of cases), while an external ventricular bypass was performed in 2 patients. Endovascular treatment consisting of mechanical thrombectomy was performed in 20% of cases. The average length of hospitalization was 7.82 days with mortality in 57.33% of cases. Complications reported were entrapment (32%), inhalation (40%), infection (38.66%), pressure sores (6.66%), thrombophlebitis (2.66%) and digestive hemorrhage in one patient. A significant association between engagement and inhalation with mortality was found in our series.



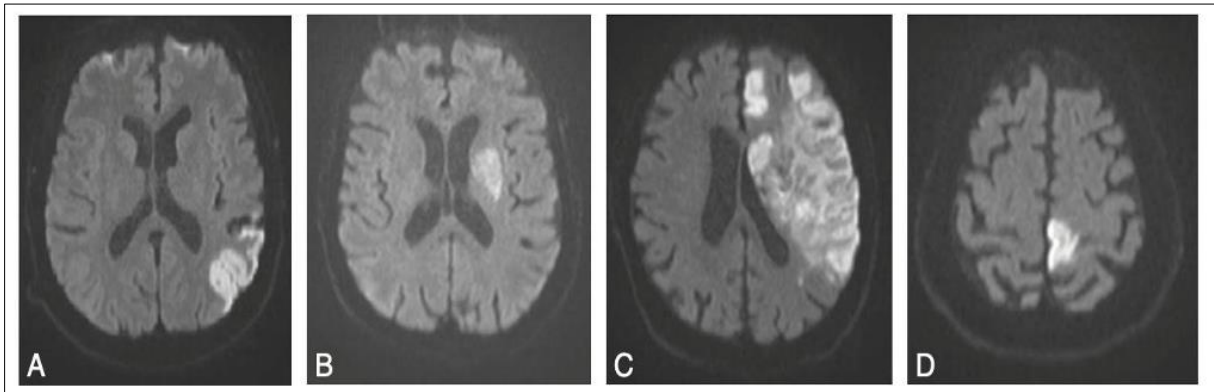
**Figure 3** GCS of patients at admission



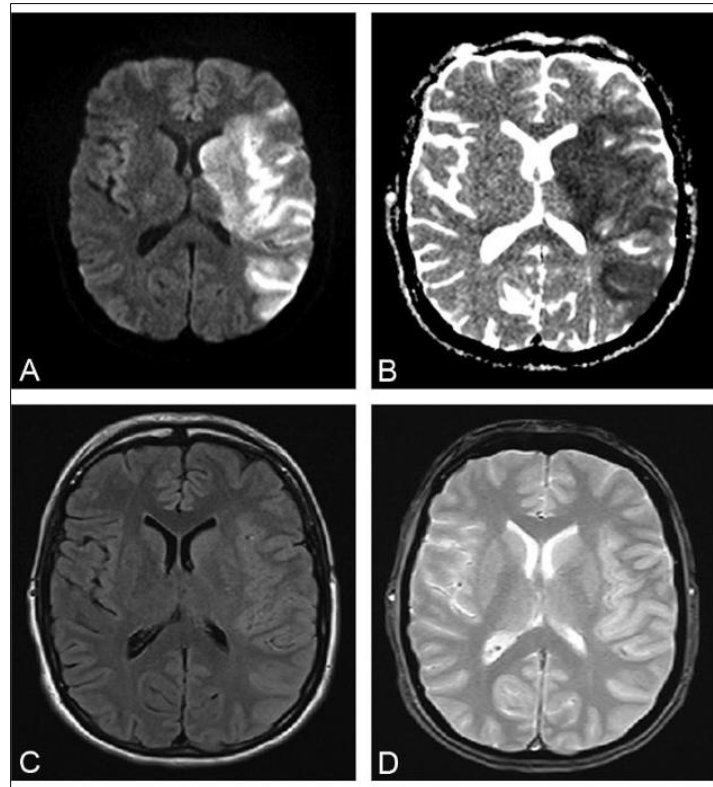
**Figure 4** ISA territories

#### 4. Discussion

Globally, there are 16 million new cases of stroke each year, responsible for 5.7 million deaths worldwide [1]. A stroke occurs worldwide every 2 seconds. In our series, the male sex predominates over the female sex, which is widely described in the literature. Age is the main non-modifiable risk factor in the occurrence of stroke. This is explained by the risk of arteriosclerosis which increases with age, thus increasing the risk of stroke [2]. Concerning the physiopathology, any sudden reduction of the cerebral arterial flow, either due to an arterial occlusion or a decrease in circulating flow will be responsible for a cerebral ischemia whose speed of extension will depend on the collaterals and their quality.



**Figure 5** Infarction in carotid territory. MRI diffusion sequence



**Figure 6** MRI sequences visualizing cerebral infarction: left sylvian cerebral infarction in the early phase

At the periphery of the infarcted area, called ischemic penumbra, the brain tissue is functionally altered but still viable, this zone constitutes the therapeutic target in order to avoid the transformation of this zone into infarcted tissue

following secondary neuronal lesions induced by a deleterious biochemical cascade leading to cytotoxic and excitotoxic effects. High blood pressure is the most common modifiable risk factor in our series, which is largely consistent with the literature. [3] The Aquila stroke registry reports a prevalence of 24.6% of patients with atrial fibrillation. This prevalence is associated with a higher risk of mortality and recurrence in the year following the occurrence of stroke [4]. Diabetes is the third most common risk factor in our series with a percentage of 22.6%, which is within the range of prevalence of diabetes in subjects with AIS in other countries. Smoking as well as previous ischemic stroke and dyslipidemia increase the risk of stroke. The Glasgow score was developed to describe the state of consciousness of patients with brain damage, whether traumatic or not, and is a primary prognostic indicator. The NIHSS is also a valid tool for assessing the severity of stroke in emergency departments. The presence of seizures in patients with ischemic stroke is associated with increased morbidity and mortality. [5]. Imaging of stroke can be performed using either computed tomography (CT) or magnetic resonance imaging (MRI) (Figure 5) (Figure 6); in our study the middle cerebral artery represents the most frequently affected

territory with a percentage of 64%, which corresponds to the data in the literature. Regarding the cardiovascular assessment, it includes a clinical examination, ECG in search of an ACFA, a TTE, as well as an imaging of the supra-aortic trunks. Treatment is based on symptomatic and antithrombotic management.

Symptomatic treatment provides life support with management of impaired consciousness, seizures, and hypertension [6]. Although commonly used, there are no currently accepted guidelines to support the prophylactic use of anticonvulsants after ischemic stroke [7]. Through a meta-analysis performed in 488 patients and published in 2020 by the American Medical Association the results suggest that performing surgical decompression in patients with DVA greatly reduces the risk of death and increases the chance of better functional outcomes compared to patients who received conservative treatment alone. [8]

In our study a decompressive component did not show a benefit with respect to a reduction in the risk of death. This could be explained by the severity of the neurological state of the patients who received surgical decompression, contrary to the data in the literature which recommends that decompression be performed within 48 hours of the onset of clinical signs before the appearance of signs of involvement. Antithrombotic treatment in the acute phase is based on platelet anti-aggregation. According to the Caprie study (Clopidogrel versus Aspirin in Patients at Risk of Ischaemic Events), the risk of a thrombotic event is estimated to be 8.7% lower in patients on clopidogrel than in those on aspirin; the benefit of clopidogrel is greater in diabetic patients and in patients with multiple atherothrombotic sites. Thromboprophylaxis is systematic, combining mechanical and pharmacological methods; intermittent pneumatic compression of the lower limbs has demonstrated a reduction in the incidence of proximal venous thrombosis from 12.1% to 8.5% [9]. Mechanical thrombectomy is an interventional neuroradiology procedure that consists of repermeabilizing the blood vessels, using a mechanical device introduced by endovascular route under fluoroscopic control.

In our series, 20% of the patients benefited from a TM. In our series, 20% of the patients benefited from a TM. 60% of these patients survived knowing that all these patients had an NIHSS score  $\geq 15$  (AIS).

57.3% of the patients in our series died in the intensive care unit which is close to the series of Khoufache and Lahiri with rates of 52% and 46.8% respectively. The most common complications found in the literature are cerebral involvement during a malignant ischemic stroke responsible for a severe HTIC. 32% of the patients in our series presented in involvement with a mortality of 87.5% which is close to the mortality rates found in the literature represented by percentages  $>80\%$ . In our series, 10% of the patients were complicated by a hemorrhagic transformation, the evolution of which was fatal in all of them. It is particularly serious when it is caused by thrombolysis with a recombinant tissue plasminogen activator (rtPA) [10] and in severe strokes. So far we know very little about their underlying mechanisms and early predictors are still lacking. Inhalation as well as infection, especially of the lungs, considerably increases morbidity and mortality.

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## 5. Conclusion

Stroke constitutes a diagnostic and therapeutic emergency. Stroke represents a real scourge on the medical, social and economic level in terms of public health. Its prognosis remains burdened by a high morbidity and mortality, especially in developing countries such as Morocco, which are particularly affected by the impact of this pathology. The evaluation of the prognosis is important for the patient suffering from AIS. Finally, prevention represents a major and essential asset in the fight against risk factors, especially since the majority of AIS are avoidable. [12].

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## Compliance with ethical standards

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### *Disclosure of conflict of interest*

No potential conflict of interest relevant to this article was reported.

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## References

- [1] [Stong K et al. 2007].
- [2] Rebecca A. Grysiewicz, DOa , Kurian Thomas, MDb , Dilip K. Pandey, MD, PhDa, Epidemiology of Ischemic and Hemorrhagic Stroke: Incidence, Prevalence, Mortality, and Risk Factors
- [3] Philip B. Gorelick & Venkatesh Aiyagari. The Management of Hypertension for an Acute Stroke: What Is the Blood Pressure Goal? *Curr Cardiol Rep* (2013) 15:366
- [4] Francesca Pistoia, MD, PhD\*, Simona Sacco, MD, Cindy Tiseo, MD, Diana Degan, MD, Raffaele Ornello, MD, Antonio Carolei, MD, FAHA . The Epidemiology of Atrial Fibrillation and Stroke.
- [5] Ramiro Castro-Apolo MD1,2 , Josephine F Huang MD1 , Myrian Vinan-Vega MD 1,3 , William O Tatum DO1 : OUTCOME AND PREDICTIVE FACTORS IN POST- STROKE SEIZURES: A RETROSPECTIVE CASE-CONTROL STUDY
- [6] Castillo J, Leira R, Garcia MM, Serena J,Blanco M,Davalos A. Blood pressure decrease during the acute phase of ischemic Stroke is associated with brain injury and poor stroke outcome. *Stroke* 2004;35(2):520-6
- [7] Broderick JP, Adams HP, Barsan W, Feinberg W, Feldmann E, Grotta J, et al. Guidelines for the management of spontaneous intracerebral hemorrhage: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. *Stroke*. 1999;30:905-15.
- [8] Hendrik Reinink, MD; Eric Jüttler, MD; Werner Hacke, MD; Jeannette Hofmeijer, MD; Eric Vicaut, MD; Katayoun Vahedi, MD;Janis Slezins, MD; Yingying Su, MD; Linlin Fan, MD; Emre Kumral, MD; Jacoba P. Greving, PhD; Ale Algra, MD;L. Jaap Kappelle, MD; H. Bart van der Worp, MD; Hermann Neugebauer, MD Surgical Decompression for Space-Occupying Hemispheric Infarction A Systematic Review and Individual Patient Meta-analysis of Randomized
- [9] Dennis M, Sandercock P, Reid J, Graham C,Fobres J, Murray G Effectiveness of intermittent pneumatic compression in reduction of risk of deep vein thrombosis in patients who had a stroke (CLOTS 3): a multicentre randomized controlled trial *Lancet* 2013;382:516-24.
- [10] M. Fiorelli, S. Bastianello, R. von Kummer, G.J. del Zoppo, V. Larrue, E. Lesaffre, A.P. Ringleb, S. Lorenzano, C. Manelfe, L. Bozzao, Hemorrhagic transformation within 36 hours of a cerebral infarct: relationships with early clinical deterioration and 3- month outcome in the European Cooperative Acute Stroke Study I (ECASS I) cohort, *Stroke* 30 (11) (1999) 2280-2284.
- [11] W.N. Whiteley, K.B. Slot, P. Fernandes, P. Sandercock, J. Wardlaw, Risk factors for intracranial hemorrhage in acute ischemic stroke patients treated with recombinant tissue plasminogen activator: a systematic review and meta- analysis of 55 studies, *Stroke* 43 (11) (2012) 2904-2909.
- [12] ISCHEMIC STROKE IN INTENSIVE CARE UNIT HASSAN II Hospital university 196/20 FMPF(about 75 cases) Dr yassine mejbar