

Contribution of Computed Tomography in Cerebral Vascular Accidents at the Fousseyni Daou Hospital in Kayes

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Abstract

Introduction: Stroke is defined as the rapid development of localized or global clinical signs of cerebral dysfunction with symptoms lasting more than 24 hours that can lead to death without any apparent causes other than a vascular origin. The ischemic or hemorrhagic nature of a stroke (stroke) can only be determined by computed tomography (CT) and/or magnetic resonance imaging. The aim of our work was to study the CT aspects of strokes in the radiology and medical imaging department of Fousseyni DAOU Hospital in Kayes. **Methodology:** This was a descriptive study with prospective collection in the Radiology and Medical Imaging Department of Fousseyni Daou Hospital in Kayes over a period of 12 months concerning 159 cases of strokes confirmed by CT scan. The variables analyzed were sociodemographic, clinical, and CT data. **Results:** We collected 159 cases out of 628 patients referred to the radiology and medical imaging department for a brain CT scan during the study period, representing a frequency of 25.32% of cases. In our series, men were predominant in 61.63% of cases, with a sex ratio of 1.61. The average age was 65.19 years in 34.59% of cases, with extremes of 31 and 87 years. Arterio-pulmonary hypertension was the main risk factor, with 57.23%. Right hemiplegia represented 40.88% of physical deficits. Headaches were the main functional sign, representing 39.62% of cases. We noted the predominance of ischemic lesions, which represented 73.33% of patients. **Conclusion:** Strokes are a major public health problem. Cranioencephalic CT scans have highlighted the

different types of strokes, with a predominance of ischemic strokes and the different locations. Cerebral CT scans remain the first-line examination for making the diagnosis and determining the nature of the stroke and the associated signs of severity. They improve therapeutic management.

Keywords

Stroke, Ischemia, Hemorrhage CT, Kayes

1. Introduction

A stroke is a sudden deficit of focal cerebral function with no apparent cause other than a vascular cause [1]. There are several types of stroke, which are divided into ischemic strokes (80%), the most frequent, hemorrhagic strokes (15%), and meningeal hemorrhages (5%) less frequent [2]. The occurrence of a stroke must immediately discuss its ischemic or hemorrhagic nature due to very different therapeutic orientations. Ischemia is the consequence of a vascular occlusion of the brain (thrombosis or embolism) leading to infarction and softening of the brain tissue. Cerebral hemorrhage occurs by rupture of a vessel, leading to an effusion of blood into the brain parenchyma. The ischemic or hemorrhagic nature of a stroke can only be determined by computed tomography (CT) and/or magnetic resonance imaging (MRI), which also specifies its topography and extension [3]. Strokes are a serious and common disease worldwide, responsible for 5.7 million deaths [4]. **The average incidence of strokes in Europe varies from 150 to 600 per 100,000 inhabitants per year.** In Africa, they are the second leading cause of mortality [5]. In Mali, they are the second leading cause of neurological emergencies after head trauma [6]. Since the advent of CT in our country, strokes have had a renewed interest. In fact, the place of imaging is crucial since it allows us to establish the diagnosis with certainty, assess the severity of the accident, and establish therapeutic indications. In the city of Kayes, few studies in Radiology have been carried out, hence the reason for this work. The objective of this work was to study the different CT aspects of strokes in the radiology and medical imaging department of the Fousseyni DAOU Hospital in Kayes.

2. Methodology

This was a descriptive study with the prospective collection, which took place over a period of 12 months from May 1, 2023 to April 30, 2024. Included in our study were all patients of any age and sex whose cranioencephalic computed tomography scan suggested a stroke. We used a multi-slice scanner (64 slices) of the “Hitachi” brand. The protocol used was without injection of contrast product with 5 mm sections and reconstruction in much finer sections and in the 3 planes of the space in the parenchymal window. The survey form was developed and validated before the start of the survey. It was individually completed

for each patient included. The information was collected from the radiologists' CT reports and the patient's clinical file (request for examination and the interview carried out by ourselves). The parameters studied were sociodemographic data, clinical data, and scan data. The confidentiality and informed consent of the patients were respected.

3. Results

3.1. Sociodemographic Data

Over the study period, we collected 159 cases of confirmed stroke in 628 patients who underwent cranioencephalic CT scans with an estimated frequency of 25.32% of cases. There was a male predominance in 61.63% of cases, with a sex ratio of 1.61 (**Figure 1**).

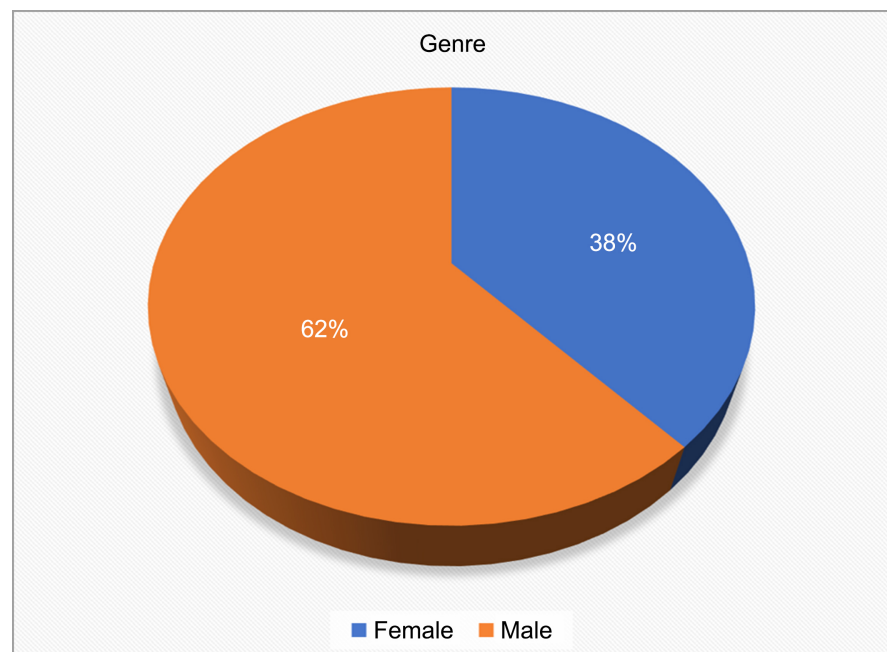


Figure 1. Distribution of patients by gender.

The age group 60 - 69 years was the most represented, with 55 cases or 34.59% of cases and an average age of 65.19 ± 14 with extremes of 31 years and 87 years. Housewives represented the most affected profession or 25.16% of cases, followed by traders in 11.95% of cases, civil servants in 9.43% of cases, breeders in 5.03% of cases, and teachers in 3.77% of cases.

3.2. Clinical Data

Clinically, the main functional sign was headaches, found in 63 patients or 39.62% of cases (**Table 1**). Isolated arteriopulmonary hypertension (AH) was the most common risk factor in 57.23% of cases (**Table 2**). The majority of patients presented with right hemiplegia in 40.88% of cases (**Table 3**).

Table 1. Distribution of patients according to functional signs.

Functional Signs	Numbers	Percentage (%)
Headaches	63	39.62
Dizziness	19	11.95
Vomiting	15	9.43
Altered Consciousness	30	18.87
Amnesia	11	6.98
Headaches and Dizziness	21	13.20
Total	159	100

Table 2. Distribution of patients according to risk factors.

Risk Factors	Numbers	Percentage (%)
Isolated HBP	91	57.23
Tobacco	05	3.14
Alcohol	02	1.26
Diabetes	03	1.89
HBP and Tobacco	16	10.06
Anticoagulant Treatment	10	6.29
Hormonal Contraception	06	3.77
Blood Diseases	03	1.89
HBP and Diabetes	12	7.54
Diabetes and Obesity	02	1.26
HBP and Heart Diseases	08	5.03
HBP and Obesity	01	0.63
Total	159	100

Table 3. Distribution of patients according to physical deficits reported by treating physicians.

Physical Deficits	Numbers	Percentage (%)
Right Hemiplegia	65	40.88
Left Hemiplegia	58	36.48
Right Hemiparesis	06	3.77
Left Hemiparesis	01	0.63
Coma	16	10.06
Aphasia	03	1.89
Vision Disorder	02	1.26
Labial Deviation	02	1.26
Hemiplegia and Aphasia	06	3.77
Total	159	100

3.3. CT Data

In our study of all CT results, ischemic stroke was the most represented diagnosis in 73.33% of cases by the presence of hypodensity in the cortico-subcortical area well systematized in an arterial territory against 27.67% of cases of hemorrhagic stroke by the presence of a spontaneously hyperdense hematoma most often capsulotalamic surrounded by a peripheral hypodensity and reflecting perilesional edema with mass effect on the structures of the midline and ventricular dilatation with the presence of intraventricular hematoma (**Figures 2-4**). Among our patients, 51 patients had a normal cranioencephalic CT scan with a strong clinical suspicion of stroke. The diagnosis retained in these cases was transient ischemic attacks (TIA), which had not been included in our study. Ventricular dilatation was the main CT sign at diagnosis in 22.64% of cases (**Figure 4**), and in 77.36% of cases, the ventricular system was normal without visible dilatation. Parietal lobe involvement was the most common location in 51 patients, or 32.08% of cases (**Figure 3**), followed by frontal lobe involvement in 21.38% of cases. The temporal lobe was affected in 19.50% of cases, followed by occipital lobe involvement in 11.32% of cases. The territory of the middle cerebral artery was the most common in 59.75% of cases (**Figure 3**), followed by the territory of the anterior cerebral artery in 22.64% of cases, the territory of the posterior cerebral artery in 10.06% of cases, and the territory of the choroidal and cerebellar arteries respectively 4.40% and 1.89% of cases. Performing the CT scan early allowed the clinician to provide appropriate care and avoid complications in 22% of cases of stroke in the acute phase, hemorrhagic and ischemic combined. The patients were in complete remission after treatment.

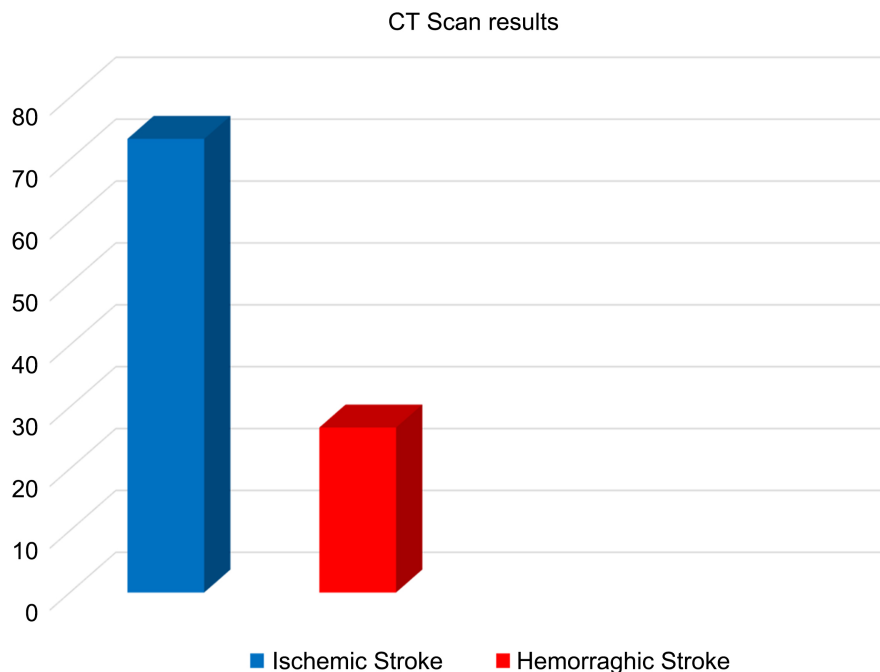


Figure 2. Distribution of patients according to CT scan results.

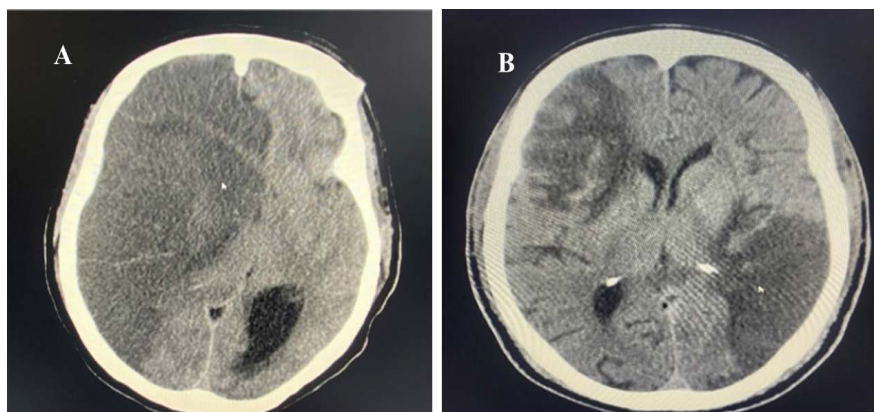


Figure 3. (A) and (B): Cranioencephalic CT scan, non-injected axial section in the parenchymal window showing a diffuse and extensive hypodensity range of the right fronto-temporo-parietal lobe exerting a mass effect on the ventricles which were collapsed and the median structures which are deviated by 19 mm to the left (ischemic stroke of the territory of the right sylvian artery with subfalcic engagement (A)) and acute hypodensity of the right frontal and left parietal reflecting cerebral ischemia lesions (superficial right and left sylvian territory (B)).

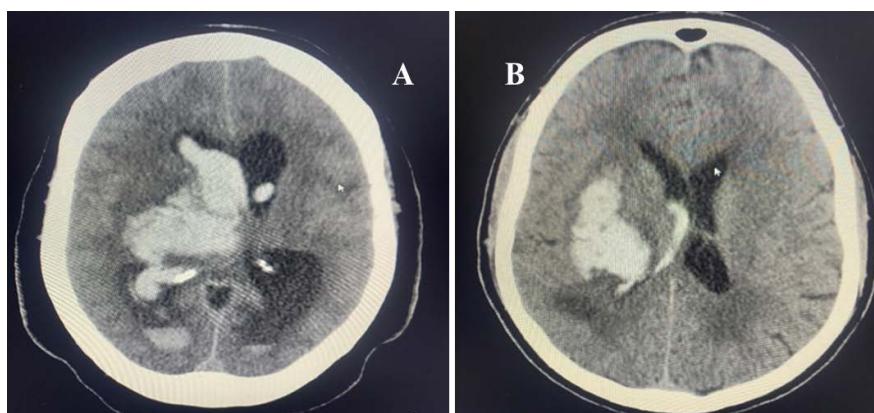


Figure 4. (A) and (B): Cranioencephalic CT, non-injected axial section in the parenchymal window showing an area of spontaneous right capsulothalamic hyperdensity surrounded by perilesional edema with mass effect on the median structures which are deviated by 11 mm to the left and ventricular flooding suggesting a hemorrhagic stroke with subfalcic engagement (A) and a right lenticulo-capsulo-thalamic hyperdensity surrounded by a perilesional hypodensity and a right lateral intraventricular hyperdensity reflecting an acute lenticulo-capsulo-thalamic hemorrhage (B).

4. Discussion

4.1. Sociodemographic Data

The prevalence of stroke in our study was 25.32% of cases. The male sex was predominant in 61.63% of cases, with a sex ratio of 1.61. This preponderance of the male sex was also found by Haïdara [7] in 64% of cases and by Diawara [8] in 56.6% of cases. The literature reported a higher incidence of stroke after 75 years in women. The explanation for this difference was the disappearance of the protective role of female hormones at this age. The prevalence of vascular risk factors

was higher in men, particularly smoking and hypertension than in women of the same age [9]. In our study, the mean age of patients was (65.19 ± 14) years, with extremes of 31 and 87 years. And the most represented age group was 60 to 69 in 34.59% of cases. These data were consistent with those in the literature [10]. This was explained by the relative rarity of cardiovascular risk factors before the age of 30 and the high frequency of cardiovascular risk during old age.

4.2. Clinical Data

In our series, headaches were the most represented functional sign in 39.62% of cases, followed by altered consciousness in 18.87%, dizziness in 11.95% of cases, and vomiting in 9.43% of cases. These results were comparable to those of Yaya [3], who found 40.6% of cases of headaches, 13.7% for altered consciousness, and 12.26% of cases of dizziness. During our study, the major risk factor was high blood pressure in 57.23% of cases. These results were comparable to those in the literature. [8] [10] [11] The risk of suffering a stroke increases with high blood pressure levels without a precise threshold value [12]. In our series, 3.14% of our patients were isolated smokers. This result was lower than that of Yaya [3], who found 5.96% of cases. The risk of occurrence of a AVC was multiplied by six in smokers compared to non-smokers [11]. In our series, physical deficits were dominated by right hemiplegia, *i.e.*, 40.88% of cases, and this result was slightly higher than that of Tiemoko [13], who found it in 31.7% of cases. Computed tomography data: the non-injected scanner showed that ischemic stroke was the most frequent type in 73.33% of cases. This result was lower than that of Camara [14], who found it in 79% of cases. These results, which showed that ischemic stroke was the most frequent type, would be linked to the factors contributing to ischemic stroke. Hemorrhagic strokes represented 27.67% of our patients. This result was similar to those found by Haidara [7] in 23% of cases and higher than that of Yaya [3] in 11.30% of cases. A dilation of the ventricular structures was found in 22.64% of cases in our series on CT. This result was higher than that of Tiemoko [13], who had observed this dilation in 8.7% of cases in his study. It was observed in the sequelae of ischemia, indicating cerebral atrophy and constituted the main associated sign. The localization at the level of the parietal lobe was the most frequent in our study in 32.08% of cases. This result was close to that of Tiemoko [13], who had found 27.90% of cases. The involvement of the middle cerebral artery was the most frequent in 59.75% of cases, followed by the territory of the anterior cerebral artery in 22.64% of cases. These results were similar to those found in the literature [7] and [8]. This high frequency of involvement of the sylvian artery could be explained by a predilection of atheromas for the internal carotid artery leading to downstream lesions, as reported in the literature [15] and [16]. The 22% of cases of ischemic and hemorrhagic stroke in complete remission after medical treatment were detected in the acute phase, *i.e.*, 24 to 36 hours, hence the interest in performing CT scans much earlier in patients clinically suspected of having a stroke.

5. Conclusion

Strokes are a major public health problem. Cranio-encephalic CT scans have highlighted the different types of strokes, with a predominance of ischemic strokes and different locations. Brain CT scans remain the first-line examination for the diagnosis, location, and nature of the stroke, as well as the associated signs of severity. It significantly helps to improve the appropriate therapeutic decision to ensure a better prognosis. The cost limits its accessibility in our country, particularly in the Kayes region.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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