RESEARCH ARTICLE

ISCHEMIC STROKE A COMPARATIVE RETROSPECTIVE STUDY: EXPERIENCE OF MILITARY HOSPITAL OF MEKNES

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Manuscript Info

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Abstract

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Cerebrovascular accident (stroke) is defined by a localized neurological deficit of sudden onset which persists for at least 24 hours. It is a frequent pathology whose social and economic burden remains very heavy. In Morocco, stroke is responsible for several thousand hospitalizations each year. Its estimated incidence would be 300 /100,000 inhabitants objective of the study is the epidemiological profile, clinical and paraclinical aspects as well as preventive management associated with Ischemic stroke at the intensive care unit of Moulay Ismail military hospital Retrospective study carried out from January 1, 2019 to December 31, 2019. We collected 66 patients for whom all the parameters studied were collected on a preestablished operating sheet then entered into Microsoft Excel, and analyzed using the chi2 software.

The study concerned 66 patients:
1. The mean age of the patients was 64.92 years (range 38 and 82), of which 63.6% of the patients were over 65 years old.
2. High blood pressure was the main risk factor, followed by diabetes type 2 as most of the series described in the literature.
3. The average time between the onset of symptoms and the emergency room visit was 66.2 hours.
4. Hemiplegia was the main clinical sign found on examination.
5. The brain scan q pathological in 93.9% of cases.
6. None of our patients benefited from thrombolysis.
7. The death rate has been estimated at 46.6%.
8. The interest of prevention in reducing the frequency and morbidity – mortality of stroke.

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Introduction:-
Cerebrovascular accident (CVA) is defined by a neurological deficit localized with sudden onset which persists for at least 24 hours [1].

According to the WHO, stroke is defined as: "The rapid development of signs

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localized or global clinical symptoms of cerebral dysfunction with symptoms lasting more than 24 hours, which can lead to death, with no other apparent cause than a vascular origin" [2].
It is a common pathology whose social and economic burden remains very heavy. In Morocco, stroke is responsible for several thousand hospitalizations each year. Its estimated incidence would be 300/100,000 inhabitants.
It constitutes the third cause of general mortality in countries
industrialized, after heart disease and cancer, and the leading cause of
acquired physical disability [3].

The last 20 years have seen major advances in the
prevention, diagnosis and treatment of stroke.
Stroke is favored by several risk factors, including hypertension, so-called "emboligenic" heart diseases, atrial fibrillation (AF), diabetes, tobacco, alcohol and obesity. Other factors such as age and sex are also incriminated [4].

All of these factors, when they coexist, can have potentiating effects on each other and thus increase the risk of stroke. These factors have been the subject of several studies confirming their incrimination in the occurrence of ischemic stroke.

The evolution of research in the field of vascular pathology has
made it possible to better manage stroke. This treatment is carried out through primary prevention, care in the acute phase and after the stroke. Primary prevention of stroke allows control of risk factors [5–6] through screening, treatment and monitoring. Acute phase management involves thrombolysis in neurovascular units [7 – 8] in the case of ischemic stroke. Post-stroke treatment through physical rehabilitation improves neurological functions.

Through this study we will determine the incidence of this pathology within the intensive care unit at the Moulay Ismail military hospital in Meknes, we will also raise the different factors predisposing to cerebral ischemic pathology, we will try to establish the become of these patients and at the end we will highlight through data from the literature, the interest of remote care, the different risk factors for the prevention of this pathology with serious consequences.

Materials And Methods:-
Materials:-
Type of study
This is a retrospective study spread over a period of 1 year from the 1st

January 2019 to December 31, 2019, carried out in the intensive care unit of the Moulay Ismail military hospital in Meknes, we would have liked to spread our study over several years to have a substantial sample for the study statistics, but the conditions imposed by this pandemic and especially the non-accessibility to the intensive care archives sequestered in the COVID pavilion of our structure.

Study population:
All subjects suffering from ischemic stroke and hospitalized in the HMMI Meknes anesthesia-resuscitation department.

Inclusion criteria:
We included all patients who consulted for a sudden onset neurological deficit in whom the radiological assessment showed an ischemic stroke and requiring intensive care treatment.

Exclusion criteria:
Were excluded from the study:
- Hemorrhagic strokes.
- TIAs lasting less than 24 hours.
- Patients whose files cannot be used.
5. Data collection:
Data was collected by consulting patient records as well as the
resuscitation register, an operating sheet (see the following pages) has been completed and includes:

- Demographic data
- Initial clinical examination
- Antecedents
- Risk factors
- Therapeutic data
- Patient progress

Variables studied
The variables studied are:
• Age
• Sex
•blood pressure: The limit value beyond which we speak
high blood pressure is 140/90mmhg
• BMI (body mass index):
BMI allows us to assess obesity and overweight in the same way
next :
Weight loss: BMI < 18.5 kg/m2
18 kg/m2 ≤ normal weight < 25 kg/m2
25 kg/m2 ≤ overweight or overweight < 30 kg/m2
Obesity ≥ 30 kg/m2 It should be noted that weight and height were estimated.
• Alcohol consumption.
• Smoking:
Smoking is the use of smoked or non-smoked tobacco. Daily smoking
is tobacco consumption every seven days of the week; he was estimated in
package-year.
• LDL cholesterol:
Adult reference value g/l mmol/l without other risk factors < 1.6 <
4.13 with other risk factors < 1.3 < 3.35 elevated LDL cholesterol is an independent atherogenic risk factor
• Atherogenic index:

This is the ratio between total cholesterol and HDL cholesterol.
Atherogenic index = Total cholesterol / HDL cholesterol: It is normally
less than 5.0 in men and 4.4 in women. The risk of atherosclerosis is increased in subjects whose this index is higher
than the norm.

Method:-
The statistical study initially consisted of describing the main
variables of the study, carried out by the Excel software in a second step using free online software CHI2 we will try
to look for possible risk factors for morbidity in relation to this ischemic pathology.
Chi2 link on the internet: http://biostatgv.sentiweb.fr.

Operating Sheet:
Identification
Service : …………………………………………………………………
Nam ……………………………………………………………….
First name …………………………………………………………….
Âge : /__/__/__/
Sex male /__/ Female /__/
Adresse : ……………………………………………………………
Date of diagnosis of ischemque storke /__/__/__/
Date entrance : /__/__/__/
 Date exit
Service or hôspital for first admission : ……………………………………………………………………
 risk
HTA : yes /__/ No /__/
Knowen and treated: /__/ knowen no treated : /__/

screaning : /__/ date of : /__/__/__/
Diabètese : yes /__/ No /__/

Type …………………………………………………………………….
known and treated /__/
known no treated /__/
Dscreaning /__/
Date of diagnosis /__/__/__/
Tobacco : yes /__/ No /__/
Date of first use : /__/__/__/
 Oldness : Nombre of pack : /__ / Duration /__/__/
 Actually smoke : Number of pack by day /__/ Duration /__/__/
Never smocke /__/
Alcohol : yes /__/ No /__/
Date of First use /__/__/
Alcoholisme longness /__/ hwo long /__/__/
Alcoholisme actuelly /__/ duration /__/__/
Surpoids et obésity
weight /__/__/__/
size /__/__/__/
BMI /__/__ /
Abdominal perimeter /__/__/__/
Obésity : yes /__/ No /__/
Fibrillation auricular : yes /__/ No /__/
follow : Oui /__/ Non /__/
Date of diagnosis : /___/___/___/ Duration : /__/__/
Treated with AT-VIT-K : yes /__/ No /__/
Heart deseases : yes /__/ No/__/
Type …………………………………………………………………….
Known treated : yes /__/ No /__/
 myocardial infarction : yes/__/ No /__/
Cholestérolémia : /___/___ /___/
Known and treated : yes /__/ No /__/
 Triglycérides : /__/__/__ /
Oral contraception : yes /__/ No /__/ Duration /__/__/
History of ischemic storke : yes /__/ No /__/ Duration /__/__/
 History transient ischemic accident : yes /__/ No /__/ Duration /__/__/
History of myocardial infarction : yes /__/ No /__/ Duration /__/__/
History Artérial deseases : yes /__/ No /__/ Duration /__/__/
clinical Exam :
Symptôms :
- fonctional signs :
    - fonctional impotence : yes.   No
                               Total   Partiel
    -neurological exam :
- Glasgow :
-cardiovascular examination:
     TAS/TAD :
      Heart murmur : yes   No
      carotid murmur : yes   No
      paraclinical examination
                       TDM : yes /__/ No /__/ Date /__/__/__ /
                      Résults : …………………………………………………….....…
                       IRM : yes /__/ No /__/ Date /__/__/__ /
                      Résultats …………………………………………………………
-ECG :

- HVG :
 - Trouble of rythme :
  - Signs of ischémia :
-heart echographia :
 - duplex ultrasound of the neck :
-ionogramme blood :   -urée :   créat :   -Glycémie :   -Hbc :
-Hémostase :   -Hb   Hte :
-Artériographia :
 Exit mode
        Full récovery
        exit with séquelles
        exit death   Date of /__/__/__/

Results:-
I. General data
• Number of hospitalizations in intensive care during the study period:
367 cases.
• Number of ischemic stroke hospitalized during the same period: 66 cases.
¬ Incidence of ischemic stroke during the study period: 0.17%.
II. Demographic data
1. Sex
The female gender was slightly predominant with a sex ratio of 0.78.

Table 1:- Distribution of ischemic stroke according to sex.

Sex	Number	Percentage %
Female	37	56,06 %
Male	29	43,94 %

2. Age
- The average age of our patients was 64.92 years.
- The minimum age was 38 years old while the maximum age was 82 years old.
- Arbitrarily three (3) age groups have been defined in our study:
¬ The first group < 45 years old represents 9.1%.
¬ The second bracket ranging from 45-65 years old represents 27.3%.
¬ The third tranche encompassing subjects over 65 years old represents 63.6%.
⌉ In our study:
Among 18 women: - 83.3% are over 60 years old.
– 16.7% aged under 60.
Among 15 men: - 93.33% are over 50 years old.
– 6.66% aged under 50.
III. History and Risk Factors
1. High blood pressure (hypertension)
The notion of hypertension was found in 30 patients, 45.4% of our entire workforce, compared to 36 patients, 54.6% of patients without a history of arterial hypertension.
¬ Duration of high blood pressure

Table 2:- Duration of high blood pressure.

Âge of diabetes	Case Numbres
< 5 years	6
5 - 10 years	10
> 10 years	14

Therapeutic compliance regarding hypertension
Nearly 27% of these patients were receiving treatment, while the rest were poorly followed.
2. Diabetes
A history of diabetes was found in 24 patients, 36.3%. All these patients had type 2 diabetes.
¬ Length of diabetes
- For type 2 diabetics the age of diabetes was:

Table 3:- Age of diabetes.

| Âge of diabetes	case number
< 5 years	0
5 to 10 years	6
> 10 years	18

All our patients had long-standing diabetes aged over 5 years.
¬ Diabetes monitoring

Table 4:- Therapeutic compliance of diabetics.

	Cases number
Diabetes balanced	8
Diabetes unbalanced	16

the majority of our patients were poorly monitored, this is reflected by the glycated hemoglobin values represented by the graph below.
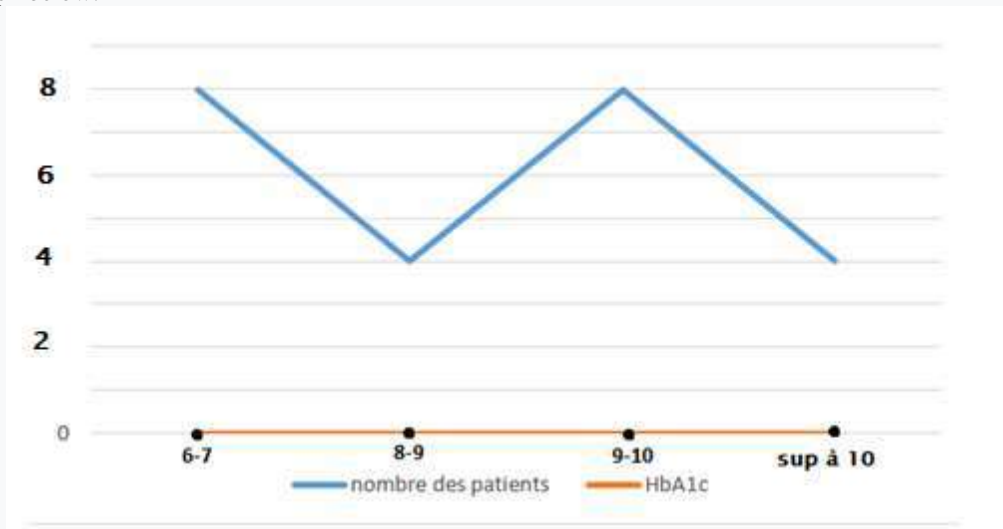
Figure 1:- HbA1C values in our patients.

Alcohol and smoking habits
In our series, 18 patients were smokers, 27.2% of all patients.
our workforce compared to 72.8% of patients who were not smokers.
The notion of alcohol consumption was found in only one patient.
4. Dyslipidemia
The notion of dyslipidemia was found in 8 of our patients, 12.1%. One patient was taking anti-hyperlipidemic treatment.
5. History of heart disease

A history of heart disease was found in 9 of the patients, representing a percentage of 13.6%.
• 4 of our patients were being monitored for advanced heart failure.
• 5 were followed for a complete arrhythmia by fibrillation
auricular (ACFA).
6. Oral contraceptives
The use of oral contraceptives was found in approximately 6 patients:
9.09%.

Results of the clinical study:-

1. Delivery times
The minimum time between the appearance of symptoms and consultation with
emergencies was 4 hours while the maximum delay was 8 days. Only six patients were admitted within 24 hours of the ischemic stroke .
2. Start mode
The onset of neurological symptoms was sudden in 90.9% (60 patients)

Table 5:- Mode of onset of ischemic stroke symptoms in our study.

Start mode	Number	Percentage (%)
Brutal	60	90,9%
Progressive	6	9,09%

3. Neurological examination on admission
• State of consciousness
The clinical examination on admission found:
• 16 patients or 24.2% had a Glasgow score less than or equal to 8.
• 32 patients or 48.4% had a Glasgow score between 9 and 12.
• 18 patients or 27.2% had a Glasgow score between 13 and 15; their intensive care unit treatment was necessary to control further decompensation (ketoacid decompensation, respiratory distress, etc.)
The average Glasgow score was 9.2 with a minimum value of 3 and
maximum at 15.
• Neurological signs
¬ The neurological deficit was observed in 62 patients (93.93%).
¬ Facial paralysis existed in 54.5% of cases.
¬ A sensory neurological deficit was found in patients, 30.3% of case.

Table 6:- Prevalence of focal neurological signs in included patients.

	Number of patients	Percentage of signs focal neurological %
Hemiplegia	44	66,6%
Facial paralysis	36	54,4%
Aphasia	18	27,2%
Sensory deficit	20	30,4%
Headache	8	12,2%

Paraclinical Study

1. Biology

All our patients have benefited from a routine biological examination including a complete blood count (BCN), a complete ionogram, blood sugar and a blood sugar assessment, the rest of the assessments are guided by the clinical evolution and history.

2. Electrocardiogram

The electrocardiogram (ECG), carried out on all our patients, revealed

normal in the majority of cases. 12 patients had a pathological ECG of which 5 patients presented ACFA.

3. Imaging

¬ BRAIN CT

Brain CT was normal in 4 patients, The territory of the artery

sylvienne was affected in 68.1% of patients (45 cases).

¬ Brain MRI:

On admission none of our patients received a diagnostic MRI.

Furthermore, during their hospitalization in the intensive care unit, MRI was performed in 5 patients.

4. Other explorations:

¬ Ultrasound of the supra-aortic trunks (ETSA)

Performed in 65.1% of patients, ASD Doppler is only pathological

in 4 patients.

¬ Transthoracic ultrasound (TTE):

Performed in 71.2% of patients, pathological in 8 patients.

Therapeutic Care

1. General therapeutic measures

• 40 patients (60.6%) benefited from ventilation during their treatment.

intensive care load (protection of the upper airways, GCS<8...).

• Prevention of thromboembolic complications by heparin has been

indicated in 57 patients (86.3%) and curative in 5 patients.

• Antiplatelet agents were prescribed in all our patients (100%).

• Antihypertensive treatment was prescribed in 28 patients (42.4%).

• Statins were prescribed in 100% of cases.

2. Specific therapeutic measures

¬ Thrombolysis:

None of our patients have benefited from this procedure.

¬ Thrombectomy:

None of our patients have benefited from this procedure.

¬ Hemcraniectomy:

None of our patients have benefited from this procedure.

The evolution

During hospitalization, the evolution of our patients was characterized by :

✓ A clear improvement in 4 patients,

✓ Persistence of after-effects in 34 patients

✓ 28 deaths

Table 7:- Patient evolution.

Patient condition	Number of patients	Percentage of patients according to evolution
Full recovery	4	6,06%
Exit with sequels	34	51,5%

death	28	46,6%

Link between demographic characteristics, factors of
risk and mortality.

1. Age:

Table 8:- Distribution of patients according to average age in the two groups
(Survivors and deaths).

	Évolution	Number	average	P
Âge	Death	28	62,3	0,42
	Survivors	38	61,2	

The difference between the two groups was statically not significant.

2. Gender:

Table 9:- Distribution of patients by sex in the two groups (Death and Survivors).

Sex	Survivors (38)	Death (28)	P
Female	16	20	0,35
man	18	12	

The distribution of patients according to sex in the two surviving groups and
deaths does not show a statistically significant difference.

3. Risk factors:

Table 10:- Distribution of deceased and surviving patients according to risk factors.

Risque factors	Survivors(38)	Death (28)	P
Hypertension	18	12	0,82
Diabetese	9	15	0,09
Tobacco	10	8	0,91
Alcohol	1	0	0,39
Heart desaeases	5	4	0,9
Dyslipidémia	6	2	0,34
Oral contraception	2	4	0,25

The difference between the two groups regarding risk factors was not statically significant for any of the parameters
studied

Discussion:-

Sociodemographic aspects

1. Age: The average age of patients in our series is 64.54 years, it is close to that of other national series such as
    that of Khoubach [9] which is 64. 9 years and that of Yonmadji [10] for whom the average age is 64.92 years,
    on the other hand this average nevertheless remains lower than that of European countries as we see the series
    by C. Garnier et al in France or the average age is 69.7 years [11] the average age of Western countries
    significantly higher than ours could be explained by the demographic pyramid (aging of the population)

Tables 11:- Average age in the different series.

	country	service	year	
C Garnier et al [11]	France	Intensive care unit	2015	69,7

Yonmadji[10]	Marocco	Fès Neurology	2016	64,92
Khoubbach[9]	Marocco	Résuscitation	2017	64,9
Bouthouri [12]	Tunisia	Neurology_	2020	68,45
Our serie	Marocco	Résuscitation	2021	64,44

The age variation between different African and Western populations could be explained by the lack of preventive measures in African countries, because these are often neglected due to ignorance of their benefits and the impact of cultural considerations in our African societies.

2.Gender:
In our study, women represent 56.06% of our entire workforce compared to 43.94% of men, a sex ratio equal to 0.78. The results obtained in our study are consistent with the results described in the literature [13, 14, 15,16]. This difference can be explained by the demographic data of Morocco where the population is predominantly female.

Table 12:- the sex ratio according to the different series.

Series	Male	Female	Sex ratio
Yonmadji [101]	576	608	0.94
C. Garnier Et al [11]	60	56	1.07
Khoubbach [9]	32	43	0.74
Notre study	15	18	0.78

Risk factors:
1. Hypertension:
- Arterial hypertension represents the most frequent risk factor in our series with a percentage of 45.4% which is close to that of the national and African series [8], the majority of hypertensive patients in our series did not have received no antihypertensive treatment.
- Several epidemiological studies have shown a causal link between high blood pressure and the genesis of cerebral infarctions, through the formation of atheromatous plaques in extracerebral vessels and lipohyalinosis of intracerebral vessels. The risk of stroke increases with high blood pressure levels, without a threshold value.
- Among all the modifiable and non-modifiable risk factors, hypertension is themost associated with the severity and risk of the occurrence of avci [17].
- The risk of stroke increases by 40% for every 5 mm HG increase in diastolic pressure. According to the literature, hypertension quadruples the risk of cerebral infarction [18].

Table 13:- Percentage of hypertensive patients according to different series.

Series	Country	Percentage of hypertensive patients (%)
Bouthouri [12]	Tunisia	62%
Khoubach[9]	Morocco	44%
Anderson e AL [14]	Denmark	43.1%
Our study	Morocco	45.4 %

2. Diabetes mellitus: Diabetes was the second risk factor incriminated in our study with a percentage of 36.3%, while it is 38.7% in the Khoubach series, 33.5% in Bouthouri, and 12.1% in Anderson e AL [14], with Diabetes was poorly controlled in the majority of our patients. A meta-analysis of data from 102 prospective studies shows that having diabetes doubles the risk of incident avci. Diabetic women have a higher risk of stroke than men, independently of other risk factors, the increased risk linked to diabetes is also greater in young subjects [19], it should also be noted that the prevalence of diabetes in subjects with cerebral infarction is between 15 and 33% [20, 21,22] which is consistent with the results of our series.

Table 14:- Percentage of diabetic patients according to different series.

Series	Country	Percentage of diabetic patients (%)
Bouthouri[12]	Tunisia	33.5%

Khoubach[9]	Morocco	38.7%
Anderson e AL [14]	Denmark	12.1%
Our study	Morocco	36.3%

3. Tobacco: In our series the notion of smoking was found in 27.2% of cases. Smoking constitutes a modifiable risk factor for ischemic stroke [23], smokers have a risk multiplied by 2 compared to a non-smoking population. This risk is correlated with the extent of smoking, the relative risk is much greater in patients with heavy consumption (>40 cigarettes/day) than in those with moderate consumption, tobacco promotes the development of atheromatous lesions, but it is also pro-thrombotic and promotes vasospasm [24,27]. Tobacco appears, nevertheless, to have increased toxicity in women [17, 18,19] and this is all the more so as consumption is high [25,26], but in our series we did not find the notion of smoking among women.

Table 16:- Percentages of smoking patients according to different series.

Series	Percentage of smoking patients (%)
Bouthouri[12]	44.5%
Khoubach[9]	36%
Anderson e AL [14]	35.4%
Our series	27.2%

4. Alcohol:
In our study, the notion of alcohol consumption is objectified in 1.5%. From 5 glasses per day, alcohol consumption is considered high, which increases the risk of ischemic stroke [24].

5. Dyslipidemia:
In our study, the notion of dyslipidemia was found in 12.1% of cases whereas it was 5.8% in the Yonmadji series [10] and 12% in the Khoubach study [9]. . A meta-analysis including 7 prospective cohort studies demonstrated that high dietary cholesterol intake is not associated with overall stroke risk. The results suggest that a higher intake of dietary cholesterol appears to increase the risk of stroke in older people, but also in older women and in women. having a higher BMI. In summary, higher cholesterol intake has no association with overall stroke risk. Age and BMI affect the relationship between dietary cholesterol intake and stroke risk [28.29].

6. Heart disease:
In our series the notion of emboligenic heart disease is only found in 1 3.6% of cases, moreover in the Khoubach series emboligenic heart disease is found in 14.2% of cases [91] and 15% in Yomondji's study [10]. ischemic stroke of cardiac origin occur preferentially in elderly subjects. The main emboligenic heart diseases are ACFA and ischemic heart disease [30]. Cardiac arrhythmia due to atrial fibrillation increases the relative risk of cerebral infarction by five [31].

Table 15:- Percentages of patients with emboligenic heart disease according to the different series.

Series	Percentage of patients with emboligenic heart disease
Khoubach[9]	18.2%
Yomondji[10]	15%
Our series	13.6%

7. Oral contraceptive (OC):
In our study 9.09% of women had the notion of taking oral contraceptives. While it is 9.3% in the Khoubach series [91]. A meta-analysis of 16 studies showed that CO intake is correlated with the risk of ischemic stroke if the age is over 35 years or that it is associated with other risk factors (migraine, smoking). [32]. Other more recent studies estimate this risk at 1.6; the risk did not vary clearly depending on the type of progestin; the use of oral contraceptives is contraindicated in all women with a history of stroke [33,34]. 8. Overweight and obesity: In our study obesity was found mainly in the female population, 12.1% of our patients, it is defined by a high body mass index (BMI) greater than or equal to 30 kg/m2 and/or a high waist-hip ratio (>0.90 in men and >0.85 in women) [35]. It is a factor in cerebral infarction increased by associated risk factors.

C. Clinical study
1. Admission time
• Ischemic stroke patients who arrive at the hospital and are treated as early as possible within a 4.5 hour window have a very good prognosis. In our series, the admission time is 66.2 hours on average. none of our patients were admitted before the 4th hour.

A study within the neurology department of Fez University Hospital found an average admission time of 61,950 hours for all strokes in patients of all ages [10].

The HAS in France has carried out an analysis of the various studies relating to the factors influencing treatment times. Transport by emergency service is found as a factor accelerating admission in almost all of these studies, it is therefore legitimate to think that the introduction of SAMU and the awareness of the population which follows makes it possible to improve the delay and therefore the management of this serious condition. More precisely, according to La HAS (2009), it is recommended to carry out the following activities:
• Completing a form collecting history, current treatments, time of onset of symptoms and elements of clinical severity assessed by the NIHSS scale.
• Carrying out blood samples which will allow the appropriate biological assessment to be carried out.
• Performing a pre-hospital capillary blood glucose test.
• Correction of hypoglycemia.
Performing an electrocardiogram in the event of medicalization of transport.
• Intracranial hypertension, impaired alertness, nausea or vomiting;
• BP measurement, but there is no argument for treating hypertension, unless indicated extra neurological associated as cardiac decompensation.
• Oxygen therapy if saturation is less than 95%. 2. Mode of onset The onset of symptoms was sudden in 90.9%, which is identical to the series of Khoubach [9] and Yonmadji [10]. The diagnosis of ischemic storke is considered in the face of sudden onset focal neurological disorders, possibly associated with disorders of vigilance.

Neurological examination on admission:
State of consciousness:
The average of the Glasgow score was 9.2 which is lower than that of Khoubach 9.8 and Bouthouri 13.96, the evaluation of the degree of consciousness by the Glasgow score constitutes the most reliable neurological parameter mortality. Indeed, the depth of the disorder of consciousness predisposes to a fatal outcome of avci [35].

Table 17:- Average GCS according to the different studies.

Study	Average of GCS
Khoubach [9]	9.8
Bouthouri [12]	13.96
Our study	9.2

3.2. Neurological sign:
Stroke should be considered clinically in the face of any persistent focal neurological symptomatology of sudden onset, this symptomatology depends on the cerebral territory affected, it is therefore important to know the function of each cerebral territory in order to have an idea of the localization of stroke. The neurological examination of our patients shows a deficit syndrome with hemiplegia or hemiparesis in the first place (66.6%), facial paralysis in second place with a percentage of 54.4% and lastly aphasia and sensory deficit. , these results are significantly similar to those of most of the series found in the literature.

D. Paraclinical study:
1. Biological:
A minimal biological assessment based on CBC, ionogram, PT and TCA and cardiac enzymes are recommended [36]. This assessment is important to exclude differential diagnoses and search for an etiology. In addition, a lipid profile seems to be interesting. An elevation of cardiac enzymes is noted in 5 to 34% of cases of avci [37], according to the literature hyperglycemia is noted in the acute phase in almost 40% of patients [38]. Currently there is no proof that in the acute phase of Ischemic Stroke, below a precise blood glucose value, the prognosis will be improved [39]. But it is recommended to maintain blood sugar levels between 140 mg/dl and 180 mg/dl [36-39].

2. Electrocardiogram:
In our series 12 were pathological, atrial fibrillation was present in 7.5% of our patients, this rate is low compared to the literature which identifies a percentage between 17 to 46% [40]. Patients with atrial fibrillation have a 5-fold increased risk of developing a avci [41-42].

Table 18:- Percentage of patients presenting with atrial fibrillation in different studies.

Studies	Percentage of patients with atrial fibrillation (%)
Bouthouri[12]	32.4%
Anderson et Al[14]	15.2%
Khoubach [9]	4%
Our study	7.5%

 3. Imaging:
3.1. Brain CT: All our patients received a brain CT. In our series, brain CT was pathological in 93.9% of cases and the territory of the sylvian artery was the most affected in 68.1% of our patients; the same results were observed in the Khoubach series [9]. In other studies, we find a very high percentage of normal CT scans ranging from 49% to 51% in two studies [43]. This difference is explained by the delay in consultation in our context and the earlier performance of brain CT in developed countries.

Table 19: percentage of territory involvement of the sylvian artery in different studies.

Series	Affected territory of the Sylvian artery %
Khoubach [9]	65%
Lausanne stroke registry [13]	64.2%
Our study	68.1%

Brain MRI:
On admission, no patient received a brain MRI for the diagnosis of avci. Furthermore, during their hospitalization in the intensive care unit, MRI was performed in 5 patients, representing a percentage of 7.57%. Which is similar to the Yomondji series [10] where 5% of patients received a brain MRI.

Other explorations:
a. Doppler of TSA In our series ETSA was performed in 65.1% of cases, and was pathological in only 4 cases and returned in favor of atheromatous infiltration of the carotid arteries. According to the Journal of Cardiology, 15 to 30% of avci have a thromboembolic origin. b. ETT The role of transthoracic echo in establishing the prognosis of avci is linked to the nature of the underlying heart disease. In our series the presence of abnormalities at the ETT level was found in 12.1% of cases.

E. Therapeutic management:
1. General therapeutic measures: To be implemented in the acute phase of a avci to prevent a worsening of the neurological condition, it represents an essential part of the treatment, and includes monitoring neurological, monitoring of oxygen saturation, blood sugar, temperature and blood pressure and prevention of thromboembolic complications.

Neurological monitoring:
In non-sedated patients, the NHISS scale must be used to evaluate and monitor the neurological state. In the event of any deterioration, it is recommended to look for major hypo or hypertension, hypoxemia, hypercapnia, metabolic disorders, an infectious cause and clinical manifestations suggestive of convulsive seizures. In the absence of an obvious cause of worsening, it is recommended to perform neuroimaging to look for extension of ischemic lesions, edema or recurrence of stroke [44].

Monitoring of vital parameters:
A. Oxygenation and protection of the airways: In an article in the Archive of Internal Medicine, Pancioli et al we note that current data do not allow us to recommend the use of oxygen therapy systematically in the management of ischemic strokes[45-46], the administration of oxygen is proposed when this is less than 92%, in the event of a

stroke with coma intubation and mechanical ventilation are recommended, there is no ventilatory mode that has proven a better outcome in patients suffering from stroke [46].

In our series, assisted ventilation was necessary in 60.6% of our patients. The prognosis of ventilated ischemic stroke is poor with 1-year mortality varying from 61 to 100% [47-48].

Table 20:- Patients who required mechanical ventilation according to the different studies.

Series	Country	Patients who required mechanical ventilation %
Khoubach[9]	Morocco	66.7%
Bouthouri[12]	Tunisia	15%
Our series	Morocco	60.6%

b. Blood sugar: The average blood sugar in our series was high with an average of 1.78g/dl. Upon admission, blood sugar levels must be measured, because hypoglycemia can mimic a stroke or worsen brain damage. Hyperglycemia is common in the acute phase of cerebral infarctions and presents between 43% to 68%. [49-50-51-52]

c. Temperature: In our series the average temperature was 37.3°C. Hyperthermia has harmful effects on the progression of avci. Recommendations recommend the use of antipyretics in ischemic stroke as soon as the temperature exceeds 37°5, but no study has managed to demonstrate an improvement in prognosis or mortality [44].

d. Blood pressure: In our study the percentage of patients who received antihypertensive drugs is 42.4% compared to 41.3% in the Khoubach series. Mastery of blood pressure figures constitutes the major element in the management of ischemic stroke. Arterial hypertension is classic during ischemic stroke and is seen in ¾ of patients with this pathology. However, there are threshold values on which we must act to avoid worsening brain damage. Antihypertensive treatment is only initiated after several sustained and repeated measurements showing high blood pressure figures above 220 or even 230 mmHg for SBP and/or 120 or even 130 mmHg for DBP and/or in the event of an associated hypertensive emergency [53 -54-55].

Table 21:- Patients who received anti-hypertension treatment according to the different studies.

Series	Country	Patients who received anti-hypertension treatment
Khoubach[9]	Morocco	41.3%
Latanzi et al[13]	Italy	70.8%
Bouthouri[12]	Tunisia	15.5%
Our series	Morocco	42.4%

Non-specific pharmacological treatment
Statins:
In our study all patients are placed on statins (100%) compared to 41.3% in the Khoubach series [9]. The reduction in stroke risk is proportional to the reduction in LDL cholesterol concentrations and largely independent of the initial value. A meta-analysis of more than 8,000 post-stroke or TIA patients demonstrated a 12% reduction in the relative risk for all types of stroke (ischemic and hemorrhagic) (95% CI 0.78–0.99) and a 20% reduction in the risk of ischemic brain infarction (95% CI 0.70–0.92), while the risk of hemorrhagic stroke was slightly increased (95% CI 1.19–2.5) [56].

Table 22:- Percentage of patients who received statin in the different studies.

Series	Percentage (%)
Khoubach[9]	41.3%
Yonmadgi [10]	55%
Our series	100%

Anticoagulants:
86.3% of patients in our series were placed on anticoagulants to prevent thromboembolic complications, the others however received anticoagulation with curative intent for emboligenic heart disease. The thromboembolic risk in patients with a stroke is major; a study carried out in 2004 showed that the incidence of deep vein thrombosis is 40% and an incidence of pulmonary embolism is 12%, three weeks after a stroke [5770]. In patients suffering from an irregular heart rhythm (atrial fibrillation, etc.), anticoagulant medications, such as warfarin, prevent the formation of this type of clot and prevent stroke. However, blood thinning medications can also cause bleeding in the brain. This deleterious effect can be more important than the benefits in patients with a normal heart rate, most thromboses appear early, the first week following the stroke, the prevention of thrombosis must therefore be part of the systematic measures in intensive care in Combining mechanical and pharmacological methods, intermittent pneumatic compression of the lower extremities demonstrated a reduction in the incidence of proximal venous thrombosis from 12.1% to 8.5% [58].

Table 23:- Patients who received anticoagulant treatment according to the different series.

Series	Country	Patients who received anticoagulant treatment
Khoubach [9]	Morocco	46.6%
Latanzi et al[13]	Italy	3%
Yonmadgi [10]	Morocco	18%
Our series	Morocco	86.3%

Antiplatelet drugs:
100% of patients in our series were placed on antiplatelet drugs. This percentage is also high compared to the series of Khoubach [9] and Youmandji [10] which is respectively 76% and 57%. They allow a relative reduction of 25% in the risk of occurrence of a thrombotic event (cerebral infarction, myocardial infarction) after a stroke or TIA [59]. But antithrombotic drugs carry a risk of hemorrhagic complications, particularly at the intracerebral level (around 7% of symptomatic hemorrhage), leading to significant neurological worsening.

Table 24:- Patients who received antiplatelet treatment according to the different series.

Series	Country	Patients who received antiplatelet treatment
Khoubach [9]	Morocco	76%
Latanzi et al [13]	Italy	44.1%
Yonmadgi[10]	Morocco	57%
Our series	Morocco	100%

Specific therapeutic measures:
3.1 Thrombolysis In our series no patient benefited from thrombolysis, because patients arrived late compared to 1.94% in the Yonmadji series [10] Thrombolysis intravenous is the reference treatment for ischemic stroke, rtPA is recommended within 3 hours following the occurrence of the stroke at a dose of 0.9 mg/kg with a maximum dose of 90 mg, the treatment period can be extended up to 4.5 hours subject to additional exclusion criteria: age > 80 years, taking anticoagulants even an INR of 2.5 a history of stroke or diabetes intra-arterial thrombolysis may be indicated in certain cases or Intravenous thrombolysis is contraindicated. It is most often currently replaced by mechanical thrombectomy. The analysis of the European studies ECASS I and ECASS II and the NINDS study shows that rt-PA reduces the risk of death or dependence by approximately 30% at 3 months, without an increase in mortality, thus 140 deaths or dependencies would be avoided for 1,000 patients treated [60-61].

Table 25:- Patients who received thrombolysis in the different studies.

Series	Country	Patients who received thrombolysis
Khoubach [9]	Morocco	0%
Yonmadji [10]	Morocco	1.94%
Our series	Morocco	0%

Treatment of carotid stenoses:
In practice, after a stroke whether minor or more importantly, surgery should only be considered after clinical improvement, that is to say recovery of normal alertness and general condition, and maximum and stable recovery of the neurological deficit whatever the character. threatening stenosis, with well-conducted medical treatment and subject to the absence of early and/or repeated recurrence. SPACE is a German study carried out in 2004 which compared endarterectomy and angioplasty, and it does not demonstrate the superiority of surgery compared to carotid angioplasty in carotid stenoses of more than 50% [62]. In our study, no patient benefited from this intervention.

Hemicraniectomy:
The results of 3 published meta-analyses show that early decompressive hemicraniectomy (performed within 48 hours after a malignant sylvian infarction) allows 22% more patients to be alive with minor or moderate residual disability (Rankin 2 or 3) and 29% more patients to survive with moderately severe disability (Rankin 4) year after cerebral infarction. Thus, decompressive hemicraniectomy reduces mortality after malignant sylvian infarction by more than 50%. One of the main questions of these randomized trials was whether hemicraniectomy leads to an increase in the number of patients surviving with severe disability (Rankin 5). This meta-analysis demonstrates that the number of bedridden and totally dependent patients remains low, whether with or without surgical treatment (around 5% in each group). The decision to practice it was the result of a discussion between anesthetists-intensivists, neurologists and neurosurgeons. [63-64]. In our study, no patient benefited from this intervention. 3.4 Thrombectomy: In our series no patient benefited from a thrombectomy. The publication of 5 large therapeutic trials on thrombectomy in 2015 has considerably modified the management in the acute phase of cerebral infarction, making mechanical thrombectomy associated with intravenous thrombolysis the new standard treatment for ischemic strokes of less than 4.5 hours with proximal arterial occlusion. This combined technique indeed allows a significantly higher rate of arterial unobstruction compared to intravenous thrombolysis performed alone and above all a clear improvement in post-stroke disability for these patients (55% favorable outcome compared to 30% after IV thrombolysis alone at 3 months). of stroke) [65].

F. Evolution of patients hospitalized in the intensive care unit:
1. Mortality: In our study the mortality percentage was 46.6%, while it was 52% in the KHOUBACH series [9], 31.3 % in Alonso et al [66], 3% in Yomanddji [10], and 30.9% in Abjaw [67].

Table 26:- Mortality rate according to the different series.

Series	Year	Service	Percentage(%)
Abjaw [67]	2012	Intensive care	30.9%
Alonso et al [66]	2015	Neurology	31.3%
Yonmadji [10]	2016	Neurology	3%
Khoubach[9]	2018	Resuscitation	52%
Our series	2021	Resuscitation	46.6%

The reduced rate of mortality in neurology units compared to intensive care can be explained by two essential factors:
- Early treatment of patients.
- The serious profile of patients hospitalized in intensive care.
2. After-effects:
In our study, 51.5% of patients presented after-effects, for example: walking problems, language problems, epilepsy, etc. This high percentage is mainly due to the delay in consulting patients.

Conclusion:-
Ischemic strokes constitute a challenge major public health issue due to their frequency and morbidity and mortality. This pathology affects 1 person every 5 seconds in the world and the WHO speaks of a pandemic and projects an increase in the incidence of stroke from 16 million in 2005 to 23 million in 2030. Furthermore, it is one of the main causes of mortality in France, the first for women; leading cause of acquired disability adults, second cause of dementia. In France, each year, 155,000 new people are affected by a stroke, one every 4 minutes, and 62,000 go die.

what emerges from studies plots testify to the same observation in terms of frequency but a morbidity and mortality which must be heavier due to the significant delays in treatment charge. Its management must be a public health priority and considered as a

diagnostic and therapeutic emergency.

Despite the importance of management in the acute phase, prevention

remains the most effective way to fight this disease, including screening and

treatment of each risk factor.

In our study, the treatment time is too long. It may be explained by the lack of awareness of our population about the seriousness of this pathology and especially the delay in diagnosis which causes treatment to be delayed   life-saving ethiopathogenic.

Informing the population to recognize early signs of ischemic stroke, emergency consultation as well as the establishment of various support structures Neuro-resuscitation are essential elements to change the prognosis of this pathology. All these efforts will make it possible to unclog the services of neurology but also resuscitation, to reduce the respective workloads but above all to improve the quality of survival of our fellow citizens of a certain age group how vulnerable.

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