



MEASUREMENT OF INTIMA MEDIA THICKNESS OF CAROTID ARTERY IN 200 HYPERTENSIVE MOROCCAN PATIENTS

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ABSTRACT **INTRODUCTION :** Carotid artery intima media thickness (CAIMT) is considered a marker of cardiovascular risk. It represents the earliest currently detectable form of atherosclerosis. **PATIENTS AND METHODS:** In this work, we measured the CAIMT in a population of 200 asymptomatic hypertensives seen in external cardiology consultation at the Moulay Ismail Military Hospital in Meknes and determined the prevalence of an increased CAIMT and the correlation with cardiovascular risk factors (CVRF) and overall cardiovascular risk level based on Framingham and ESH/ESC scores. **RESULTS:** Our 200 hypertensive patients (60% of men) are on average 62.06 years old (40 and 81 years old). The CVRF identified were dominated by total hypercholesterolemia (38%), smoking (34%), obesity (32%), diabetes mellitus (28%) and left ventricular hypertrophy (22%). The overall cardiovascular risk according to Framingham was high in 34% and very high in 26% of patients. The CAIMT was increased in 54% of our patients. It was correlated with age over 50 and the level of cardiovascular risk. **CONCLUSION:** the prevalence of increased CAIMT is high in our hypertensive patients (54%). It can be used to better determine the level of general cardiovascular risk. Its use should be popularized for better cardiovascular prevention.

KEYWORDS : atherosclerosis, carotid artery intima media thickness, cardiovascular risk

INTRODUCTION:

The Carotid artery intima media thickness (CAIMT) is the earliest currently detectable form of sub-clinical atherosclerosis. In fact, it is considered a marker of cardiovascular risk (CVR). In this work, we measured CAIMT in a population of hypertensives with the aim of determining the prevalence of increased CAIMT and assessing the correlation with cardiovascular risk factors (CVRF) and overall cardiovascular risk (CVR) level based on Framingham and ESH-ESC scores.

PATIENTS AND METHODS:

This is a cross-sectional study of 200 hypertensive patients of both sexes aged over 40 years asymptomatic. All patients were recruited, between July 2014 to December 2016, at the outpatient consultation of the cardiology department of the Moulay Ismail Military Hospital in Meknes-Morocco. A clinical examination with measurement of blood pressure, weight gain, height and waist circumference was performed. A biological assessment was requested including: fasting glucose, total cholesterol, triglycerides and cholesterol LDL and HDL. A surface electrocardiogram (ECG) was also performed. CVR was determined based on the Framingham score and the ESH-ESC criteria.

The CAIMT was measured by the same operator using a GE vivid 7 echocardiography device. The measurement was performed manually at the posterior wall of the left and right common carotids and the mean of the two values was calculated. For the interpretation of the CAIMT results, the standards used in the PARC 2003 study (Table I) were used as references.

RESULTS:

1/- general characteristics of the population:

We have collected 200 hypertensives aged over 40 (40 – 81) with an average age of 62.06, 60% of whom are men. The mean of systolic blood pressure was 146 mmHg (high in 30% of cases) and the mean of diastolic blood pressure was 87 mmHg (high in 27% of patients). The evolution time of hypertension in our population ranges from 0.5 to 23 years. Table II summarizes the different characteristics of our population.

2/- CAIMT and CVR factors:

The mean CAIMT was 0.90 mm. It was increased in 64% of cases, especially in subjects over 50 years of age, but its variation with sex was not significant. The general characteristics of the population studied according to the quartiles of CAIMT (Table III) show that hypertensives belonging to the 1st quartile of CAIMT, compared to those belonging to the 4th quartile had a significantly higher mean for the age (73.5 years vs 48.7 years), the duration of the hypertension

(2.73 vs 10.12 years), as well as the presence of a left ventricular hypertrophy by ECG (0 vs 50%). On the other hand, the difference was not significant between the CAIMT quartiles for lipidogram, obesity index, diabetes mellitus and smoking.

3/- CAIMT and overall CVR:

The CVR assessed on the Framingham score was low in 6% of subjects, high in 34% and very high in 26% of cases. An increase in CAIMT was found in those at high and very high CVR. For example, Framingham's overall CVR was significantly higher in the 4th quartile of CAIMT than in the 1st quartile of CAIMT (54.7% vs 14.3%). Similarly, the frequency of the overall CVR "very strongly increased" according to the ESH/ESC criteria was significantly higher among hypertensives belonging to the 4th quartile of CAIMT than among those belonging to the 1st quartile of CAIMT (33.3% vs 0%).

DISCUSSION:

The measurement of CAIMT is a non-invasive and easy-to-use method that allows for a fairly accurate assessment, at an early stage, of carotid atherosclerosis. Indeed, large epidemiological studies have shown that EIMC is significantly associated with the risk of one or more cardiovascular events, including ischaemic heart disease and stroke [1].

It is well established that CAIMT increases with age, even in the absence of clinical or occult atherosclerosis. In our patients, the CAIMT was increased in 64% of the cases, the correlation with age was clearer after 50 years. In the Rotterdam study [2], the average value of the CAIMT was 0.80 in a 70-year-old population on average. It was 0.63 mm in the ARIC study [3] in patients with an average age of 54 years. Cazaubon and al. [4] found an increase in CAIMT in 45% of asymptomatic subjects with an average age of 59 years. These variations are probably related to the techniques used but also to other factors including ethnic.

For example, Chow and al. [5] found a higher CAIMT among Indians than among Italians. In this study, the CAIMT were only significantly correlated with the age and duration of hypertension. However, in an Italian study, Signorelli and al. [6] reported a significant correlation of CAIMT with total cholesterol ($p=0.0001$) and with LDL ($p=0.0001$). In a study of black African subjects, Holland and al. [7] found 76% of subjects with increased CAIMT and showed a linear correlation between the increase in CAIMT and the degree of coronary impairment. Other earlier studies had already established the relationship between the Framingham score and the increase in CAIMT, which is consistent with the results of our study.

CONCLUSION:

Several learned societies recommend the measurement of CAIMT as an effective means of stratification of CVR [8]. The Framingham score is applied very little in medical practice and it is known that the weight of risk factors is different between individuals and the time of exposure to these factors. In practice, the measurement of CAIMT and the search for plaques make it possible to decide objectively on the level of risk of an individual. As a result, the increase in CAIMT in hypertensive patients indicates a high CVR. Thus, treatment monitoring should be more rigorous (close-up appointments, treatment optimization) addressing other risk factors and co-morbidities.

Table I: Normal values (in mm) of the CAIMT by age and sex in PARC study (2003)

| | <40 ans | 40 – 49 ans | 50 – 59 ans | 60 – 69 ans | 70 – 79 ans |
|--------|---------|-------------|-------------|-------------|-------------|
| Female | 0.584 | 0.641 | 0.682 | 0.734 | 0.783 |
| Male | 0.625 | 0.660 | 0.711 | 0.758 | 0.807 |

Table II: Different characteristics of the population

| Caractéristiques | Pourcentage (%) |
|---|-----------------|
| Male | 60 |
| Female | 40 |
| Diabetes mellitus | 28 |
| Obesity | 32 |
| Smoking | 34 |
| Hypercholesterolemia | 38 |
| Left ventricular hypertrophy (LVH) by ECG | 22 |

Table III: Characteristics of the population according to CAIMT quartiles (in mm)

| | 1st quartile (0.6 – 0.7) (n= 36) | 2nd quartile (0.8 – 0.9) n= 108 | 3rd quartile (1 – 1.1) n= 32 | 4th quartile (≥1.2) n= 24 |
|----------------------------------|--|---------------------------------------|------------------------------------|---------------------------------|
| Mean age (years) | 48.7 | 59.7 | 66.3 | 73.5 |
| Duration of hypertension (years) | 2.73 | 5.18 | 8.87 | 10.12 |
| Diabetes mellitus (%) | 33 | 22 | 37 | 33 |
| Obesity (%) | 22 | 33 | 37 | 33 |
| Total cholesterol(g/l) | 1.79 | 1.82 | 1.95 | 1.95 |
| LDL (moy en g/l) | 1.13 | 1.15 | 1.26 | 1.25 |
| Smoking (%) | 33 | 40 | 25 | 16 |
| LVH (%) | 0 | 18 | 37 | 50 |

Table IV: The overall overall CVR as a function of the CAIMT quartiles

| | 1st Q | 2nd Q | 3rd Q | 4th Q |
|---|-------|-------|-------|-------|
| Framingham scor | 14.3% | 26.9% | 37% | 54.7% |
| Very high CVR according to ESH-ESC criteria | 0% | 4% | 12.5% | 33.3% |

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