ANKLE BRACHIAL INDEX AS VASCULAR RISK FACTOR

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SUMMARY: This study aims to demonstrate that the ankle - brachial index (ABI) is a predictor of vascular risk. The available population is represented by 40 cases with hypertension and stable angina hospitalized in Department of Cardiology. The collected data were grouped into 2 groups, one represented by patients with hypertension (group 1) and one represented by patients with hypertension and stable angina (group 2). As risk factors in both groups were registered: smoking, diabetes, dyslipidemia, obesity (BMI), age over 60 and male gender, and they were all screened for ABI. Also we observed the incidence, degrees of arteriopathy in each group, distribution of risk factors for each degree of arteriopathy. We could draw conclusions about the incidence and the importance of each risk factor separately in the alteration of ABI, about the importance of modifying the values of ABI for the prediction of the coronary disease and the fact that ABI remains a predictive risk factor and important to investigate not only in patients with a coronary disease, but also in patients with isolated hypertension.

Keywords: ankle-brachial index (ABI), risk factor, hypertension, stable angina.

INTRODUCTION

Ankle-brachial index (ABI) is a noninvasive method of exploring subclinical atherosclerosis. Being introduced as a screening method, it would lead to early detection of atherosclerotic impairments and decrease the number of cardiovascular diseases by treating them in advance, and it would also lead to the decrease of their complications.

The advantage of this method of detection of atherosclerosis is that it requires a short time to achieve, it is simple to perform, the equipment is not expensive, it does not require special training, it can be performed in the medical office and it does not require the presentation to the hospital.

PURPOSE AND OBJECTIVES

This study aims to demonstrate that the ankle - arm index (ABI) is a predictor of vascular risk, by highlighting the ABI changes in the two chosen groups, one with hypertension and one with hypertension and stable angina. It aims to establish a correlation between the risk factors chosen: smoking, diabetes, dyslipidemia, obesity, gender and age. Following this correlation, it will highlight how each factor separately alters or not the ABI values.

We want to demonstrate that the use of this method in detecting subclinical atherosclerosis would bring benefits that can be highlighted by reducing impairment,
cardiovascular complications and deaths caused by atherosclerosis.

MATERIALS AND METHODS

The available population is represented by 40 cases with hypertension and stable angina hospitalized in Department of Cardiology between 03.2012 - 05.2012.

The collected data were grouped into 2 groups, one represented by patients with hypertension (group 1) and one represented by patients with hypertension and stable angina (group 2), each group having 20 patients. As risk factors in both groups were registered the following parameters: smoking, diabetes, dyslipidemia, obesity (BMI), age over 60 and male gender.

After the anamnesis and clinical examination there were collected data as: average age, demographics data, height and weight were measured, it was determined blood pressure, it was calculated the BMI, patients who smoke were identified and other risk factors. There were performed also paraclinical exams as it follows: blood count, urine test ( urine analysis and urinary sediment), blood glucose, ECG, echocardiography, angiocoronarography, chest x-ray and ankle-brachial index.

Ankle-brachial index is determined by ultrasound technique according to the guidelines [1, 2]. In a normal subject the pressure at the ankle has a value slightly higher than the pressure measured in the arm. ABI is given by the ratio between the highest measured blood pressure, in the ankle and arm from brachial artery and an index greater than 0.9 is considered normal (not significant peripheral vascular disease). [1].

However, an index value greater than 1.3 is considered abnormal and suggests calcification in the arterial wall and incompressible vessels, reflecting severe peripheral vascular disease.

An ABI less than 1.0 is associated with heart attack risk and/or stroke in the future. [3]

An index value between 0.5 - 0.8 is low-moderate and often appear symptoms as pain of the legs induced by walking.

An index value less than 0.5 indicates severe ischemia. [1]

Statistical analysis

The statistical study was performed using Microsoft Office Excel.

RESULTS AND DISCUSSIONS

In group 1, the higher percentage of patients with a modified ABI is predominantly in smokers patients (44%), while in the group of coronary patients, in an equal percentage smokers and nonsmokers, the index is 20% higher in the nonsmoking patients.

In the two groups is observed approximately equal percentages (45% in group 1 and 40% in group 2), with pathological ABI change in a significant percentage, 67% hypertensive group and 63% in hypertensive coronary group.

In group 2 there is also at those without DM a high percentage of 42% of the damage ABI, which indicates that angina is associated with alterations of ABI in the absence of DM, but at a lower percentage than in those with diabetes.

The incidence of dyslipidemia in patients with hypertension is represented by 33% positive cases of which 43% with arteriopathy compared to 20% dyslipidemia cases of which 75% with arteriopathy in group 2. It is also observed that the incidence of an altered ABI in coronary patients without dyslipidemia is represented by a smaller percentage than in those with dyslipidemia, but significantly, 44%, expressing an association between angina and impaired ABI.

Overweight is represented approximately equally in the 2 groups, whereas in group 1 grade 1 obesity has an 40%, 38% with arteriopathy and in group 2 the highest incidence belongs to obesity grade 2 with 15% where 33% of those with arterial disease.

The incidents of patients under the age of 60 is approximately equal in the 2 groups, as well as affecting the ABI. But at age over 60 years although the incidence is almost equal (60% group 1 and 55% group 2), ABI is distinctly altered at the coronary group (at a rate of 64% compared with only 33% of the hypertensive group).

Reported at the literature data it can be stated that: atherosclerotic peripheral arterial disease is a common disorder with an incidence of age-related, affecting 5-10% of people over 55 years. [3,4]

Because of the association of atherosclerotic disease, in particular coronary artery disease, ankle-brachial index is inversely correlated with the survival. [5]

Regarding males, we observe that the percentage arterial pathology is more frequent in group 2 of patients where from 40% male patients, 63% present arteriopathy, comparing group 1 where from 55% males, only a percentage of 27% have arteriopathy.
Regarding the degrees of arteriopathy, we observe that moderate arteriopathy has a higher incidence in group 1 (20% vs. 5% in group 2), and the severe one in group 2 (15% vs. 10% in group 1). (Fig. 1, Fig. 2.)

We observe that in hypertensive people (Fig. 3.), the distribution of risk factors in different degrees of arteriopathy, so in mild arteriopathy we frame the following risk factors: age > 60 years, smoking, DM, dyslipidemia and obesity, all of them representing 100%.

Moderate arteriopathy is dominated by the following risk factors, listed in descending order: DM and obesity in 100%, smoking and males in 75%, dyslipidemia in 50% and age over 60 years in 25%.

The most important risk factors in severe arteriopathy are: obesity in 100%, an equal percentage of 50% DM and age over 60 years.

At coronary patients (Fig. 4.), in mild arteriopathy, it highlights that the most important risk factors are: DM and obesity in 83%, age > 60 in 67%, dyslipidemia in 50%, followed by males 33% and smoking 17%.

The risk factors that dominate the moderate arteriopathy are represented in equal percentage of 100% by age over 60 years, smoking, obesity and males.

In severe arteriopathy, the most important risk factors are: age > 60 years, smoking, obesity and males. All a percentage equal to 67%.

In group 1, the incidence of risk factors in descending order is the following: in the first place is the obesity (BMI) in percentage of 90%, then the age in 60%, males in 55%, smoking and DM in an equal percentage of 45% and in the last place is the dyslipidemia in 35%.
The most important risk factor in group 2 is represented by the obesity (BMI) with an incidence of 75%, followed by the age over 60 years in 55%, smoking in 45%, males and DM in an equal percentage of 40% and the dyslipidemia in 20%.

CONCLUSIONS

Smoking has an incidence approximately equal in the two groups, with an alteration in approximately equal proportions, of the ABI (respectively 0.6 in the hypertensive group and 0.5 in hypertensive coronary group).

Diabetes mellitus has also a similar implication (over 60%, with a medium pathological value).

The incidence of dyslipidemia is higher in the hypertensive group, but the change of the ABI is more important in coronary group in a percentage of 75%, so we have a clear involvement of dyslipidemia in modifying the ABI in this group of patients compared with the first group.

Obesity grade 2 has a higher incidence in group 2 with an ABI of 0.4 compared to 1 in group 1.

Older patients have a much increased ABI damage in group 2, of 60% and a value of 0.6.

Regarding gender, males with coronary heart disease have a significant impairment of the ABI of 63% with a 0.6 compared to group 1 where ABI is modified only in 27% of cases.

Towards the degree of arteriopathy, it appears that moderate form has a higher incidence in group 1 (20% vs. 5% in lot 2) and the severe in group 2 (15% versus 10% in lot 1).

It is created a relationship between moderate arteriopathy and hypertension and also between severe arteriopathy and coronary artery disease.

ABI remains an predictive and important research risk factor not only in patients with coronary heart disease but also in those with isolated hypertension.

References: