Xi'an Shiyou Daxue Xuebao (Ziran Kexue Ban)/
Journal of Xi'an Shiyou University, Natural Sciences Edition
ISSN: 1673-064X
E-Publication: Online Open Access
Vol: 67 Issue 04 | 2024
DOI: 10.5281/zenodo.11064783

PREDICTIVE CARDIOVASCULAR FACTORS OF THE EXISTENCE OF A POLYVASCULAR DISEASE IN PATIENTS WITH ACUTE CORONARY SYNDROME

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Abstract

Polyvascular disease, reflecting the spread of severe atherosclerotic lesions, is an independent and powerful predictive factor of mortality and the occurrence of cardiovascular events in the short and medium term in patients with acute coronary syndrome. The objective of the study is to evaluate the predictive factors of the existence of a polyvascular disease in a population presenting with acute coronary syndrome. 336 consecutive patients are included and screened. Hypertension and thinness appear to be the risk factors most strongly linked to the existence of a polyvascular disease. Their Hazard ratio are respectively 3.82 and 4, 27.

Keywords: Polyvascular Disease, Acute Coronary Syndrome, Hypertension.

INTRODUCTION

Atherosclerosis is a global and diffuse disease. No branch of the arterial tree is safe from atheroma attacks; the most dangerous locations of the disease are in the coronary arteries, the cerebral arteries, the abdominal aorta and the arteries of the lower limbs. Polyvascular disease is defined by the simultaneous presence of symptomatic or significant atherosclerotic lesions in at least two major vascular territories [1]. The cardiovascular risk of polyvascular patients is naturally very high. The prognosis remains guarded for patients presenting an acute cardiovascular event; but also for those who are said to be “stable”. The data from the REACH register, from numerous publications, provide the perfect demonstration of this [2]. Multiple studies have demonstrated the poor prognosis of coronary artery disease when other vascular beds are affected. However, most of these studies were sub analyses of clinical trials or studies conducted on a

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selected population benefiting from either cardiac catheterization, revascularization surgery, or both. Thus, in acute coronary syndromes, the presence of a polyvascular disease impacts the prognosis in the short, medium and long term [3-7].

MATERIAL ET METHODS

The objective of the study is to evaluate the predictive factors of the existence of a polyvascular disease in a population presenting with acute coronary syndrome. Polyvascular disease is defined by the existence of a Systolic Pressure Index less than 0.90 and/or significant carotid stenosis. The Anckle Brachial Index ABI (right or left) is the ratio of the highest systolic pressure measured at the posterior tibial or pedal to the highest systolic pressure measured at the brachial level. The Anckle Brachial Index is measured in the supine position after resting for at least ten minutes. Of the two lower limbs, the lowest systolic pressure index value is retained for the analysis. A Doppler ultrasound of the supra-aortic trunks is done for all patients with acute coronary syndrome. Hemodynamic stenosis is defined by an acceleration of arterial flow with a velocity ratio (maximum systolic velocity) greater than 2 determining a stenosis estimated at more than 50%.

341 patients are hospitalized for acute coronary syndrome. We counted five patients not included due to premature death. 336 patients are included in our study. The data are expressed as the means±SD or frequencies (percentages). The patient characteristics between groups were compared using a t-test for continuous variables and a chi-square test for categorical variables. Cox regression analysis was performed to determine the variables that were independently associated with the defined events. A Cox proportional hazard model to estimate the hazard ratios (HR) with corresponding 95% confidence intervals (CI95%) after adjusting for potential confounding. All P values for the statistical tests were two-tailed, and a P value <0.05 was considered statistically significant. All analyses were performed using EpiData analysis and Epi Info 7 statistical software.

RESULTS

336 consecutive patients are included and screened. Patient characteristics are summarized in Table 1. The mean age is 63.3 years. Among them, 69.0% are men, 59.5% smokers, 58.6% hypertensives, 59.8% diabetics and 21.7% obese. Diabetes is discovered at the time of acute coronary syndrome in 11.0% of patients in the general population. Previous dyslipidemia is known in 35.0% of patients. 23.9% of patients have a KILLIP ≥ 2. 15.2% have anemia on admission and 6.0% of them have a GFR estimated according to Cockroft of less than 30ml/min. 41% have an LVEF according to Simpson of less than 50%. The frequency of polyvascular disease is 28.9%.

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Table 1: Baseline characteristics of the study subjects

CV risk factors	% (n)	Clinical presentation	% (n)
Mean Age y	**63,3** ±12,2	**STEMI**	**51,5** (173)
Male sex	**69,0** (232)	**Polyvascular disease**	**28,9** (97)
CV Heredity	**10,7** (36)	**ABI < 0,9**	**16,1** (54)
Smoker	**59,5** (200)	**Carotid stenosis > 50%**	**16,7** (57)
Current Smoker	**36,0** (141)	**Systolic BP < 90 mmHg**	**1,5** (5)
Dyslipidemia	**35,0** (111)	**KILLIP ≥ 2**	**23,9** (80)
Hypertension	**58,6** (197)	**Hb < 11,5 gr/dl**	**15,2** (51)
Diabetes	**59,8** (201)	**eGFR-creatinine < 30 ml/'/1,73m2**	**6,0** (20)
Obesity BMI>30	**21,7** (73)	**LVEF Simpson < 50%**	**41,1** (138)

***CV Heredity**: Cardiovascular Heredity, **BMI**: Body Mass Index, **ABI**: Anckle Brachial Index, **STEMI**: ST elevation Myocardial Infarction, **Hb**: Hemoglobin, **EGFR**: estimated Glomerular Filtration ration, **LVEF**: Left Ventricular Ejection Fraction*

After analytical study, as shown in Table 2, there is a statistically significant link between advanced age, smoking over thirty years, heavy exposure to tobacco, hypertension, known hypertension for over ten years, diabetes, diabetes on insulin therapy and thinness with the existence of a polyvascular disease in patients with acute coronary syndrome. Hypertension and thinness appear to be the risk factors most strongly linked to the existence of a polyvascular disease. Their Hazard ratio are respectively 3.82 and 4, 27.

Table 2: Results of a multivariate Cox proportional hazard model for cardiovascular events

	Population without polyvascular disease N=239 % (n)	Polyvascular Population N=97 % (n)	Hazard ratio	P
Age ≥ 75 Years	15,5 (37)	33,0 (32)	**2,69**	$<10^{-2}$
Smoker ≥ 30 years	26,4 (63)	45,4 (44)	**2,32**	$<10^{-2}$
Smoking ≥ 30 packages/year	38,1 (91)	52,6 (51)	**1,80**	$<10^{-2}$
Known Dyslipidemia	29,3 (70)	42,3 (41)	1,77	0,89
Statin therapy	18,1 (43)	28,9 (28)	1,84	0,29
Hypertension	50,2 (120)	79,4 (77)	**3,82**	$<10^{-2}$
Hypertension ≥ 10 years	21,8 (52)	40,2 (39)	**2,42**	$<10^{-2}$
Diabetes	55,2 (132)	71,1 (69)	**2,00**	0,05
Diabetes ≥ 10 years	21,8 (52)	34,0 (33)	1,85	0,79
Diabetes with insulin	13,4 (32)	29,9 (29)	**2,76**	0,01
Diabetes with Metformin	29,7 (71)	44,3 (43)	1,88	0,28
Thinnes BMI < 18	1,3 (3)	5,2 (5)	**4,27**	0,02
Metabolic Syndrome (ATPIII)	54,4 (130)	74,2 (72)	2,41	0,19
Number of Cv RF	29,7 (71)	49,5 (48)	2,32	$<10^{-2}$

***BMI:** Body Mass Index, **Metabolic Syndrome** ATPIII [8], **Number of Cv RF**: Number of cardiovascular Risk Factor*

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DISCUSSION

Cardiovascular risk factors are, as illustrated in the following **table 3**, particularly frequent compared to the ACCESS Maghreb patient registry [9]. Apart from diabetes, their frequencies match those of the large international registers on which studies of the prevalence of polyvascular disease have been carried out: GRACE [5], CRUSADE [3], MASCARA [7], GULFRACE-2 [10] and PAMISCA [11]. We note that the frequency of diabetes in our series (59.8% of cases) is the highest among these latter studies cited. It is, in fact, 22%, 28.1% and 38% for the GRACE [5], MASCARA [7] and GULFRACE-2 [10] studies respectively. Apart from diabetes, the characteristics of our study population are similar or even overlap with those of the Western GRACE [5] and MASCARA [7] registers.

Table 3: Cardiovascular risk factors in different comparative studies carried out on patients with acute coronary syndrome.

	Our study N=336 %	ACCESS N=1687 %	GRACE N=32735 %	MASCARA N=6745 %	Gulf RACE-2 N=6705 %	CRUSADE N=95749 %	ALLIANCE N=8904 %	PAMISCA N=1410 %
Mean Age Y	63,3	59	64	66,9	56	67	66	66
Male Sex	69,0	76	68	70,6	80	59,9	71,9	71,4
Cv Heredity	10,7							
Smoker	59,5	47	59	64,2	54		59,3	59,1
Current Smoker	36,0			28,3		27,1		30,9
Dyslipidemia	35,0	22	46	46,4	36	52,1	43,4	84,1
Hypertension	58,6	45	58	58,3	45,3	71,2	50,0	79,3
Diabetes	59,8	37	22	28,1	38	33,2	21,0	35,0
Obesity	21,7	19					18,0	

***CV Heredity**: Cardiovascular Heredity*

After multivariate analysis, and in accordance with data from the existing literature on symptomatic polyvascular disease, numerous cardiovascular risk factors in our series were significantly associated with polyvascular disease. However, they remain unequal in the power of their statistical link with it. Arterial hypertension appears, as in all studies carried out in patients with acute coronary syndrome, the cardiovascular risk factor most strongly linked to the presence of a polyvascular disease, particularly when it has been known since more than ten years. Its Hazard ratio is 3.82 in our series. Similarly to what is reported in the literature [3-5] [7, 9-11], polyvascular patients are older. An age greater than or equal to 75 years is predictive of multi-territorial arterial damage (Hazard ratio of 2.69). On the other hand, no significant link was observed between the sex of the patients and polyvascular disease in our series. In the literature, the data are contradictory. In the MASCARA study [7], male patients are more at risk of having polyvascular disease. But in GULFRACE-2 [10], it is women who are significantly more at risk. In our series, tobacco intoxication, when significant (duration of exposure ≥30 years, quantity ≥30 packs/year) is significantly linked to polyvascular disease. This notion remains, like sex, controversial in literature. Indeed, the results of MASCARA [7] and ALLIANCE [4] are similar to ours

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on this point, unlike the GRACE [5], CRUSADE [3] and GULFRACE-2 [10] studies. Diabetes, as observed in the GRACE [5], GULFRACE-2 [10], CRUSADE [3] and ALLIANCE [4] studies, also appears to be significantly associated with the presence of a polyvascular disease (Hazard ratio=2). This link is particularly highlighted in our series when diabetes is treated with insulin. Dyslipidemia is a difficult concept to understand due, as said above, to a delicate and even perilous interpretation of the lipid profile carried out in the acute phase of a myocardial infarction. However, known dyslipidemia is described as linked to polyvascular disease in the GRACE [5], MASCARA [7], CRUSADE [3] and ALLIANCE [4] studies. In our series, this link is not observed after multivariate analysis. The existence of a metabolic syndrome is linked in univariate analysis to polyvascular disease (Hazard ratio=2.41). This notion has not been reported in the various studies carried out in patients with acute coronary syndrome, and in our series after logistic regression this link is no longer significant. Finally, in order of decreasing power, the cardiovascular risk factors significantly linked to the presence of polyvascular disease in patients with acute coronary syndrome are: High blood pressure, diabetes under insulin therapy, advanced age and prolonged smoking. Furthermore, in the CRUSADE [3] and ALLIANCE [4] studies, polyvascular disease appears inversely correlated with the Body Mass Index: obesity would be a protective factor. In our series, thinness (BMI<18Kg/m2) is very strongly linked to polyvascular disease with a Hazard ratio=4.27.

Table 4: Statistical correlation of cardiovascular risk factors in different comparative studies carried out on patients with acute coronary syndrome

	Our study N=336	GRACE N=32735	MASCARA N=6745	Gulf RACE-2 N=6705	CRUSADE N=95749	ALLIANCE N=8904	PAMISCA N=1410
Age ≥ 75 Years	+	+	+	+	+	+	+
Male Sex	NS	-	+	- ♀	- ♀	NS	- ♀
Smoking	+/-	+	+	-	-	+	NS
Dyslipidemia	NS	+	+	NS	+	+	NS
Hypertension	+	+	+	+	+	+	+
Diabetes	+	+	+	+	+	+	+
Obesity	-	U	U	U	-	-	U
Thinness	+	U	U	U	U	U	U
Abdominal Obesity	NS	U	U	U	U	U	U
Metabolic Syndrome	NS	U	U	U	U	U	U

***-** : Negative, +: Positive, **-** ♀: Negative for women, **U**: Unspecified, **NS**: Not Significant*

CONCLUSION

Our study revealed that among cardiovascular risk factors, hypertension and thinness are strong predictive factors for the existence of polyvascular disease in patients with acute coronary syndrome.

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Bibliography

1) Tendera M, Aboyans V, Bartelink ML, Baumgartner I, Clément D, Collet JP, Cremonesi A, De Carlo M, Erbel R, Fowkes FG, Heras M, Kownator S, Minar E, Ostergren J, Poldermans D, Riambau V, Roffi M, Röther J, Sievert H, van Sambeek M, Zeller T, ESC Committee for Practice Guidelines. ESC Guidelines on the diagnosis and treatment of Peripheral artery diseases: Document covering atherosclerotic disease of extracranial carotid and vertebral, mesenteric, renal, upper and lower extremity arteries: the Task Force on the Diagnosis and Treatment of Peripheral artery diseases of the European Society of Cardiology. Eur Heart J 2011; 32(22):2851–906.

2) Steg PG, Bhatt DL, Wilson PW, D'Agostino R Sr, Ohman EM, Röther J, Liau CS, Hirsch AT, Mas JL, Ikeda Y, Pencina MJ, Goto S, REACH Registry Investigators. One-year cardiovascular event rates in outpatients with atherothrombosis. J Am Med Assoc 2007; 297:1197–1206.

3) Bhatt DL, Peterson ED, Harrington RA, Ou FS, Cannon CP, Gibson CM, Kleiman NS, Brindis RG, Peacock WF, Brener SJ, Menon V, Smith SC Jr, Pollack CV Jr, Gibler WB, Ohman EM, Roe MT, CRUSADE Investigators (2009) Prior Polyvascular disease (PVD): risk factor for adverse ischaemic outcomes in acute coronary syndromes. Eur Heart J 30:1195–202.

4) Meizels A, Zeitoun DM, Bataille V et al. Impact of polyvascular disease on baseline characteristics, management and mortality in acute myocardial infarction. The Alliance project. Archives of Cardiovascular Diseases 2010; 103(4):207–14.

5) Mukherjee D, Eagle KA, Kline-Rogers E, et al. Impact of prior peripheral arterial disease and stroke on outcomes of acute coronary syndromes and effect of evidence-based therapies (from the Global Registry of Acute Coronary Events). Am J Cardiol 2007; 100(1):1–6.

6) Cotter G, Cannon CP, McCabe CH, Michowitz Y, Kaluski E, Charlesworth A, et al. Prior peripheral arterial disease and cerebrovascular disease are independent predictors of adverse outcome in patients with acute coronary syndromes: are we doing enough? Results from the Orbofiban in Patients with Unstable Coronary SyndromesThrombolysis in Myocardial Infarction (OPUSTIMI) 16 study. Am Heart J. 2003; 145:622-7.

7) Ferreira-Gonzalez I, Miralda GP, Heras M, et al. Investigadores Del Estudio MASCARA. Prognosis and management of patients with acute coronary syndrome and polyvascular disease. Revista Espanola de Cardiologia 2009; 62(9):1012–21.

8) Expert panel on detection, evaluation and treatment of high blood cholesterol in adults. Executive summary of the third report on the National cholesterol education program (NCEP) expert panel on detection, evaluation and treatment of high blood cholesterol in adults (Adult treatment panel III). JAMA 2001; 285: 2486-97.

9) Moustaghfir. A, Haddak. H, Mechmeche. R. Management of acute coronary syndromes in Maghreb countries: The ACCESS (ACute Coronary Events — a multinational Survey of current; management Strategies) registry. Archives of cardiovascular disease 2012; 105: 566-77.

10) 1Al Thani H, El Menyar A, Al Habib KF et al. Polyvascular Disease in Patients Presenting with Acute Coronary Syndrome: Its Predictors and Outcomes. The ScientificWorld Journal 2012; 2012(284851):1-7. GULF RACE2

11) Quiles J, Morillas P, Bertomeu V, Mazon P, Cordero A, Soria F, Facila L, Gonzalez-Juanatey JR, Prevalence of Peripheral Arterial Disease in Patients with Acute Coronary Syndrome (PAMISCA) Investigators. Combination of ankle brachial index and diabetes mellitus topredict cardiovascular events and mortality after an acute coronary syndrome. Int J Cardiol 2011; 151:84–8.