

Peripheral Arterial Disease Evaluation in the Saudi Project for Assessment of Coronary Events Registry Reveals a Missed Opportunity in Preventing the Adverse Cardiovascular Outcomes: A Pilot Study (SPACE-PAD-I)

Badr Aljabri, Ayman Al-Saleh, Sultan Al Sheikh, Talal Al-Tuwaijri, Khalid Al-Habib and Mohammed Al-Omran

From the Division of Vascular Surgery (BA, SA, TA, MA); and from the Division of Cardiology (AA, KA), King Saud University, Riyadh, Saudi Arabia.

Abstract

Background: Peripheral Arterial Disease (PAD) is a marker of systemic atherosclerosis with an elevated risk of cardiovascular mortality and morbidity. This study was undertaken to identify the prevalence of PAD in patients presenting with acute coronary syndrome and do not have previous history of coronary artery disease in order to identify the missed opportunity in treating these patients and potentially avoiding such cardiovascular events.

Methods: We prospectively collected data from consecutive patients who presented with acute coronary events over 4 months. PAD was diagnosed if the Ankle-Brachial index was less than 0.90 and/or if the patient had signs or symptoms suggestive for PAD. Risk factors and risk reduction therapy were compared between patients with and without PAD.

Results: A total of 51 patients were recruited. The mean age for these patients was 62 years and 27% were women. Prevalence of PAD was 45%, of these, 61% were asymptomatic. Prevalence of PAD in patients with no previous history of CAD was 48%, of these, 64% were asymptomatic. There was no difference in atherosclerotic risk factors between patients with PAD compared to patients without PAD. Utilization of risk reduction was suboptimal in patients with PAD; only 61% were on aspirin, 48% were on statin therapy, 43% were on beta-blockers and 30% were on angiotensin converting enzymes inhibitors.

Conclusion: There is a great opportunity in preventing acute coronary events that we are missing. This can be achieved by recognizing patients with PAD (symptomatic or asymptomatic) and aggressively control their risk factors.

Keywords: peripheral arterial disease, acute coronary syndrome, ankle-brachial index

Introduction

Peripheral arterial disease (PAD) is a marker of advanced atherosclerosis with an elevated risk of cardiovascular mortality and morbidity. Patients with PAD have a 4 fold increased risk of myocardial infarction (1) and a 2-to-3 fold increased risk of stroke (2) compared to persons without PAD. Furthermore, the risk of cardiovascular mortality and morbidity in patients with PAD is comparable to that in patients with coronary artery disease (CAD) (3). Since PAD is a marker of advanced atherosclerosis with an elevated risk of cardiovascular mortality and morbidity, intensive risk reduction therapy is critical in these patients. Risk reduction therapy such as smoking cessation, blood sugar control, blood pressure control, antiplatelets, statin, and angiotensin converting enzyme (ACE) inhibitors are proven therapy in reducing the risk of cardiovascular mortality and morbidity in PAD patients (4–9). These results have led several expert committees in recommending their use in patients with PAD (10–12).

CAD is the leading cause of death worldwide (13). In Saudi Arabia, CAD is a major public health problem with overall prevalence of 5.5% (14). Early detection and utilization of risk reduction therapy play a major role in reducing the mortality associated with CAD (12). Therefore, identifying patients at risk of acute coronary events among asymptomatic people is a major challenge. Diagnosing patients

Correspondence: Mohammed Al-Omran, M.D., MSc, King Khalid University Hospital, Department of Surgery, P.O. Box 7805(37), Riyadh 11472, Saudi Arabia. Tel: +9661 467-9097; Fax: +9661 467-9493; Email: m_alomran@hotmail.com



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not known to have CAD with either symptomatic or asymptomatic PAD could potentially result in preventing future adverse cardiovascular events. Ankle-Brachial index (ABI : ratio of ankle to arm systolic blood pressure) is a simple non-invasive test that is highly specific and sensitive in diagnosing PAD (15; 16). ABI has been shown to significantly improve the prediction of fatal myocardial infarction over and above that of conventional risk factors (17).

The aims of this pilot study were to identify the prevalence of PAD in patients presenting with acute coronary syndrome and to explore the missed opportunity in potentially preventing acute coronary events by identifying the prevalence of PAD and the optimal use of risk reduction therapy in patients presenting with acute coronary syndrome and do not have previous history of CAD.

Methods

We conducted a prospective study of consecutive patients who presented to King Khalid University Hospital with acute coronary syndrome (unstable angina, Non ST-segment elevation myocardial infarction (NSTEMI), or ST-segment elevation myocardial infarction (STEMI)) over a period of 4 months (between April 1 and July 31, 2006) and were willing to participate in this study after obtaining an informed consent. A pre-designed questionnaire based on WHO/Rose questionnaire(18) was filled by a research resident for each patient. Ankle-Brachial index (ABI) was performed for each patient. In this test, the systolic blood pressure is measured at the brachial artery, dorsalis pedis artery and posterior tibial artery using a hand-held Doppler, the ABI is calculated by dividing the higher systolic reading in the pedal arteries (either posterior tibial or dorsalis pedis) over the brachial artery reading. This study was approved by the Ethics Review Board of King Khalid University Hospital, Riyadh, Saudi Arabia.

Patients were considered having PAD if the ABI was less than 0.90 and/or if the patient was having one of the following;

- 1) Previous history of leg arterial bypass for PAD indication.
- 2) Previous history of leg angioplasty for PAD indication.
- 3) Previous history of leg amputation for PAD indication.
- 4) Current leg rest pain secondary to PAD.

- 5) Current tissue loss (leg ulcer, gangrene) secondary to PAD.
- 6) Current intermittent claudication symptoms.

Asymptomatic PAD was diagnosed if the ABI < 0.9 and not having any of the above 6 criteria, while symptomatic PAD was diagnosed if any of the above 6 criteria is present whether ABI < 0.9 or not (10).

The data for atherosclerotic risk factors were collected and include; age, gender, family history, smoking history (current and former), diabetes mellitus (defined as a fasting blood sugar (FBS) > 7 mmol/l in 2 occasions), Hypertension (defined as a systolic blood pressure (BP) > 140 mmHg and/or a diastolic BP > 90 mmHg), Hyperlipidemia (defined as a low density lipoprotein cholesterol (LDL-C) > 2.5 mmol/l and/or triglycerides (TG) > 1.7 mmol/l), overweight (defined as a body mass index (BMI) > 25 kg/m²), and obesity (defined as a body mass index (BMI) > 30 kg/m²). In addition, glycosylated hemoglobin A1c (Hb A1c) was obtained in diabetic patients to assess the optimal control for diabetes.

The data for risk reduction pharmacotherapies were collected and include; the use of antiplatelets medications (such as aspirin and clopidogrel), the use of statins, angiotensin converting enzyme (ACE) inhibitors and beta-blockers.

Statistical analysis

Prevalence was estimated and expressed as percentage. Baseline characteristics were summarized with the use of frequencies and percentages for categorical variables and means and standard deviations (SD) for continuous variables. Chi-square tests were used to compare proportions between different groups and student t tests were used to compare means between different groups. All P-values reported were two tailed, and were considered significant at the 0.05 level.

Results

A total of 51 patients of the seventy consecutive patients with acute coronary syndrome agreed to be enrolled in this study were included. The mean age for these patients was 62 years (SD 14.3) and 27% were women. Majority of patients presented with NSTEMI (57%), 31% presented with STEMI, 10% with unstable angina and 2% with left bundle branch block MI.

Table 1. Baseline characteristics of 51 patients with acute coronary syndrome presented to a tertiary care hospital coronary care unit between April and July 2006.

Characteristics	Overall n = 51	PAD positive n = 23	PAD negative n = 28	P value*
Age, years (mean $\pm$ SD)	62 $\pm$ 14	64 $\pm$ 12	60 $\pm$ 11	NS
Female, n (%)	14 (27%)	7 (30%)	7 (25%)	NS
Diabetes, n (%)	31 (61%)	14 (61%)	17 (61%)	NS
Hypertension, n (%)	28 (55%)	12 (52%)	16 (57%)	NS
Current smoker, n (%)	11 (22%)	4 (17%)	7 (25%)	NS
Hyperlipidemia, n (%)	25 (49%)	13 (57%)	12 (43%)	NS
Family history, n (%)	4 (8.0%)	1 (4.3%)	3 (11%)	NS
Creatinine level, ummo/l (mean $\pm$ SD)	126 $\pm$ 12	128 $\pm$ 11	123 $\pm$ 9	NS
BMI > 25 kg/m ² , n (%)	25 (49%)	11 (48%)	16 (57%)	NS
Past history of CAD, n (%)	24 (47%)	12 (52%)	12 (43%)	NS
Past history of CVD, n (%)	5 (10%)	2 (9%)	3 (11%)	NS

Abbreviations: PAD: Peripheral arterial disease; CAD: Coronary artery disease; CVD: Cerebrovascular disease; BMI: body mass index
 *comparison between patients with and without PAD.

Prevalence of PAD was 45%, of these, 61% were asymptomatic. In symptomatic PAD group, 5 patients were suffering from intermittent claudication, 1 patient had ischemic rest pain, 2 patients had history of tissue loss, and 1 patient had history of leg bypass. Prevalence of PAD in patients with no past history of CAD was 48%, of these, 64% were asymptomatic.

Baseline characteristics for the patients included in this study are shown in Table 1, which showed that there was no statistical difference in the prevalence of different atherosclerotic risk factors between patients with or without PAD who presented with ACS.

The utilization of risk reduction in patients with PAD was suboptimal as shown in Table 2. Furthermore, only 53.6% of the hypertensive

patients (15/28) had an optimal control of blood pressure (BP < 140/90 mmHg) and only 61.3% of the diabetic patients (19/31) had an optimal control of blood sugar (HbA1c < 7%). Of those patients with PAD who were on statins, 27.3% (3/11) had LDL > 2.5 mmol/L.

Discussion

Although, peripheral arterial disease (PAD) is a marker of advanced atherosclerosis with an elevated risk of cardiovascular mortality and morbidity and the use of intensive risk reduction therapy is critical in these patients (19), in this pilot study we showed that PAD was prevalent in the asymptomatic CAD patients; however, there is deficiency in prescribing risk reduction pharmacotherapy

Table 2. Risk reduction therapy utilization in patients with peripheral arterial disease who presented with acute coronary syndrome presented to a tertiary care hospital coronary care unit between April and July 2006.

Risk reduction therapy	All PAD patients n = 23	Symptomatic PAD patients n = 9	Asymptomatic PAD patients n = 14
Antiplatelets (%)	61	78	50
Statins (%)	48	56	43
ACE Inhibitor (%)	30	36	22
Beta Blockers (%)	43	56	36

Abbreviation: ACE: Angiotensin converting enzyme.

(antiplatelets, statins, and ACE inhibitors and beta blockers). In addition, significant number of patients did not achieve the recommended goals for risk factors control.

The role of ABI in predicting the adverse cardiovascular outcomes in patients with CAD from the previously published studies (20–22) along with our data add support to the importance of using ABI as an independent predictor for assessing the risk for cardiovascular events.

Our findings may be explained by; 1) the association of PAD and CAD is usually unrecognized by the patients and primary care physicians (23) and a significant number of patients with PAD may not have symptoms related to their CAD (24). 2) the gaps in physicians' knowledge and action in managing risk factors in patients with PAD (25–27).

In the evaluation of these results, certain potential limitations should be considered. The small number of the participants included in this study. It is also important to stress that this study reflects the practice of physicians in one area over a short period of time, and may not be generalizable to other areas. However, the prospective nature of collecting data in consecutive patients adds strength to the validity and reliability of our data. In addition, we have already started a broad spectrum national study of PAD assessment in multiple medical centers involved in the SPACE registry (SPACE-PAD-II).

In conclusion, there is a great opportunity in potentially preventing acute coronary events that we are missing. This is can be achieved by recognizing patients with PAD (symptomatic or asymptomatic) and aggressively control their risk factors.

Competing interest

The study was fully sponsored by Sanofi-Aventis

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