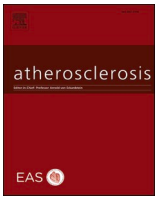
Atherosclerosis 392 (2024) 117488

Contents lists available at ScienceDirect

Atherosclerosis

journal homepage: www.elsevier.com/locate/atherosclerosis



Ten-year mortality after treating obstructive coronary atherosclerosis with contemporary stents in patients with or without concomitant peripheral arterial disease

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ARTICLE INFO

Keywords:
Coronary artery disease
Drug-eluting stent
Long-term mortality
Percutaneous coronary intervention
Peripheral arterial disease
10-Year mortality

ABSTRACT

Background and aims: Previous studies in percutaneous coronary intervention (PCI) patients showed a higher 3-year adverse event risk, including all-cause mortality, in those with concomitant peripheral arterial disease (PADs). Ten-year data of mortality and causes of death are scarce. This analysis assessed PCI patients, treated with contemporary drug-eluting stents, the impact of concomitant PADs on very long-term mortality, and causes of death.

Methods: We assessed PCI all-comers from our center who participated in the TWENTE and DUTCH PEERS trials (*clinicaltrials.gov:NCT01066650*, *NCT01331707*), comparing patients with *versus* without PADs. Life status was checked in the Dutch Personal Records Database; causes of death were obtained from medical records.

Results: Of 2705 study patients, 668 (24.7%) died during follow-up: 88/212 (41.5%) patients with PADs and 580/2493 (23.1%) without PADs. In PADs patients, the 10-year rate of all-cause mortality was about twice as high as in patients without PADs (41.5% *vs.*23.1%, HR: 2.05, 95%-CI: 1.64–2.57, $p < 0.001$). For both groups, the rates of patients dying from various causes of death were: cardiac (14.1% *vs* .6.8%), vascular (2.8% *vs.* 1.1%), non-cardiovascular (17.4% *vs.* 9.8%), and unclear causes (7.1% *vs.* 5.3%), without a statistically significant between-group difference. When multivariate analysis was adjusted for between-group differences in cardiovascular risk profile, PADs remained predictor of all-cause mortality (adjusted HR: 1.38, 95%-CI: 1.08–1.75, p=0.01).

Conclusions: The 10-year all-cause mortality rate in PCI patients with concomitant PADs was almost twice as high as in those without PADs. Age and other traditional cardiovascular risk factors were higher in patients with PADs, but after correction for these confounders PADs still accounted for almost 40% increase in mortality.

1. Introduction

During the last decades, clinical outcome after percutaneous coronary intervention (PCI) has significantly improved [1]. Consequently, an increasing number of patients with obstructive coronary atherosclerosis live for many years and even decades after PCI [2–4], and outcome data from studies with very long-term follow-up are of interest [5]. Ten years after PCI with early-generation drug-eluting stents (DES), the mortality rate was about 30% [3,6]. With new-generation coronary DES that employ more biocompatible coatings and refined stent designs [7,8], there was hope for a better long-term survival [9]. Yet, up to 5 years after PCI, no significant improvement in mortality was seen [10–13].

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https://doi.org/10.1016/j.atherosclerosis.2024.117488
Received 24 November 2023; Received in revised form 17 February 2024; Accepted 22 February 2024
Available online 26 March 2024

As for new-generation DES reliable outcome data beyond 5 years after PCI is scarce, it is of interest to assess the very long-term outcome of participants in all-comer trials that mimic routine clinical practice [5]. This applies especially to PCI patients with concomitant peripheral arterial disease (PADs), as they are known to have a higher adverse event risk after PCI [14,15] and, thus, might benefit more from use of the most refined coronary stents. Five-year follow-up data have shown that PCI patients with PADs have an inferior clinical outcome than those without PADs, with higher risks for repeated coronary revascularization, target vessel failure, and all-cause mortality [14]. Yet, it is unknown whether this higher propensity for unfavorable clinical outcome persists at very long-term follow-up.

Therefore, we obtained information on the 10-year life status of participants in two randomized all-comer trials, who were treated in our center (Medisch Spectrum Twente, The Netherlands). The aim of the present study was to assess the impact of concomitant PADs on very long-term mortality and the causes of death among all-comer patients after treatment with PCI using newer-generation drug-eluting stents.

2. Patients and methods

2.1. Study population and design

This analysis is an investigator-driven initiative to obtain information about 10-year mortality and causes of death of participants in the TWENTE and DUTCH PEERS trials, who were enrolled and treated at Thoraxcentrum Twente (Medisch Spectrum Twente, Enschede, the Netherlands). Study design and original results of the investigator-initiated TWENTE and DUTCH PEERS trials have been published previously [11,12]. The inclusion criteria were broad in order to obtain an all-comer population.

In brief, TWENTE is a single-center, randomized controlled trial conducted between June 2008 and August 2010 at Thoraxcentrum Twente. Trial participants required PCI with DES for the treatment of a chronic or acute coronary syndrome, while patients with an acute ST-segment elevation myocardial infarction during the first 48 h were not included. Patients were randomized between the Resolute zotarolimus-eluting stent (Medtronic Vascular, Santa Rosa, California) or Xience V everolimus-eluting stent (Abbott Vascular, Santa Clara, California). DUTCH PEERS is a multicenter, randomized controlled trial conducted between November 2010 and May 2012 in which participants required PCI with DES for stable angina or any acute coronary syndrome. Patients were included in four Dutch medical centers and randomized between the Resolute Integrity zotarolimus-eluting stent (Medtronic, Santa Rosa, California) or Promus Element everolimus-eluting stent (Boston Scientific, Natick, Massachusetts). Patients were eligible for participation if they were 18 years or older and capable of providing informed consent.

All (100%) TWENTE participants and the vast majority (84.6%) of all DUTCH PEERS participants were enrolled at Thoraxcentrum Twente. At 10-year follow-up, we used the Dutch Personal Records Database to check the life status of all trial participants from our region, who had been alive at 5-year follow-up. Of patients who died between 5 and 10-year follow-up, additional information was obtained from the medical records of the hospital or the patients' general practitioner. The cause of death was classified as cardiac, vascular, non-cardiovascular, or unclear. Further data on the cause and circumstances of death were considered as unclear, if contact information of the general practitioner was undefined, the patient was unsubscribed by the indicated general practitioner due to relocation (e.g., to a nursing home), or the general practitioner had no information about the cause of death as he or she was not able to enter a patient's medical record. In patients who deceased during the first 5 years of follow-up, the cause of death was independently adjudicated by an external clinical event committee. In patients who died during 6 to 10-year follow-up, the first author (THP) classified the cause of death based on prespecified definitions. In case of any doubt, both second author (EHP) and last senior author (CvB) were available for consultation, discussion, and finally classification, based on a majority decision.

The Medical Ethics Committee Twente and the Institutional Review Board of Medisch Spectrum Twente approved the original clinical trials. Both trials complied with the Declaration of Helsinki and all participants provided written informed consent. The present extended follow-up study was approved by the Medical Ethics Committee Twente, which classified it as research that does not fall under the Dutch 'Medical Research Involving Human Subjects Act'. Consequently, the requirement for obtaining an additional written informed consent from each individual patient was formally waived.

2.2. Definitions

All-cause mortality, that is death from any cause, was assessed as the main endpoint of the present analysis. The cause of death was assessed and classified as cardiac, vascular, non-cardiovascular, or unclear cause. The definitions of cardiac, vascular, and non-cardiovascular mortality were in accordance with definitions of the Academic Research Consortium [16,17]. Cardiac mortality was defined as any death due to proximate cardiac cause (e.g., myocardial infarction, low-output cardiac failure, fatal arrhythmia), unwitnessed death and death of unknown cause, and all procedure-related deaths, including those related to concomitant treatment. Vascular mortality included death caused by non-coronary vascular causes, such as cerebrovascular disease, pulmonary embolism, ruptured aortic aneurysm, dissecting aneurysm, or other vascular diseases. Non-cardiovascular mortality was defined as any death not covered by the above definitions, such as death caused by infection, malignancy, sepsis, pulmonary causes, suicide, or trauma.

Peripheral arterial disease was classified as being present, if study patients –by anamnesis or medical record– had a history of: symptomatic atherosclerotic lesion in the lower or upper extremities; atherosclerotic lesion in the aorta causing symptoms or requiring treatment; atherosclerotic lesion in the carotid or vertebral arteries related to a non-embolic ischemic cerebrovascular event; or symptomatic atherosclerotic lesion in a mesenteric artery [18,19].

2.3. Statistical analysis

Continuous variables were reported as mean ± standard deviation and categorical variables as number and percentage. Between-group differences were assessed with Student's t-test or Wilcoxon Rank Sum test for continuous variables and chi-square test for categorical variables. The time to endpoints was assessed using the Kaplan-Meier methods. Cox proportional hazards analysis was used to compute hazard ratios (HR) with confidence intervals. Potential confounders (e.g. demographics, clinical and procedural characteristics) were identified if in univariate analyses p-values were <0.15. All potential confounders with univariate association with PADs as well as the endpoint 10-year mortality were included in the first pass of a multivariate Cox regression model ($p < 0.15$). Stepwise backward selection was used to exclude variables with a non-significant association with the main endpoint all-cause mortality. In the final multivariate Cox regression, the following confounders were included: age, smoking, diabetes, renal failure, previous stroke, left ventricular ejection fraction of <30%, prior myocardial infarction, and prior coronary artery bypass grafting. SPSS software was used to perform the statistical analyses (version 28, IBM, Armonk, NY). p-values and confidence intervals (CI) were two-sided; they were considered significant if p-values were <0.05.

3. Results

3.1. Study population

Of all 2743 participants in TWENTE and DUTCH PEERS from our hospital's region, information on the presence of PADs was available in

all but 38 who were excluded from the present analysis. As a consequence, the study population consisted of 2705 patients of whom 212 (8%) had PADs and 2493 (92%) did not (Fig. 1).

Patients with and without PADs showed significant differences in demographics and baseline clinical and procedural characteristics. Patients with PADs were older and had more often diabetes, hypertension, hypercholesterolemia, renal failure, and a history of stroke. In addition, they more often had a previous myocardial infarction or previous PCI. Furthermore, during the index procedure, they more often underwent PCI in severely calcified lesions, but less often in bifurcated lesions (Table 1).

3.2. Mortality 10 years after PCI

Information on the 10-year mortality of PCI patients enrolled in the TWENTE trial was collected between August 2021 and October 2022. For study patients who had been enrolled in the DUTCH PEERS trial, that information was collected between October 2021 and October 2022. Ten years after the index PCI, 3 out of 4 study patients (2037/2705 patients (75.3%)) were still alive. Overall, 668/2705 (24.7%) patients were deceased: 88/212 (41.5%) patients with concomitant PADs and 580/2493 (23.1%) patients without PADs.

3.3. PADs and 10-year mortality

At 10-year follow-up, the rate of all-cause mortality in patients with PADs was about twice as high as in those without PADs (41.5% *vs.* 23.1%, HR: 2.05, 95%-CI: 1.64–2.57, $p<0.001$, Fig. 2). Cardiac mortality was noted in 14.1% of the patients with PADs and in 6.8% of those without PADs (adj.HR: 1.22, 95%-CI: 0.81–1.85, $p=0.34$, Table 2). In addition, the vascular mortality rate was 2.8% and 1.1%, respectively (adj.HR: 1.92, 95%-CI: 0.76–4.86, $p=0.17$). Furthermore, the rate of non-cardiovascular mortality was 17.4% and 9.8%, respectively (adj.HR: 1.15, 95%-CI: 0.79–1.68, $p=0.46$); in 7.1% and 5.3%, respectively, the cause of death was unclear.

After adjustment for confounders, PADS was found to be an independent predictor of 10-year all-cause mortality (adj.HR: 1.38, 95%-CI: 1.08–1.75; $p=0.01$; Table 3). Other predictors of 10-year all-cause mortality were: age (adj.HR: 1.10, 95%-CI: 1.09–1.11; $p<0.001$); smoking (adj.HR: 1.82, 95%-CI: 1.48–2.25; $p<0.001$); diabetes mellitus (adj.HR: 1.91, 95%-CI: 1.61–2.27; $p<0.001$); renal failure (adj.HR: 2.31, 95%-CI: 1.73–3.08; $p<0.001$); reduced left ventricular ejection fraction (adj.HR: 1.83, 95%-CI: 1.28–2.63; $p<0.001$); previous myocardial infarction (adj.HR: 1.45, 95%-CI: 1.23–1.71; $p<0.001$); and previous coronary artery bypass surgery (adj.HR: 1.41, 95%-CI: 1.14–1.75; $p=0.002$). PADs showed no independent association with 10-year cardiac (adjHR: 1.22, 95%-CI: 0.81–1.85, $p=0.34$), vascular (adjHR: 1.92, 95%-CI: 0.76–4.86, $p=0.17$), or non-cardiovascular mortality (adjHR: 1.15, 95%-CI: 0.79–1.68, $p=0.46$).

4. Discussion

4.1. Main findings

Of the 2705 study patients, information on the 10-year life status was available in all patients. Overall, about three out of four (75.3%) all-comer patients were still alive, ten years after PCI with contemporary DES. Notably, PCI patients with concomitant PADs (8% of the study population) had a much higher risk for all-cause mortality that was about twice as high as in those without PADs (41.5% *vs.*23.1%; Fig. 3). The higher mortality risk of patients with CAD and PADs was not based on a disproportionate increase in a single cause of death. Multivariate analysis, which adjusted for differences in demographics and risk profiles between PCI patients with and without PADs, confirmed that the presence of PADs was an independent predictor for 10-year all-cause mortality, accounting for 38% increase in mortality risk as compared to patients without PADs. Furthermore, deceased patients with and without concomitant PADs showed no statistically significant difference in their causes of death. Most of the deceased patients with concomitant PADs died of non-cardiovascular cause (one in six), closely followed by cardiac cause (one in seven), while only three out of one-hundred died of vascular cause.

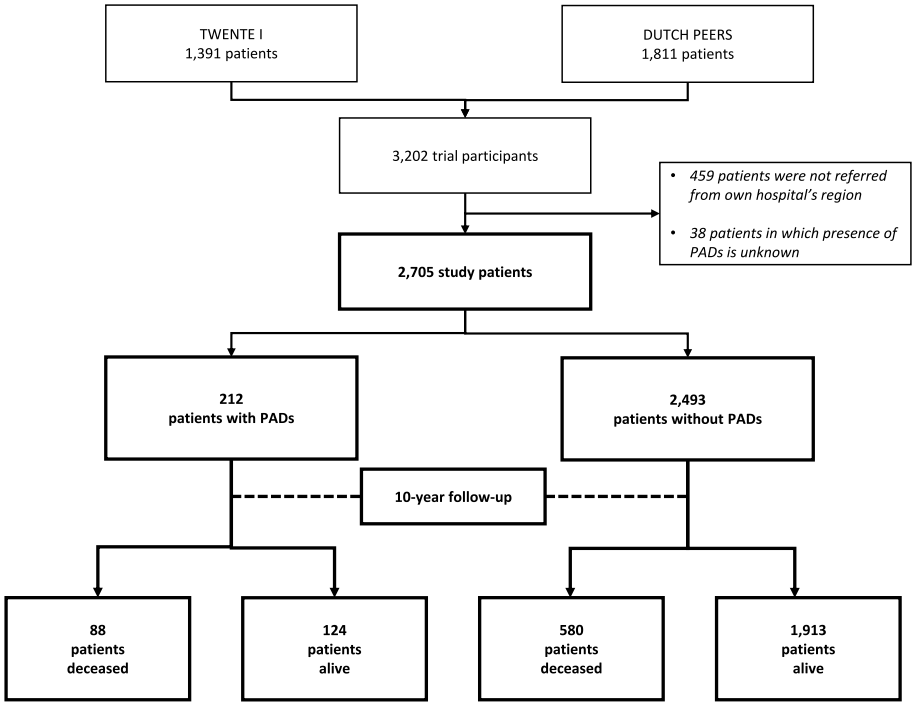

Fig. 1. Flowchart of the study.
Number of patients with and without peripheral arterial disease according to life status 10 years after the index PCI. PADs = peripheral arterial disease.

Table 1
Baseline and procedural characteristics of the study population, stratified by the presence of PADs.

	PADs (n = 212)	No PADs (n = 2493)	*p*-value
Age (years)	67.2 ± 7.8	63.8 ± 10.8	*<0.001*
Premature CAD [a]	4 (1.9)	307 (12.3)	*<0.001*
Woman	48 (22.6)	687 (27.6)	0.12
Body-Mass Index (kg/m^2)	27.8 ± 4.5	27.9 ± 4.3	0.40
Smoker	61 (28.8)	598 (24.0)	0.12
Diabetes mellitus	67 (31.6)	459 (18.4)	*<0.001*
Renal failure [b]	19 (9.0)	70 (2.8)	*<0.001*
Hypertension	133 (62.7)	1356 (54.4)	*0.019*
Hypercholesterolemia	130/206 (63.1)	1303/2476 (52.6)	*0.004*
Previous stroke	22 (7.0)	73 (2.9)	*<0.001*
LVEF <30%	12 (6.1)	44 (2.0)	*<0.001*
Family history of coronary artery disease	116 (54.7)	1288 (51.7)	0.39
Previous myocardial infarction	63 (29.7)	690 (27.7)	0.53
Previous percutaneous coronary intervention	53 (25.0)	466 (18.7)	*0.025*
Previous coronary artery bypass surgery	37 (17.5)	251 (10.1)	*<0.001*
Clinical syndrome at presentation			
Stable angina pectoris	110 (51.9)	1148 (46.0)	0.13
STEMI	14 (6.6)	277 (11.1)	
NSTEMI	51 (24.1)	657 (26.4)	
Unstable angina pectoris	37 (17.5)	411 (16.5)	
Multivessel treatment	55 (25.9)	528 (21.2)	0.11
Target vessels			
Left main	8 (3.8)	78 (3.1)	0.61
Right coronary artery	96 (45.3)	913 (36.6)	*0.012*
Left anterior descending artery	77 (36.3)	1272 (51.0)	*<0.001*
Left circumflex artery	74 (34.9)	744 (29.8)	0.12
Bypass graft	18 (8.5)	70 (2.8)	*<0.001*
Length of stent (mm)	43.6 ± 29.0	40.9 ± 26.9	0.10
Calcified lesion treated	64 (30.2)	537 (21.5)	*0.004*
Ostial lesion treatment	27 (12.7)	225 (9.0)	0.07
Bifurcation treatment [c]	41 (19.3)	681 (27.3)	*0.012*
Chronic total occlusion treatment	11 (5.2)	150 (6.0)	0.63

Data are mean ± SD, n (%) or n/N (%).[a]Defined as CAD in men<50 and women<55 years; [b]Defined as previous renal failure, creatinine ≥130 μmol/L, or the need for dialysis; [c]Target lesions were classified as bifurcated if a side branch ≥1.5 mm originated from them.
CAD = coronary artery disease; LVEF = left ventricular ejection fraction; NSTEMI = non–ST-segment–elevation myocardial infarction; PADs = peripheral arterial disease; STEMI = ST-segment–elevation myocardial infarction.

4.2. Previous studies about 10-year mortality after PCI

In patients treated with PCI for left main coronary artery disease or 3-vessel disease, previous studies found 10-year mortality rates that ranged from 15% to 34% [20–22], and cardiac mortality was reported to be 8–10% [21]. In 2098 all-comer patients treated with PCI and early-generation DES, a 10-year all-cause mortality rate of 28% was seen and the cardiac mortality rate was 11% [3]. After the introduction of new-generation coronary DES, improvement in very long-term clinical outcome was observed. The ISAR-TEST 4 trial assessed 2603 PCI patients with acute myocardial ischemia and obtained 10-year follow-up data in 83% of the original study population. The mortality rate was found to be lower in PCI patients treated with new-generation DES (30–32%) as compared to those treated with early-generation DES (37%) [2]. In the present analysis of data from PCI all-comers, the all-cause mortality rate was 25% for all patients. The slight differences in 10-year mortality after PCI with new-generation DES, seen between patients of the ISAR-TEST 4 trial and our present study (30–32% and 25%), results most likely from differences in study population (i.e., PCI patients with acute myocardial ischemia as compared to all-comers, including patients with stable angina). Compared to the PCI all-comers of the SORT OUT II trial, who were treated with early-generation DES [3], 10-year all-cause mortality was somewhat lower in the present study which used new-generation DES (28% and 25%).

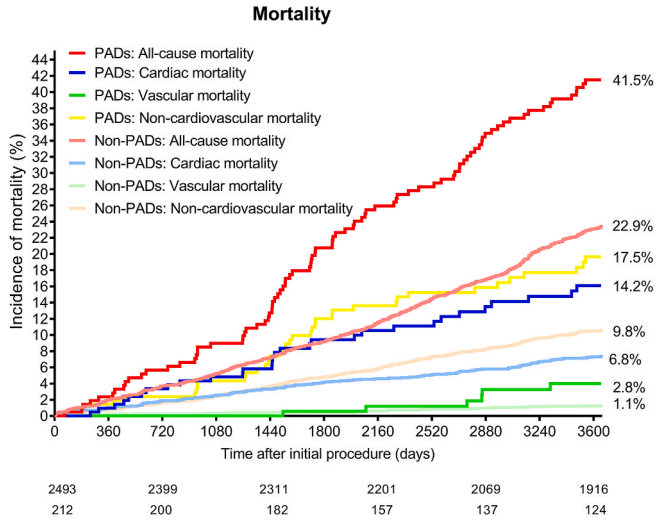

Fig. 2. Kaplan-Meier cumulative event curves for mortality at 10-year follow-up. Kaplan-Meier cumulative incidence curves for: all-cause, cardiac, vascular, and non-cardiovascular mortality. PADs = peripheral arterial disease.

Patients with lower extremity peripheral artery disease (independent of concomitant coronary artery disease or PCI) are known to have a higher risk of mortality than healthy individuals [23]. A study in 331 patients with lower extremity peripheral arterial disease showed that the 10-year mortality rate was significantly higher in patients who also had diabetes (58%) as compared to those who did not (29%) [23]. In addition, a Swedish observational population-based cohort study found a 10-year mortality rate of 33% for the entire population, consisting of 5080 men and women aged 60–90 years, while the 10-year mortality rates of patients with asymptomatic peripheral arterial disease (56%)

Table 2
Mortality (by cause) at 10-year follow-up: PADs compared to non-PADs patients.

	PADs (n = 212)	No PADs (n = 2493)	Adjusted HR (95-CI)	*p*-value
All-cause mortality	88 (41.5)	668 (23.1)	1.38 (1.08–1.75)	*0.010*
Cardiac mortality	30 (14.1)	171 (6.8)	1.22 (0.81–1.85)	0.34
Vascular mortality	6 (2.8)	27 (1.1)	1.92 (0.76–4.86)	0.17
Non-cardiovascular mortality	37 (17.4)	248 (9.8)	1.15 (0.79–1.68)	0.46
Unclear cause of death	15 (7.1)	134 (5.3)	1.11 (0.61–2.00)	0.74

Data are n (%).
HR = hazard ratio; PADs = peripheral arterial disease.

and patients with intermittent claudication (63%) were higher [24]. A direct comparison with the findings of the present study is rendered difficult by differences in study population. Subjects assessed in the Swedish study were older than patients of the present study (average of 71 years and 63 years), and in the Swedish study the proportion of women was more than twice as high (55% and 27%) [24]. Yet, a Dutch single-center observational cohort study found a somewhat lower 10-year mortality of 40–42% in 2642 patients with lower extremity peripheral artery disease [25]. Median age of these patients was 65 years and the proportion of women was 28%. The 10-year mortality rate of PCI patients with PADs of the present study (41.5%) is similar to that of the patients with lower extremity peripheral artery disease, assessed in the Dutch cohort study (40–42%) [25]. Yet, that study (1983–2005) was performed about 25 years earlier than the present study (2008–2022). As a matter of fact, during these two and a half decades there have been substantial improvements in pharmacological treatment of atherosclerosis and cardiovascular risk factors, which may explain why the 10-year mortality rate of our study's PADs patients, who also had obstructive coronary disease requiring PCI, was similar to that of the previously treated patient population [25] with lower extremity peripheral artery disease only.

4.3. Risk factors and clinical implications

To the best of our knowledge, the present study in PCI all-comers is the first to evaluate the 10-year mortality risk of patients with both obstructive coronary artery disease and PADs. The 10-year risk for all-cause mortality after PCI with new-generation DES was found to be 41.5% in patients with concomitant PADs, which is more than twice as high as in patients without PADs. Our data corroborate the findings of previous studies that reported high mortality rates for patients with PADs [23–25].

The more diffuse atherosclerotic disease that is present in patients having both coronary artery disease and PADs increases the risk of experiencing ischemic events in vascular beds other than the coronary arteries [26,27]. Other possible explanations for the high long-term mortality rates in patients with PADs are the more advanced age, the higher cardiovascular risk profile, and the increased risk for adverse events after PCI [14]. Furthermore, a higher (systolic) arterial pressure, which is more frequently present in PADs patients (due to greater arterial stiffness and calcification of aorta and major arteries), is known to increase the risk of chronic heart failure, arrhythmias, cardioembolic events, and chronic kidney disease [28]. As previous smoking was not assessed (only active smoking at the time of the index PCI), we cannot exclude that a potentially higher rate of previous smoking in patients with concomitant PADs might have contributed to the higher very long-term risk for all-cause mortality, for instance by inducing malignancies [29].

Previously, multiple risk factors have been associated with increased mortality after PCI, such as age, the presence of cardiogenic shock, renal failure, previous heart failure and presentation with a myocardial infarction [30]. In addition, patients with peripheral arterial disease, diabetes, a previous stroke or myocardial infarction and smokers had a higher mortality risk [30]. Furthermore, a previous study that assessed all-cause mortality 3 years after PCI suggested age, diabetes, renal failure, PADs, previous myocardial infarction, and ostial lesion treatment to be predictors for all-cause mortality [14]. In the present study, even after adjusting for confounders such as smoking, diabetes, renal failure, previous stroke, myocardial infarction, and coronary artery bypass grafting, patients with PADs had a higher risk for 10-year mortality than patients without PADs.

Hence, for treating physicians it is important to be aware of the increased mortality risk of the PCI patients with concomitant PADs. In addition, in patients with PADs a more aggressive risk factor modification, including smoking cessation, lifestyle modifications (e.g., healthy diet and physical exercise), and individualized pharmacological treatment with more ambitious lipid-lowering goals should be considered for secondary prevention.

Table 3
Predictors of 10-year all-cause mortality.

	Adj.HR (95%CI)	*p*-value
Characteristics		
PADs	1.38 (1.08–1.75)	*0.010*
Age (per year)	1.10 (1.09–1.11)	*<0.001*
Smoking	1.82 (1.48–2.25)	*<0.001*
Diabetes mellitus	1.91 (1.61–2.27)	*<0.001*
Renal failure	2.31 (1.73–3.08)	*<0.001*
Previous stroke	1.26 (0.91–1.74)	0.17
LVEF <30%	1.83 (1.28–2.63)	*<0.001*
Previous myocardial infarction	1.45 (1.23–1.71)	*<0.001*
Previous coronary artery bypass surgery	1.41 (1.14–1.75)	*0.002*

CI = confidence interval; adj.HR = adjusted hazard ratio; LVEF = left ventricular ejection fraction; PADs = peripheral arterial disease.

4.4. Limitations

This study has some limitations. Although the detailed data from an extended follow-up are quite unique, the findings are only hypothesis generating. The present host-hoc analysis of 10-year follow-up after PCI with new-generation DES in all-comers is an investigator-driven initiative that pooled single-center data from two large-scale randomized stent trials to increase the sample size of the study population –in particular of study patients with concomitant PADs. In addition, we performed the multivariate analyses with greatest care, but –as in other studies– the presence of unknown confounders cannot be excluded. The improvement in very long-term PCI outcome, observed during the last one and a half decade, cannot be attributed solely to using more refined coronary stents but also to progress in pharmacological therapy and secondary prevention (e.g., more potent anti-platelet and lipid lowering therapies). So, when speaking about the 'era of newer-generation DES', this also implies the improvement in medical therapy that was achieved during this period. In all patients, both life status and cause of death were carefully assessed. While information on life status was available in all patients, the cause of death could be identified in 93% and 95% of the patients with and without PADs, respectively. The main reasons for classification as an unclear cause of death (in 7% and 5%, respectively) were that (a) the contact information of the general practitioner was undefined; (b) the patient was unsubscribed with the indicated general

practitioner due to relocation, mainly to a nursing home; (c) the general practitioner did not have any information about the cause of death, as he or she was unable to enter the respective medical record after the patient's death. As a consequence, the assessed rates of cardiac, vascular, and non-cardiovascular mortality slightly underestimate the actual rates.

4.5. Conclusions

The 10-year all-cause mortality rate in PCI patients with concomitant PADs was almost twice as high as in those without PADs. Age and other traditional cardiovascular risk factors were higher in patients with PADs, but after correction for these confounders PADs still accounted for almost 40% increase in mortality.

Financial support

This study was conducted by the Research Department of Thoraxcentrum Twente, Medisch Spectrum Twente without external funding.

CRediT authorship contribution statement

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The research department of Thoraxcentrum Twente has received research grants provided by Abbott Vascular, Biotronik, Boston Scientific, and Medtronic, not related to the research question of this study.

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