Indian Heart Journal xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Indian Heart Journal

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

Original Article

Predictors of major adverse cardiac events following elective stenting of large coronary arteries

Hassan Aghajani[a,*], Abdolhakim Alkamel[a], Akbar Shafiee[a,b], Arash Jalali[a], Younes Nozari[a], Hamidreza Pourhosseini[a], Seyed Ebrahim Kassaian[a], Mojtaba Salarifar[a], Alimohammad Hajizeinali[a], Alireza Amirzadegan[a], Mohammad Alidoosti[a], Farzad Masoudkabir[a], Ebrahim Nematipour[a]

[a] Tehran Heart Center, Tehran University of Medical Sciences, Tehran, Iran
[b] Department of Community Medicine, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

ARTICLE INFO

Article history:
Received 29 November 2016
Accepted 18 June 2017
Available online xxx

Keywords:
Percutaneous coronary intervention
Large coronary artery
Stent
Major adverse cardiac events

ABSTRACT

Objective: Diameter of the affected coronary artery is an important predictor of restenosis and need for revascularization. In the present study, we investigated the frequency and potential risk factors for major adverse cardiac events following elective percutaneous coronary intervention (PCI) and stenting of large coronary arteries.

Methods: We reviewed the data of elective candidates of PCI on a large coronary artery who presented to our center. Demographic, clinical, angiographic and follow-up data of the eligible patients were retrieved from our databank. The study characteristics were then compared between the patients with and without MACE in order to find out the probable risk factors for MACE in patients with large stent diameter.

Results: Data of 3043 patients who underwent single vessel elective PCI with a stent diameter of ≥3.5 mm was reviewed. During a median follow up period of 14 months, 64 (2.1%) patients had MACE. TVR was the most common type of MACE that was observed in 29 patients, while 5 patients had cardiac death. Higher serum levels of creatinine, history of cerebrovascular accident (CVA), and use of a drug eluting stent (DES) were significantly associated with MACE. In the multivariate model, history of CVA (odds ratio = 5.23, P = 0.030) and use of DES (odds ratio = 0.048, P = 0.011) were the independent predictors of MACE in patients underwent large coronary artery stenting.

Conclusion: This study showed that prior CVA and the use of BMS were the potential risk factors for MACE in patients who were stented on their large coronary arteries.

1. Introduction

Coronary artery disease (CAD) is a common cause of morbidity and mortality in developed and developing countries.[1,2] By the advances in the revascularization techniques, particularly percutaneous coronary intervention (PCI), more patients undergo revascularization with single vessel disease.[3]

Diameter of the affected coronary artery is an important predictive factor for restenosis and need for target vessel revascularization (TVR).[4] Therefore, the clinical outcome between small-vessel stenting versus large-vessel stenting can be different as small vessels are more prone to restenosis.[5,6] On the other hand, type of the stent is another important factor. Drug eluting stents (DES) reduce the risk of restenosis; however, there are some considerations regarding their usage, such as higher price, longer duration of dual antiplatelet therapy that increases the risk of minor and major bleeding, patients' intolerance and some serious complications like late and very late stent thrombosis, especially in the first generation of DES.[7–10] Thus, it is important to identify the risk factors for MACE in patients who undergo large coronary artery stenting.

In the present study, we investigated the frequency and potential risk factors for MACE following elective PCI and stenting of large coronary arteries in patients who presented to our center.

* Corresponding author at: Interventional Cardiology, Tehran Heart Center, North Kargar Ave. Tehran, 1411713138, Iran.
E-mail address: aghajanih@tums.ac.ir (H. Aghajani).

http://dx.doi.org/10.1016/j.ihj.2017.06.011

2. Methdos

In this study, we reviewed the data of elective candidates of PCI on a large coronary artery who presented to our center consecutively from March 2004 to March 2014. Inclusion criteria of this study were: 1) age >18 years; 2) complete clinical profile in the Tehran Heart Center Databank; 3) Being followed-up for at least 9 months, unless developing the study endpoints; 4) Single vessel stenting; 5) stent diameter ≥3.5 millimeter. Based on our routine, all patients give an informed consent at the time of admission that their data would be registered in the THC databank and would be used for research purposes anonymously. The protocol of this study was confirmed by the committee of ethics and institutional board of research.

Demographic, clinical, angiographic and follow-up data of the eligible patients were retrieved from the THC databank, which its characteristics has been described elsewhere.[11,12] Cardiovascular risk factors were also reviewed for each patient, including diabetes mellitus, hypertension, dyslipidemia, smoking, opium abuse, and family history of coronary artery disease as defined institutionally based on the international guidelines.[13] For blood tests, venous blood samples were obtained before the procedure and routine blood tests, including fasting blood sugar, serum creatinine, and lipid profile was performed for every patient.

All the procedures were performed at the catheterization laboratory of THC using the latest protocols and guidelines as described before.[14] Type of stent was selected to each particular case based on the clinical situation and the interventionist's discretion. All patients received 300–600 mg loading dose of clopidogrel plus 325 mg aspirin before the intervention and 70–100 IU/kg intravenous unfractionated heparin during the procedure. Clopidogrel (75 mg/d) and aspirin (325 mg/d) were continued for at least 1-month. Then aspirin was tapered to 80 mg for lifelong use while clopidogrel was prescribed for a minimum of 1-month in BMS and 12 months in DES.

Follow-up data were collected prospectively by scheduled inpatient visits or direct telephone interviews. All the events were recorded from the time of intervention. The primary endpoint was the incidence of MACE defined as cardiac death, nonfatal myocardial infarction (MI), target lesion revascularization (TLR) or target vessel revascularization (TVR).

The study characteristics were then compared between the patients with and without MACE in order to find out the probable risk factors for MACE in patients with large stent diameter.

2.1. Statistical analysis

Continuous variables are presented as means ± standard deviation, or as median and interquartile range boundaries, as appropriate. Categorical variables were expressed as frequency and percentage. Association of the variables with MACE occurrence was assessed using univariate logistic regression model and was reportedthrough odds ratio (OR) with 95% confidence interval (CI).Variables with *p*-values less than 0.1 were entered in a multivariable logistic regression model to find the multiple predictors of MACE. Statistical analyses were conducted applying IBM SPSS Statistics for Windows, version 23.0 (Armonk, NY: IBM Corp.).

Table 1
General characteristics of the study population and univariate analysis of the characteristics related to major adverse cardiac events.

Characteristic	Total (n=3043)	MACE free (n=2979)	MACE (n=64)	Odds ratio	95% confidence interval	P-value
Age, year	57.1 ± 10.5	57.1 ± 10.4	56.7 ± 10.8	0.99	0.97–1.02	0.774
Male gender, n (%)	2367 (77.8)	2317 (77.8)	50 (78.1)	1.02	0.56–1.85	0.947
BMI, kg/m^2	27.9 ± 4.3	27.9 ± 4.3	27.6 ± 4.7	0.98	0.92–1.04	0.592
EF, %	50.0 ± 10.3	50 ± 10.2	48.7 ± 10.7	0.99	0.96–1.01	0.295
Diabetes mellitus, n (%)	688 (22.6)	672 (22.6)	16 (25.0)	1.14	0.64–2.02	0.649
Hypertension, n (%)	1358 (44.6)	1328 (44.7)	30 (46.9)	1.09	0.66–1.79	0.725
Dyslipidemia, n (%)	1931 (63.4)	1892 (64.2)	39 (60.9)	0.87	0.52–1.45	0.591
Smoking, n (%)	902 (29.6)	881 (29.7)	21 (32.8)	1.15	0.68–1.96	0.585
Opium, n (%)	334 (11.0)	330 (11.7)	4 (7.1)	0.59	0.20–1.61	0.296
Family history of CAD, n (%)	575 (18.9)	562 (19.0)	13 (20.3)	1.08	0.58–2.01	0.793
Past medical history						
CVA, n (%)	44 (1.4)	41 (1.4)	3 (4.7)	5.02	1.14–22.0	0.032
Renal failure, n (%)	52 (1.7)	50 (1.7)	2 (3.1)	1.88	0.44–7.93	0.386
CHF, n (%)	10 (0.3)	9 (0.7)	1 (3.1)	4.42	0.54–36.02	0.164
COPD, n (%)	45 (1.5)	44 (3.5)	1 (3.1)	1.13	0.15–8.51	0.901
Total cholesterol, mg/dl	173.6 ± 46.9	173.6 ± 47.0	177.9 ± 44.3	1	0.9–1.01	0.524
Triglyceride, mg/dl	151.0 [110.0, 212.0]	150.0 [110.0, 212]	165.0 [135.0, 227.5]	1	0.99–1.00	0.406
LDL, mg/dl	102.6 ± 38.0	102.6 ± 38.0	103.8 ± 38.4	1	0.99–1.00	0.837
HDL, mg/dl	40.3 ± 10.4	40.3 ± 10.4	39.5 ± 9.1	0.99	0.96–1.02	0.61
Fasting blood sugar, mg/dl	100.0 [89.0, 120.0]	100.0 [89.0, 120.0]	106.0 [90.0, 128.0]	1	0.99–1.01	0.18
Creatinine, mg/dl	1.1 [0.9, 1.2]	1.1 [0.9, 1.2]	1.1 [0.9, 1.3]	1.57	1.07–2.31	0.02
Hb A1c, %	7.9 [6.7, 9.5]	7.9 [6.8, 9.5]	8.2 [6.2, 10.2]	0.97	0.78–1.19	0.775
Hb, mg/dl	14.2 ± 1.7	14.2 ± 1.7	14.0 ± 1.9	0.93	0.71–1.21	0.611
Target vessel, n (%)						
LAD	1602 (52.6)	1575 (52.9)	27 (42.2)	0.65	0.39–1.07	0.093
LCX	355 (11.7)	343 (11.5)	12 (18.8)	1.15	0.69–1.92	0.569
RCA	1086 (35.7)	1061 (35.6)	25 (39.1)	1.77	0.93–3.53	0.078
Stent length >20 mm, n (%)	1678 (55.1)	1646 (55.3)	32 (50.0)	0.81	0.49–1.32	0.404
Type of stent, n (%)						
BMS	1115 (36.8)	1081 (36.4)	34 (53.1)	Reference	–	–
DES	1918 (63.2)	1888 (63.6)	30 (46.9)	0.5	0.30–0.83	0.007

BMI: Body mass index; BMS: Bare metal stent; CAD; Coronary artery disease; CHF: Congestive heart failure; COPD: Chronic obstructive pulmonary disease; CVA: Cerebrovascular accident; DES: Drug eluting stent; EF: Ejection fraction; HB: Hemoglobin; LAD: Left anterior descending artery; LCX: Left circumflex artery; LDL: Low density lipoprotein; MACE: Major adverse cardiac events; RCA: Right coronary artery.
*P-value<0.05 was considered as statistically significant.

Please cite this article in press as: H. Aghajani, et al., Predictors of major adverse cardiac events following elective stenting of large coronary arteries, Indian Heart J (2017), http://dx.doi.org/10.1016/j.ihj.2017.06.011