Influence of Diabetes Mellitus on Long-Term Outcomes of Patients With Unprotected Left Main Coronary Artery Disease Treated With Either Drug-Eluting Stents or Coronary Artery Bypass Grafting

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SUMMARY

Whether the effect of diabetes on patients with unprotected left main coronary artery (ULMCA) disease differs according to different strategies of revascularization was unknown. This study was conducted to evaluate the impact of diabetes on patients with ULMCA disease treated with either percutaneous coronary intervention (PCI) or coronary-artery bypass grafting (CABG).

A total of 922 patients with ULMCA disease who received drug-eluting stent (DES) ($n = 465$) implantation or underwent CABG ($n = 457$) were retrospectively analyzed. We compared the effects of these 2 treatments on clinical outcomes (death, myocardial infarction, stroke, repeat revascularization, and the composite of death, myocardial infarction, or stroke), according to diabetic status.

During the median follow-up of 7.1 years (interquartile range, 5.3 to 8.2 years), no difference was found between PCI and CABG in the adjusted occurrence of death ($P = 0.112$) and the composite endpoints of death, myocardial infarction, and stroke ($P = 0.235$). Significantly higher incidence of repeat revascularization ($P < 0.001$) was observed in the DES group, whereas the CABG group had a significantly higher rate of stroke ($P = 0.001$). These trends were consistent in both diabetic and nondiabetic patients. We did not observe significant interactions between treatment outcomes and the presence or absence of diabetes after adjustment for covariates ($P_{\text{interaction}} = 0.580$ for the composite of death, MI and stroke, $P_{\text{interaction}} = 0.685$ for death, $P_{\text{interaction}} = 0.416$ for MI, $P_{\text{interaction}} = 0.470$ for stroke, and $P_{\text{interaction}} = 0.502$ for repeat revascularization).

Presence of diabetes was not important for decision-making between CABG and PCI in patients with ULMCA disease. (Int Heart J 2015; 56: 43-48)

Key words: Revascularization, Prognosis, Percutaneous coronary intervention

According to current guidelines, coronary-artery bypass grafting (CABG) is considered the standard treatment for unprotected left main coronary artery (ULMCA) disease.^{1,2} However, the development of percutaneous coronary intervention (PCI) techniques has made it possible to treat ULMCA disease in selected patients.³⁻⁵ Therefore, much attention has been paid to identifying appropriate risk stratification to help determine the optimal revascularization strategy in patients with ULMCA disease.⁶⁻⁸ Among many risk factors, diabetes was a strong independent predictor of adverse outcome in patients with coronary artery disease.⁹⁻¹¹ Previous studies have shown CABG performed better than PCI in diabetic patients with multivessel disease,¹²⁻¹⁴ indicating that diabetes might be an important consideration when selecting a revascularization strategy in patients with severe coronary ar-

tery disease. However, whether the diabetes has an impact on CABG or PCI outcome in patients with ULMCA disease remains uncertain. Therefore, this study was conducted to evaluate the influence of diabetes on patients with ULMCA disease treated with either drug-eluting stents (DES) or CABG.

METHODS

Patients and procedure: ULMCA disease was defined as left main coronary artery stenosis $\geq 50\%$ and no bypass grafts to the left anterior descending or left circumflex coronary artery. Eligible patients with de novo ULMCA disease who received DES implantation or underwent CABG between January 2003 to July 2009 in Beijing An Zhen Hospital were consecutively

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enrolled. Patients with prior stents implanted at the left main coronary artery were excluded. Patients > 80 years old when the procedures were operated, with prior CABG, concomitant valvular or aortic surgery, or cardiogenic shock were excluded. STEMI/NSTEMI patients who underwent primary PCI or urgent CABG were excluded. A total of 922 patients were finally analyzed (DES, $n = 465$; CABG, $n = 457$).

The decision to perform CABG or PCI was dependent on patient comorbidities, physician's choice, and/or patient preference. Coronary angioplasty and stent implantation were performed according to the operator's criteria following the center's usual practice. The choice of sirolimus-, paclitaxel- or zotarolimus-eluting stents was at the discretion of the physician (zotarolimus-eluting stents became available for clinical use in our center in September 2006). CABG was performed with standard bypass techniques.¹⁵ The internal thoracic artery was preferentially used for revascularization of the left anterior descending artery.

Before stent implantation, all patients received aspirin according to their physicians' normal procedures and either clopidogrel 75 mg/day for 3 days before the procedure or a preprocedural loading dose of clopidogrel ≥ 300 mg. Patients were continued on clopidogrel for at least one year (75 mg/day) and aspirin indefinitely (100 mg/day) after the procedure. Patients with diabetes mellitus were being treated with oral antidiabetics or insulin.

All patients provided informed consent for both the procedure and subsequent data collection and analysis for research purposes. The study was conducted in accordance with the Declaration of Helsinki and was approved by the local ethics committee (The ethics committee of Beijing An Zhen Hospital, Capital Medical University). The local ethics committee approved the use of the data for this study. There was no industry involvement in the design, conduct, financial support, or analysis of the study.

Clinical definitions and follow up: Clinical follow-up was performed at 1 month, 6 months, 1 year, and then annually thereafter. All follow-up data were collected by outpatient or telephone interview and angiographic follow-up. Angiographic follow-up was recommended in the DES group from 8 to 12 months after the procedure or whenever clinically indicated. For patients who underwent CABG, angiographic follow-up was recommended if there were ischemic symptoms or signs during follow-up. Angiographic follow-up was not mandatory. All outcomes of interest were confirmed by source documentation and were adjudicated by the local ethics committee at Beijing An Zhen Hospital, Capital Medical University.

The endpoints of the study were death; repeat revascularization; myocardial infarction (MI); stroke; the composite of death, MI or stroke. Death was defined as death from any cause. Periprocedural myocardial infarction (< 7 days after intervention) was defined as elevated serum creatine kinase-MB isoenzyme levels 5 times the upper limit of normal after CABG and 3 times the upper limit of normal after PCI.¹⁶ Myocardial infarction after the periprocedural period was defined as any typical increase or decrease of biochemical markers of myocardial necrosis with 1 of the following: cardiac symptoms, development of Q waves on electrocardiography, or electrocardiographic changes indicative of ischemia. Cardiac enzymes were not measured routinely unless there was clinical suspicion of myocardial ischemia. Stroke, as indicated by neu-

rologic deficits, was confirmed by a neurologist based on imaging studies. All events were based on clinical diagnoses assigned by the patients' physicians and were centrally adjudicated by an independent group of clinicians in Beijing An Zhen Hospital. In the cumulative analysis of endpoints, events were counted only once, whichever occurred first.

Statistical analysis: Continuous variables are presented as the mean $\pm$ SD or median (interquartile range [IQR]) and were compared between the study groups with the independent sample Student *t* or Mann-Whitney *U* test, dependent on whether or not the data followed a normal distribution. Categorical variables are reported as counts and percentages, and differences between the two groups were assessed by means of the chi-square test. Time to the primary endpoint was evaluated according to the Kaplan-Meier method, and the log-rank test was applied to compare the incidence of the endpoint between patients who underwent PCI and CABG.

Crude and adjusted risks for adverse outcomes were compared by univariate and multivariate Cox proportional hazards regression analyses. Multiple regression analyses using Cox proportional hazard models were tested with the CABG group as the reference category. Interaction terms in the multivariate Cox model were tested for the statistical significance of 2 treatment effects by diabetic status on clinical outcomes. All statistical analyses were performed with the SPSS (Statistical Package for Social Sciences) version 17.0 system for Windows. A *P* value less than 0.05 was considered statistically significant.

RESULTS

Among the 922 eligible patients (DES, $n = 465$; CABG, $n = 457$) enrolled, 274 had diabetes (DES, $n = 143$; CABG, $n = 131$) and 648 did not (DES, $n = 322$; CABG, $n = 326$). The median follow-up was 7.1 years (IQR, 5.3 to 8.2 years) in the overall patients. Complete follow-up was obtained in 93.2% of the overall cohort (93.8% for the PCI group, and 92.6% for the CABG group; $P = 0.47$). During overall follow-up, 113 patients (12.3%) died. A total of 59 (6.4%) suffered a MI, and 57 (6.2%) suffered a stroke. Repeat revascularization was performed in 167 (18.1%).

The baseline clinical and angiographic characteristics of all the patients, and the diabetic and nondiabetic patients, who underwent DES and CABG, are shown in Table I. Overall, the CABG group had a significantly higher prevalence of risk factors (more previous myocardial infarctions, lower EF, higher sCr, more chronic total occlusion, bifurcation, and three-vessel disease) compared with the DES group. The DES group suffered more dyslipidemia and previous PCI. Among the CABG patients, 85.3% underwent revascularization of the left anterior descending artery with an arterial conduit and 92.3% were off-pump CABG.

Table II summarizes the unadjusted and adjusted outcomes of patients receiving DES versus CABG. In the overall population (Figure 1), there was no significant difference in the unadjusted rate of myocardial infarction (13.9% DES versus 6.7% CABG; $P = 0.196$), confirmed by the adjusted results. Significantly higher unadjusted incidences of the composite of death, MI and stroke (22.8% DES versus 38.0% CABG; $P = 0.011$) and death (13.0% DES versus 22.1% CABG; $P = 0.027$) were observed in the CABG group. However, after ad-

Table I. Baseline Clinical and Procedural Characteristics

Variable	Overall (<i>n</i> = 922)			Diabetic patients (<i>n</i> = 274)			Nondiabetic patients (<i>n</i> = 648)		
	DES	CABG	<i>P</i>	DES	CABG	<i>P</i>	DES	CABG	<i>P</i>
Number	465	457	-	143	131	-	322	326	-
Age, years	62 (54-70)	64 (57-70)	0.052	65 (56-70)	66 (58-71)	0.541	61 (53-70)	63 (56-70)	0.043
Male, <i>n</i> (%)	367 (78.9)	377 (82.5)	0.170	103 (72.0)	102 (77.9)	0.266	264 (82.0)	275 (84.4)	0.420
DM, <i>n</i> (%)	143 (30.8)	131 (28.7)	0.488	-	-	-	-	-	-
Smoking history, <i>n</i> (%)	230 (49.5)	205 (44.9)	0.161	71 (49.7)	60 (45.8)	0.524	159 (49.4)	145 (44.5)	0.211
Hypertension, <i>n</i> (%)	286 (61.5)	269 (58.9)	0.412	98 (68.5)	86 (65.6)	0.612	188 (58.4)	183 (56.1)	0.563
Dyslipidemia, <i>n</i> (%)	231 (49.7)	158 (34.6)	< 0.001	77 (53.8)	49 (37.4)	0.006	154 (47.8)	109 (33.4)	< 0.001
Prior stroke, <i>n</i> (%)	45 (9.7)	42 (9.2)	0.800	20 (14.0)	7 (5.3)	0.017	25 (7.8)	35 (10.7)	0.192
Prior MI, <i>n</i> (%)	66 (14.2)	99 (21.7)	0.003	21 (14.7)	28 (21.4)	0.149	45 (14.0)	71 (21.8)	0.010
Prior PVD, <i>n</i> (%)	24 (5.2)	34 (7.4)	0.154	10 (7.0)	10 (7.6)	0.839	14 (4.3)	24 (7.4)	0.103
Prior PCI, <i>n</i> (%)	68 (14.6%)	31 (6.8%)	< 0.001	18 (12.6)	11 (8.4)	0.260	50 (15.5%)	20 (6.1%)	< 0.001
Euroscore	5 (3-6)	5 (3-6)	0.290	5 (3-6)	5 (3-6)	0.204	4 (3-6)	5 (3-6)	0.026
LVEF, %	64 (59-70)	62 (54-68)	< 0.001	64 (59-70)	59 (52-67)	< 0.001	64 (59-70)	64 (54-69)	0.043
sCr, umol/L	79.6 (70.0-93.7)	84.0 (70.7-97.2)	0.012	78.7 (68.0-99.0)	81.3 (70.7-97.2)	0.442	79.6 (70.4-91.5)	84.9 (70.7-97.2)	0.011
Clinical indication			0.001			< 0.001			0.123
Unstable angina, <i>n</i> (%)	323 (69.5)	318 (69.6)		102 (71.3)	85 (64.9)		221 (68.6)	233 (71.5)	
NSTEMI, <i>n</i> (%)	19 (4.1)	16 (3.5)		5 (3.5)	6 (4.6)		14 (4.3)	10 (3.1)	
STEMI, <i>n</i> (%)	55 (11.8)	41 (9.0)		17 (11.9)	7 (5.3)		38 (11.8)	34 (10.4)	
SAP, <i>n</i> (%)	52 (11.2)	80 (17.5)		13 (9.1)	33 (25.2)		39 (12.1)	47 (14.4)	
Silent ischemia	16 (3.4)	2 (0.4)		6 (4.2)	0 (0)		10 (3.1)	2 (0.6)	
Involved location, <i>n</i> (%)			0.007			0.357			0.009
Ostium/body	149 (32.0)	110 (24.1)		42 (29.4)	32 (24.4)		107 (33.2)	78 (23.9)	
Distal bifurcation	316 (68.0)	347 (75.9)		101 (70.6)	99 (75.6)		215 (66.8)	248 (76.1)	
CTO, <i>n</i> (%)	75 (16.1)	184 (40.3)	< 0.001	29 (20.3)	63 (48.1)	< 0.001	46 (14.3)	121 (37.1)	< 0.001
Extent of disease vessel, <i>n</i> (%)			< 0.001			< 0.001			< 0.001
LM only	31 (6.7)	12 (2.6)		9 (6.3)	0 (0)		22 (6.8)	12 (3.7)	
LM plus single-vessel disease	96 (20.6)	33 (7.2)		23 (16.1)	9 (6.9)		73 (22.7)	24 (7.4)	
LM plus double-vessel disease	174 (37.4)	105 (23.0)		56 (39.2)	28 (21.4)		118 (36.6)	77 (23.6)	
LM plus triple-vessel disease	164 (35.3)	307 (67.2)		55 (38.5)	94 (71.8)		109 (33.9)	213 (65.3)	

DES indicates drug-eluting stent; CABG, coronary artery bypass grafting; DM, diabetes mellitus; MI, myocardial infarction; PVD, peripheral vascular disease; PCI, percutaneous coronary intervention; LVEF, left ventricular ejection fraction; NSTEMI, non-ST-elevation myocardial infarction; STEMI, ST-elevation myocardial infarction; SAP, stable angina pectoris; CTO, chronic total occlusion; and LM, left main.

justing for the incidences of the composite of death, MI and stroke ($P = 0.235$) and death ($P = 0.112$) were similar between the two cohorts. A significantly higher incidence of repeat revascularization (32.3% DES versus 19.2% CABG; $P < 0.001$) was observed in the DES group, whereas the CABG group had a significantly higher rate of stroke (5.8% DES versus 18.9% CABG; $P < 0.001$), confirmed by the multivariable adjustment.

In the diabetic population (Figure 2), the unadjusted risks of death (14.1% DES versus 20.7% CABG, $P = 0.256$), MI (25.6% DES versus 6.7% CABG, $P = 0.107$), and the composite of death, MI and stroke (25.6% DES versus 37.5% CABG, $P = 0.216$) did not significantly differ between the DES and CABG groups, confirmed by the adjusted results. The incidence of stroke (3.7% DES versus 19.5% CABG; $P = 0.005$) was significantly higher in the CABG group, confirmed by the adjusted results ($P = 0.023$). A significantly higher incidence of repeat revascularization (29.8% DES versus 22.6% CABG; $P = 0.002$) was observed in the DES group, confirmed by the multivariable adjustment ($P = 0.024$).

In the nondiabetic population (Figure 3), significantly higher unadjusted incidences of the composite of death, MI and stroke (21.7% DES versus 38.0% CABG; $P = 0.019$) and death (12.8% DES versus 22.2% CABG; $P = 0.049$) were observed in the CABG group. However, after adjusting for the incidences of the composite of death, MI and stroke ($P = 0.348$) and death ($P = 0.247$) were similar between the two co-

horts. A significantly higher incidence of repeat revascularization (33.6% DES versus 18.1% CABG; $P < 0.001$) was observed in the DES group, whereas the CABG group had a significantly higher rate of stroke (6.7% DES versus 18.5% CABG; $P = 0.008$), confirmed by the multivariable adjustment. There was no significant difference in the unadjusted rate of myocardial infarction (8.3% DES versus 6.6% CABG; $P = 0.784$), confirmed by the adjusted results.

When we assessed whether the treatment effects of DES and CABG varied significantly according to diabetes status, we did not observe significant interactions between treatment outcomes and the presence or absence of diabetes after adjustment for covariates ($P_{\text{interaction}} = 0.580$ for the composite of death, MI and stroke, $P_{\text{interaction}} = 0.685$ for death, $P_{\text{interaction}} = 0.416$ for MI, $P_{\text{interaction}} = 0.470$ for stroke, and $P_{\text{interaction}} = 0.502$ for repeat revascularization).

In addition, we directly compared the outcomes of diabetic with those of nondiabetic patients in the DES and CABG groups, respectively. After adjustment using the multivariate Cox model, the rates of death ($P = 0.459$), MI ($P = 0.119$), stroke ($P = 0.742$), the composite of death, MI and stroke ($P = 0.154$) and repeat revascularization ($P = 0.704$) in the diabetic over the nondiabetic patients were similar in the DES groups. The rates of death ($P = 0.789$), MI ($P = 0.802$), stroke ($P = 0.480$), the composite of death, MI and stroke ($P = 0.393$) and repeat revascularization ($P = 0.826$) in diabetic over the nondiabetic patients were also similar in the CABG groups.

Table II. Crude and Adjusted HRs of Clinical Outcomes

Outcomes	Crude			Multivariate adjusted			Interaction <i>P</i> for diabetes
	HR	95%CI	<i>P</i>	HR	95%CI	<i>P</i>	
Overall							
Death/MI/Stroke	0.677	0.500~0.917	0.012	0.818	0.587~1.140	0.235 [*]	0.580
Death	0.647	0.439~0.954	0.028	0.707	0.461~1.085	0.112 [†]	0.685
MI	1.407	0.836~2.366	0.198	1.626	0.947~2.795	0.078 [‡]	0.416
Stroke	0.298	0.153~0.581	<0.001	0.324	0.165~0.637	0.001 [§]	0.470
Repeat revascularization	2.256	1.633~3.115	<0.001	2.098	1.513~2.910	<0.001	0.502
Diabetic patients							
Death/MI/Stroke	0.737	0.453~1.198	0.219	0.794	0.463~1.361	0.401 ^{**}	
Death	0.698	0.374~1.303	0.259	0.752	0.380~1.489	0.413 ^{††}	
MI	1.994	0.847~4.693	0.114	1.596	0.669~3.807	0.292 ^{‡‡}	
Stroke	0.199	0.057~0.692	0.011	0.226	0.063~0.816	0.023 ^{§§}	
Repeat revascularization	2.574	1.371~4.834	0.003	2.112	1.102~4.048	0.024	
Nondiabetic patients							
Death/MI/Stroke	0.629	0.425~0.930	0.020	0.818	0.538~1.244	0.348 ^{***}	
Death	0.609	0.371~1.001	0.051	0.731	0.430~1.242	0.247 ^{†††}	
MI	1.099	0.561~2.150	0.784	1.386	0.690~2.784	0.359 ^{‡‡‡}	
Stroke	0.360	0.163~0.792	0.011	0.397	0.179~0.879	0.023 ^{§§§}	
Repeat revascularization	2.157	1.479~3.148	<0.001	2.374	1.608~3.507	<0.001	

HR (hazard ratio) for drug-eluting stents with reference to coronary artery bypass grafting; ^{*}adjusted for age, EF, sCr, peripheral vascular disease, diabetes mellitus, prior stroke, involved location of left main artery, extent of diseased vessel and chronic total occlusion; [†]adjusted for age, EF, sCr, peripheral vascular disease, diabetes mellitus, prior myocardial infarction, prior stroke, extent of diseased vessel and chronic total occlusion; [‡]adjusted for EuroSCORE, prior stroke and extent of diseased vessel; [§]adjusted for age, EF, sCr, prior stroke and smoking history; ^{||}adjusted for age, EF, sCr and peripheral vascular disease; ^{††}adjusted for EF, sCr, EuroSCORE, hypertension, smoking history and chronic total occlusion; ^{‡‡}adjusted for age, EF, sCr and peripheral vascular disease; ^{§§}adjusted for sCr and dyslipidemia; ^{|||}adjusted for EF and EuroSCORE; ^{||||}adjusted for age, EF, sCr and dyslipidemia; ^{***}adjusted for age, EF, sCr, prior stroke, involved location of left main artery, extent of diseased vessel and chronic total occlusion; ^{†††}adjusted for age, EF, sCr, prior myocardial infarction, prior stroke and extent of diseased vessel; ^{‡‡‡}adjusted for EuroSCORE and extent of diseased vessel; ^{§§§}adjusted for EF, sCr and prior stroke; ^{|||||}adjusted for sCr, peripheral vascular disease, dyslipidemia, smoking history and involved location of left main artery. CI indicates confidence interval; and MI, myocardial infarction.

Figure 1. Cumulative Incidence of Outcomes in Overall Patients. Kaplan-Meier incidence curves of clinical outcomes in the overall population of patients with unprotected left main coronary artery lesions who received drug-eluting stents or underwent coronary-artery bypass grafting. **A:** Death. **B:** Myocardial infarction (MI). **C:** Stroke. **D:** Repeat revascularization.

Figure 2. Cumulative Incidence of Outcomes in Diabetic Patients. Kaplan-Meier incidence curves of clinical outcomes in diabetic patients with unprotected left main coronary artery lesions who received drug-eluting stents or underwent coronary-artery bypass grafting. **A:** Death. **B:** MI. **C:** Stroke. **D:** Repeat revascularization.

Figure 3. Cumulative Incidence of Outcomes in Nondiabetic Patients. Kaplan-Meier incidence curves of clinical outcomes in nondiabetic patients with unprotected left main coronary artery lesions who received drug-eluting stents or underwent coronary-artery bypass grafting. **A:** Death. **B:** MI. **C:** Stroke. **D:** Repeat revascularization.

DISCUSSION

The major findings of this observational analysis are as follows. 1) In patients with ULMCA disease, the adjusted rates of death, myocardial infarction, and the composite of cardiac death, MI or stroke were similar between the DES and CABG groups. The DES group was observed to have significantly lower stroke rates but higher rates of repeat revascularization compared with CABG. 2) These findings were consistent in diabetic and nondiabetic patients. 3) There was no significant prognostic influence of diabetes on long-term treatment with DES or CABG in patients with ULMCA disease.

Diabetes was one of the strongest independent predictors of adverse outcome in coronary artery disease patients.⁹⁾ Prothrombotic and proinflammatory states, in adjunct to endothelial dysfunction and metabolic disorders, such as hyperglycemia, dyslipidemia, obesity, insulin resistance, and oxidative stress, are key features of the accelerated atherosclerotic progression observed in patients with diabetes.^{17,18)} Diabetes was associated with an increased risk of unfavorable clinical outcomes in both DES^{19,20)} and CABG populations.^{21,22)} Therefore, diabetes was an important consideration when deciding upon the optimal revascularization strategy for patients, especially those with complex lesions.

The results of studies comparing PCI with CABG for multivessel disease treatment in diabetic patients were mixed. Trials including the Arterial Revascularization Therapies Study (ARTS),²³⁾ the Coronary Artery Revascularization in Diabetes (CARDia) study,²⁴⁾ and a subgroup analysis of the Synergy between PCI with TAXUS and Cardiac Surgery (SYNTAX) study,¹¹⁾ have reported no difference in mortality but a greater need for repeat revascularization with PCI in patients with dia-

betes. In the Bypass Angioplasty Revascularization Investigation (BARI) trial,¹⁴⁾ patients with diabetes and multivessel disease who underwent CABG lived longer than did patients undergoing balloon angioplasty. A comprehensive meta-analysis of trials performed before the introduction of DES showed excess mortality after PCI, as compared with CABG, in patients with diabetes.¹²⁾ The Future Revascularization Evaluation in Patients with Diabetes Mellitus: Optimal Management of Multivessel Disease (FREEDOM) trial showed CABG was superior to PCI with DES in that it significantly reduced rates of death and myocardial infarction.¹³⁾ Considering the limitation of ARTS (historical control), CARDia (underpowered), and SYNTAX (subgroup analysis), the data of FREEDOM seemed to provide a convincing signal that PCI results in increased long-term mortality, as compared with CABG, in patients with diabetes and multivessel coronary artery disease.

However, data comparing PCI and CABG in diabetic patients with ULMCA disease are limited. The subgroup analysis of the MAIN-COMPARE (revascularization for unprotected left MAIN coronary artery stenosis: Comparison of Percutaneous coronary Angioplasty versus surgical Revascularization) trial showed the adjusted rates of death and the composite of death, MI, or stroke were similar between the DES and CABG groups in both diabetic and nondiabetic patients with ULMCA disease, without significant interactions, findings that were similar to ours.²⁵⁾ In addition, our results demonstrated the rate of stroke was significantly higher regardless of the diabetes, confirmed by several meta-analyses with large sample numbers comparing PCI and CABG for ULMCA patients.^{26,27)} Farooq, *et al* developed SYNTAX score II which contains 8 predictors, including the presence of ULMCA disease, and could well predict 4-year mortality in patients with complex coronary artery disease.⁸⁾ Diabetes was excluded from the SYNTAX score II since diabetes was not an independent predictor of mortality in patients with complex coronary artery disease. Therefore, they demonstrated the presence of diabetes was not important for decision making between CABG and PCI in patients with complex coronary artery disease ($P_{\text{interaction}} = 0.67$).

Study limitations: This study was non-randomized, a fact which exposes it to the usual limitations associated with observational studies. Meanwhile, this study offers only a single-centered experience and the sample size of the whole cohort is not sufficient. Therefore, our findings should be confirmed or rebutted by large, prospective randomized clinical studies.

Conclusions: In patients with ULMCA disease, the adjusted rates of death, myocardial infarction, and the composite of cardiac death, MI, or stroke were similar between the DES and CABG groups. The DES group was observed to have significantly lower stroke rates but higher rates of repeat revascularization compared with CABG. These findings were consistent in diabetic and nondiabetic patients. There was no significant prognostic influence of diabetes on long-term treatment with DES or CABG in patients with ULMCA disease.

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