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Transradial Versus Transfemoral Method of Percutaneous Coronary Revascularization for Unprotected Left Main Coronary Artery Disease: Comparison of Procedural and Late-Term Outcomes

Yue-Jin Yang, MD,* David E. Kandzari, MD,† Zhan Gao, MD,* Bo Xu, MBBS,* Ji-Lin Chen, MD,* Shu-Bin Qiao, MD,* Jian-Jun Li, MD,* Xue-Wen Qin, MD,* Min Yao, MD,* Yong-Jian Wu, MD,* Jin-Qing Yuan, MD,* Jue Chen, MD,* Hai-Bo Liu, MD,* Jun Dai, MD,* Tao Chen, MSc,* Yang Wang, PhD,* Wei Li, PhD,* Run-Lin Gao, MD*

Beijing, China; and Atlanta, Georgia

Objectives This study intended to compare outcomes between transradial (TR) and transfemoral (TF) percutaneous revascularization in high-risk coronary anatomy.

Background The feasibility, efficacy and safety between TR and TF methods of percutaneous coronary revascularization for unprotected left main coronary artery (UPLM]) disease have not been compared.

Methods Among 821 consecutive patients with UPLM disease treated with percutaneous revascularization by either TR (n = 353) or TF (n = 468) vascular access, procedural outcomes, resource use, in-hospital bleeding, and late clinical events were compared according to vascular access method.

Results Clinical and angiographic characteristics were similar between groups, except that TR patients less commonly presented with unstable angina and had less UPLM bifurcation disease requiring treatment with 2 stents. No significant differences were observed between TR and TF methods for procedural success (97% TF vs. 96% TR, p = 0.57) or total procedural time. However, duration of hospital stay and in-hospital occurrence of Thrombosis In Myocardial Infarction (TIMI) major or minor bleeding (0.6% vs. 2.8%, p = 0.02) were significantly lower with TR access. Using propensity score modeling (254 matched pairs), over a mean follow-up period of 17 months, rates of cardiovascular death (1.2% vs. 2.0%, p = 0.48), nonfatal myocardial infarction (4.7% vs. 2.4%, p = 0.16), stent thrombosis (0.8% vs. 2.8%, p = 0.10) and any target vessel revascularization (6.0% vs. 6.7%, p = 0.72) did not statistically differ among TR and TF groups, respectively.

Conclusions In contrast to TF vascular access, TR percutaneous coronary revascularization for UPLM disease is feasible and associated with similar procedural success, abbreviated hospitalization, reduced bleeding, and comparable late-term clinical safety and efficacy. (J Am Coll Cardiol Intv 2010; 3:1035–42) © 2010 by the American College of Cardiology Foundation

From the *Department of Cardiology, Cardiovascular Institute and Fuwai Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China; and the †Piedmont Heart Institute, Atlanta, Georgia. Dr. Kandzari receives research/grant support and consulting honoraria from Abbott Vascular, Medtronic CardioVascular, Inc., and Cordis Corporation. All other authors have reported that they have no relationships to disclose.

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Compared with transfemoral (TF) vascular access, transradial (TR) percutaneous coronary intervention (PCI) is associated with clinically significant reductions in procedural-related bleeding complications and improved patient satisfaction (1–9), yet its adoption has remained a limited procedure in many geographies. In part related to operator inexperience (10–12), increasing performance of TR PCI is also challenged by an incomplete evidence basis, furthering perceptions that the practicality of TR PCI may be restricted to less complex coronary anatomy and lower risk clinical settings.

Unprotected left main coronary artery (UPLM) disease represents a particularly challenging lesion subset for percutaneous coronary revascularization. Despite an evolving evidence basis and guideline recommendations supporting the relative safety and efficacy of UPLM PCI compared with surgical revascularization (13,14), technical complexities related to stent technique and bifurcation disease represent unresolved procedural-related dilemmas for interventionalists. Considering the practical limitations associated with TR PCI in high-risk lesion anatomy (e.g., guiding catheter support, equipment size restrictions), UPLM disease challenges the feasibility of a transradial procedural strategy compared with a more standard femoral approach. Our purpose, therefore, was to compare procedural results, resource use, and clinical outcomes between TR and TF methods of percutaneous coronary revascularization with drug-eluting stents (DES) for UPLM disease.

Abbreviations and Acronyms

DES = drug-eluting stent(s)
IVUS = intravascular ultrasound
MACE = major adverse cardiac events
MI = myocardial infarction
PCI = percutaneous coronary intervention
TF = transfemoral
TIMI = Thrombolysis In Myocardial Infarction
TR = transradial
TVR = target vessel revascularization
UPLM = unprotected left main coronary artery

Methods

Study population. Between April 2004 and April 2009, consecutive patients undergoing UPLM PCI with DES at the Fu Wai Hospital in Beijing, China, were evaluated for in-hospital and late-term outcomes. Unprotected left main coronary disease was defined as documented myocardial ischemia with ≥50% UPLM stenosis and no patent bypass graft to the left anterior descending or left circumflex arteries. In general, the decision for UPLM PCI was based on consultation with both patients and surgeons in the setting of isolated UPLM disease or in situations of multilesion treatment amenable to complete revascularization with stent placement. For those patients with UPLM stenosis and more complex multivessel disease, PCI was elected in instances of patient refusal for surgery or comorbidity that posed excessive surgical risk. Patients were excluded from the present analysis in instances of contraindication for antiplatelet therapy, acute myocardial infarction (MI) within 7 days, or bailout stenting of the left main artery due to PCI-related complications (e.g., dissection, thrombus) of non-left main target lesions.

Procedural details. Vascular access method and stent technique were performed according to the operator's discretion. Ostial or shaft lesions without distal bifurcation involvement were typically treated with a single stent. Stent strategies to treat distal bifurcation lesions included: crossover stenting with side branch balloon angioplasty, provisional or dedicated T stenting, simultaneous kissing or V stenting (TF approach only), Culotte or crush technique (including "step crush" technique involving sequential balloon crushing of side branch stent followed by main vessel stenting). Final kissing balloon post-dilation was performed in cases with suboptimal results after crossover stenting at the side branch ostium and, in most cases, with 2-stent implantation. Intravascular ultrasound (IVUS)–guided stenting was encouraged to achieve optimal stent expansion and lesion coverage. Stent type and brand were selected per the treating physician's discretion among those commercially available at the time of the study, namely, the sirolimus-eluting Cypher stent (Cordis, Europa N.V., LJ Roden, the Netherlands), paclitaxel-eluting Taxus stent (Boston Scientific, Galway, Ireland), sirolimus-eluting Firebird stent (MicroPort, Shanghai, China), and sirolimus-eluting Excel stent (JW Medical Co., Ltd., Shandong, China).

Before the procedure, all patients received aspirin, 300 mg daily, and a 300-mg loading dose of clopidogrel was given at least 1 day before the procedure. During the procedure, unfractionated heparin (100 U/kg) was administered to all patients, and use of glycoprotein IIb/IIIa inhibitors was per the operator's judgment. After the procedure, aspirin was prescribed at a dose of 300 mg daily for 3 months, followed by 100 mg daily indefinitely; clopidogrel 75 mg daily was prescribed for at least 1 year.

Patient follow-up. All patients were evaluated by clinic visit or by phone at 1, 3, 6, and 12 months and annually thereafter. Per local standards, all patients were advised to return for coronary angiography 6 months following the index procedure, or earlier if clinically indicated by symptoms or documentation of myocardial ischemia. Two independent, experienced staff members analyzed all baseline and follow-up angiographic results. Quantitative coronary angiography analysis was performed with QUANTCOR QCA (CAAS II) Version 5.0 (Pie Medical Imaging, Maastricht, the Netherlands). Binary restenosis was defined as ≥50% diameter stenosis at follow-up and was classified as in-stent or in-segment if located within 5 mm proximal or distal to the stent margin.