

In-hospital Outcomes of Attempting More Than One Chronic Total Coronary Occlusion Through Percutaneous Intervention During the Same Procedure

Peter Tajti, MD^{a,b}, Khaldoon Alaswad, MD^c, Dimitri Karmaliotis, MD, PhD^d, Farouc A. Jaffer, MD, PhD^e, Robert W. Yeh, MD^f, Mitul Patel, MD^g, Ehtisham Mahmud, MD^g, James W. Choi, MD^h, M. Nicholas Burke, MD^a, Anthony H. Doing, MDⁱ, Catalin Toma, MD^j, Barry Uretsky, MD^k, Elizabeth Holper, MD^l, R. Michael Wyman, MD^m, David E. Kandzari, MDⁿ, Santiago Garcia, MD^o, Oleg Krestyaninov, MD^p, Dmitrii Khelinskii, MD^p, Michalis Koutouzis, MD^q, Ioannis Tsiafoutis, MD^q, Wissam Jaber, MD^r, Habib Samady, MD^r, Jeffrey W. Moses, MD^d, Nicholas J. Lembo, MD^d, Manish Parikh, MD^d, Ajay J. Kirtane, MD^d, Ziad A. Ali, MD^d, Darshan Doshi, MD^d, Iosif Xenogiannis, MD^a, Bavana V. Rangan, BDS, MPH^s, Imre Ungi, MD, PhD^b, Subhash Banerjee, MD^s, and Emmanouil S. Brilakis, MD, PhD^{a,*}

The frequency and outcomes of patients who underwent chronic total occlusion (CTO) percutaneous coronary intervention (PCI) of more than one CTO during the same procedure have received limited study. We compared the clinical and angiographic characteristics and procedural outcomes of patients who underwent treatment of single versus >1 CTOs during the same procedure in 20 centers from the United States, Europe, and Russia. A total of 2,955 patients were included: mean age was 65 ± 10 years and 85% were men with high prevalence of previous myocardial infarction (46%), and previous coronary artery bypass graft surgery (33%). More than one CTO lesions were attempted during the same procedure in 58 patients (2.0%) and 70% of them were located in different major epicardial arteries. Compared with patients who underwent PCI of a single CTO, those who underwent PCI of >1 CTOs during the same procedure had similar J-CTO (2.4 ± 1.3 vs 2.5 ± 1.3, p = 0.579) and Prospective Global Registry for the Study of Chronic Total Occlusion Intervention (1.5 ± 1.2 vs 1.3 ± 1.0 p = 0.147) scores. The multi-CTO PCI group had similar technical success (86% vs 87%, p = 0.633), but higher risk of in-hospital major complications (10.3% vs 2.7%, p = 0.005), and consequently lower procedural success (79% vs 85%, p = 0.197). The multi-CTO PCI group had higher in-hospital mortality (5.2% vs 0.5%, p = 0.005) and stroke (5.2% vs 0.2%, p < 0.001), longer procedure duration (162 [117 to 242] vs 122 [80 to 186] minutes, p < 0.001) and higher radiation dose (3.6 [2.1 to 6.4] vs 2.9 [1.7 to 4.7] Gray, p = 0.033). In conclusion, staged revascularization may be the preferred approach in patients with >1 CTO lesions requiring revascularization, as treatment during a single procedure was associated with higher risk for periprocedural complications. © 2018 Elsevier Inc. All rights reserved. (Am J Cardiol 2018;00:1–7)

Chronic total occlusion (CTO) percutaneous coronary intervention (PCI) can be challenging, but can also provide clinical benefits.^{1–6} Some patients have >1 CTO lesions that require revascularization. Whether >1 CTO lesions

should be attempted during the same procedure has not been systematically studied. We sought to examine the frequency and procedural outcomes of PCI of >1 CTOs during the same procedure in a multicenter registry.

^aMinneapolis Heart Institute, Abbott Northwestern Hospital, Minneapolis, Minnesota; ^bUniversity of Szeged, Division of Invasive Cardiology, Second Department of Internal Medicine and Cardiology Center, Szeged, Hungary; ^cHenry Ford Hospital, Detroit, Michigan; ^dColumbia University, New York, New York; ^eMassachusetts General Hospital, Boston, Massachusetts; ^fBeth Israel Deaconess Medical Center, Boston, Massachusetts; ^gVA San Diego Healthcare System and University of California San Diego, La Jolla, California; ^hBaylor Heart and Vascular Hospital, Dallas, Texas; ⁱMedical Center of the Rockies, Loveland, Colorado; ^jUniversity of Pittsburgh Medical Center, Pittsburgh, Pennsylvania; ^kVA Central Arkansas Healthcare System, Little Rock, Arkansas; ^lThe Heart Hospital Baylor Plano, Plano, Texas; ^mTorrance Memorial Medical Center, Torrance, California; ⁿPiedmont Heart Institute, Atlanta, Georgia; ^oVA Minneapolis Healthcare System and University of Minnesota, Minneapolis, Minnesota; ^pMeshalkin Siberian Federal Biomedical Research Center, Ministry of Health of Russian Federation, Novosibirsk, Russian Federation; ^qKorgialeneio-Benakeio Hellenic Red Cross General Hospital of Athens, Athens, Greece; ^rEmory University Hospital, Atlanta, Georgia; and ^sVA North Texas Health Care System and University of Texas Southwestern Medical Center, Dallas, Texas. Manuscript received January 9, 2018; revised manuscript received and accepted April 3, 2018.

The PROGRESS-CTO registry has received support from the Abbott Northwestern Hospital Foundation, Minneapolis, Minnesota.

*Corresponding author: Tel: (612) 863-4204; fax: (612) 863-6441.

E-mail address: esbrilakis@gmail.com (E.S. Brilakis).

Methods

We analyzed the clinical, angiographic, and procedural characteristics of 2,955 patients enrolled in the PROGRESS CTO (Prospective Global Registry for the Study of Chronic Total Occlusion Intervention, NCT02061436) registry between January 2012 and September 2017 at 18 US, 1 European, and 1 Russian centers. Some centers only enrolled patients during part of the study period due to participation in other studies. The study was approved by the institutional review board of each center.

Coronary CTOs were defined as coronary lesions with thrombolysis in myocardial infarction (TIMI) grade 0 flow of at least 3 months duration. Estimation of the duration of occlusion was clinical, based on the first onset of angina, previous history of myocardial infarction (MI) in the target vessel territory, or comparison with a previous angiogram. Calcification was assessed by angiography as mild (spots), moderate (involving $\leq 50\%$ of the reference lesion diameter), and severe (involving $> 50\%$ of the reference lesion diameter). Moderate proximal vessel tortuosity was defined as the presence of at least 2 bends $> 70^\circ$ or 1 bend $> 90^\circ$ and severe tortuosity as 2 bends $> 90^\circ$ or 1 bend $> 120^\circ$ in the CTO vessel. Blunt or no stump was defined as lack of tapering or lack of a funnel shape at the proximal cap. Interventional collaterals were defined as collaterals considered amenable to crossing by a guidewire and a microcatheter by the operator. A procedure was defined as “retrograde” if an attempt was made to cross the lesion through a collateral vessel or bypass graft supplying the target vessel distal to the lesion; if not, the procedure was classified as “antegrade-only.” Antegrade dissection/re-entry was defined as antegrade PCI during which a guidewire was intentionally introduced into the subintimal space proximal to the lesion, or re-entry into the distal true lumen was attempted after intentional or inadvertent subintimal guidewire crossing.

Technical success was defined as successful CTO revascularization with achievement of $< 30\%$ residual diameter stenosis within the treated segment and restoration of TIMI grade 3 antegrade flow. Procedural success was defined as achievement of technical success without any in-hospital major adverse cardiac events (MACEs). In patients in whom > 1 CTO PCI was attempted, procedural success was defined as technical success in at least one major epicardial vessel without any in-hospital MACE. In-hospital MACE included any of the following adverse events previous to hospital discharge: death, MI, recurrent symptoms requiring urgent repeat target vessel revascularization with PCI or coronary artery bypass graft surgery (CABG), tamponade requiring either pericardiocentesis or surgery, and stroke. MI was defined using the third universal definition of MI (type 4a MI).⁷ Major bleeding was defined as bleeding causing reduction in hemoglobin > 3 g/dl or bleeding requiring transfusion or surgical intervention. The J-CTO score was calculated as described by Morino et al,⁸ the PROGRESS CTO score as described by Christopoulos et al,⁹ and the PROGRESS CTO Complications score as described by Danek et al.¹⁰

Categorical variables were expressed as percentages and were compared using Pearson’s chi-square test or

Fisher’s exact test. Continuous variables were presented as mean \pm standard deviation or median (interquartile range) unless otherwise specified and were compared using the *t* test and 1-way analysis of variance for normally distributed variables; the Wilcoxon rank-sum test, and the Kruskal–Wallis test were applied for nonparametric continuous variables, as appropriate. Multivariable logistic regression was used to examine the association between attempting > 1 CTO lesions during the same procedure and in-hospital MACE after adjusting for confounding variables selected on the ground of univariable association in the present study ($p < 0.10$). All statistical analyses were performed with JMP 13.0 (SAS Institute, Cary, North Carolina). A 2-sided *p* value of 0.05 was considered statistically significant.

Results

More than one coronary CTOs were present in 690 of 2,955 patients (23%). More than 1 CTO lesions were attempted in 58 of 2,955 patients (2.0%) during the study period. Three CTOs were attempted in one patient and 2 CTOs in the remaining 57 patients.

As compared with patients who underwent single CTO PCI, those in whom > 1 CTO lesions were attempted during the index procedure had similar age, cardiac risk factors (smoking, dyslipidemia), history of previous MI, previous PCI, previous CABG, and congestive heart failure, but lower left ventricular ejection fraction, and were less likely to have hypertension and diabetes mellitus (Table 1). They were also less likely to undergo ad hoc CTO PCI and more likely to undergo myocardial viability testing. Amongst patients who had > 1 CTO, those patients in whom > 1 CTO PCIs were attempted during the same procedure had fewer comorbidities and were less likely to have had previous CABG as compared with those who underwent single CTO PCI (Supplementary Table 1).

In the overall cohort, the most common CTO target vessel was the right coronary artery (55%), followed by the left anterior descending artery (24%) and the left circumflex (20%). The two study groups had similar occlusion length, J-CTO, and PROGRESS CTO scores and similar prevalence of proximal cap ambiguity, moderate to severe calcification and tortuosity, and interventional collaterals. Previously attempted CTO PCIs, however, were less common in patients from the > 1 CTO PCI group (Table 2).

Primary and secondary target vessels were mostly located in different epicardial territories (71%), but had similar angiographic characteristics and lesion complexity as described by the J-CTO and PROGRESS-CTO scores. Secondary target vessels, however, were smaller in diameter (Supplementary Table 2).

The technical characteristics of the CTO PCIs are summarized in Table 3. Bilateral injection was used in 70% of all cases, with no difference between the > 1 and 1 CTO groups (71% vs 70%, $p = 0.852$). At least 1 radial access site was selected in 36%, and femoral approach in 82% of cases overall, with no significant differences between the study groups. However, in the > 1 CTO PCI group, use of biradial access was significantly higher (21% vs 13%, $p = 0.021$), driven by

Download English Version:

<https://daneshyari.com/en/article/8962763>

Download Persian Version:

<https://daneshyari.com/article/8962763>

[Daneshyari.com](https://daneshyari.com)