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Journal reviews

Luis Nombela-Franco, Mariana Urena, Mighel Jerez-Valero, Can Manh Nguyen, Henrique Barbosa Ribeiro, Yoann Bataille, Josep Rodes-Cabau, Stephane Rinfret, Validation of the J-chronic total occlusion score for chronic total occlusion percutaneous coronary intervention in an independent contemporary cohort. Circ Cardiovasc Interv 6 (2013) 635–643.

Background: Chronic Total Occlusion (CTO) recanalization is a complex and technically challenging procedure. The J-CTO score has been proposed to stratify case complexity and procedural success rates. However, the score has never been tested outside the setting of the original study. Moreover, its predictive value when using a hybrid antegrade or retrograde approach is unknown. We investigated the performance of the J-CTO score for predicting procedure complexity and success in an independent contemporary cohort.

Methods and results: A total of 209 consecutive patients who underwent CTO recanalization by a high-volume operator were included. Clinical and angiographic data were prospectively collected. The J-CTO score was applied for each patient, and discrimination and calibration were evaluated in the whole cohort, and according to the approach (antegrade 47% and retrograde 53%). Clinical and angiographic differences were noted between the original and studied cohort. The mean J-CTO score was 2.18 ± 1.26, and successful guidewire crossing within 30 min and final angiographic success were 44.5% and 90.4%, respectively. The J-CTO score demonstrated good discrimination (c statistic, >0.70) and calibration (Hosmer–Lemeshow $p > 0.1$) in the whole cohort and for antegrade and retrograde approaches. However, the final success rate was not associated with the J-CTO score.

Conclusions: In this independent cohort, the J-CTO score showed good discriminatory and calibration capacity for guidewire CTO crossing within 30 min but it does not for final success rate. The J-CTO score helps to predict complexity of CTO recanalization, and the simplicity of the score supports the widespread use as a clinical tool.

1. Perspective

The multicenter Japanese CTO Registry investigators had originally developed the J-CTO score, which was used to determine the difficulty in crossing a CTO within 30 min and overall success rate.[1] It utilized 5 independent predictors: 1) calcification 2) bend >45° in the CTO segment 3) blunt proximal cap 4) length of occluded segment >20 mm 5) previously failed attempt. 1 point was given to each variable. The CTO case complexity was stratified as easy (J-CTO score = 0), intermediate (score = 1), difficult (score = 2) and very difficult (scores = 3–5). However, this score was never tested outside the setting of the original study and its validity was also not tested in a non-Japanese population.

It is in this context that the present study holds significance. It has validated the J-CTO score in an independent and unselected CTO PCI cohort. It has reinforced the findings of the original Japanese study in a non-Japanese population. However, although it predicted guidewire crossing within 30 min, it failed to predict overall success rate. In contrast, in another series[2] with a longer inclusion period, the J-CTO score was also predictive of successful recanalization.

A careful evaluation of the lesion complexity is essential before attempting CTO recanalization both for the high-volume and low-volume CTO operators. The present study has established the J-CTO score as a useful tool to stratify CTO PCI complexity in all populations. It can also predict procedure time, contrast load and radiation exposure, all of which are of paramount importance in planning a CTO PCI.

In my opinion, the J-CTO score is a relatively simple and useful score to predict the time to guidewire crossing and also overall success rates and total procedure time in CTO PCI. It can clearly assist interventional cardiologists in decision-making process. CTO with low scores could be attempted using simple antegrade techniques by low-volume CTO operators while those with higher scores are preferably to be referred to high-volume CTO operators proficient in both antegrade and retrograde approach. In dedicated CTO Cath labs, it can be useful to plan the schedule, to optimize case number and to reduce failure rates of CTO PCI. Widespread application of this novel scoring system is the need of the hour.

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Yaling Han, Guoying Zhu, Lixian Han, Fengxia Hou, Weijian Huang, Huiliang Liu, Jihong Gan, Tiemin Jiang, Xiaoyan Li, Wei Wang, Shifang Ding, Shaobin Jia, Weifeng Shen, Dongmei Wang, Ling Sun, Jian Qiu, Xiaozeng Wang, Yi Li, Jie Deng, Jing Li, Kai Xu, Bo Xu, Roxana Mehran, Yong Huo, Short-term rosuvastatin therapy for prevention of contrast-induced acute kidney injury in patients with diabetes and chronic kidney disease. J Am Coll Cardiol (JACC) 63 (2014) 62–70.

Objectives: This study sought to evaluate the safety and efficacy of rosuvastatin in preventing contrast-induced acute kidney injury (CI-AKI) in patients with diabetes mellitus (DM) and chronic kidney disease (CKD).

Background: CI-AKI is an important complication after contrast medium injection. While small studies have shown positive results with statin therapy, the role of statin therapy in prevention of CI-AKI remains unknown.

Methods: We randomized 2998 patients with type 2 DM and concomitant CKD who were undergoing coronary/peripheral arterial angiography with or without percutaneous intervention to receive rosuvastatin, 10 mg/day ($n = 1498$), for 5 days (2 days before, and 3 days after procedure) or standard-of-care ($n = 1500$). Patients' renal function was assessed at baseline, 48 h, and 72 h after exposure to contrast medium. The primary endpoint of the study was the development of CI-AKI, which was defined as an increase in serum creatinine concentration $\geq$0.5 mg/dl (44.2 mmol/l) or 0.25% above baseline at 72 h after exposure to contrast medium.

Results: Patients randomized to the rosuvastatin group had a significantly lower incidence of CI-AKI than controls (2.3% vs.3.9%, respectively; $p = 0.01$). During 30 days' follow-up, the rate of worsening heart failure was significantly lower in the patients treated with rosuvastatin than that in the control group (2.6% vs. 4.3%, respectively; $p = 0.02$).

Conclusions: Rosuvastatin significantly reduced the risk of CI-AKI in patients with DM and CKD undergoing arterial contrast medium injection.

1. Perspective

CI-AKI risk increases dramatically in patients with DM or CKD. Besides these, other risk factors for CI-AKI are: 1) presentation as ACS 2) advanced NYHA Class 3) anaemia and 4) decreased eGFR. Because these risk factors can be easily identified, prophylactic measures for the prevention of CI-AKI should be considered in these patients.

Present day strategies to prevent CI-AKI include: 1) intravenous hydration with saline 2) reduced use of contrast and preferably an iso-osmolar agent like iodixanol and 3) N-acetyl cysteine (NAC).

The present study is the first of its kind, which has evaluated short-term (5 days) low dose rosuvastatin (10 mg/day) started 2 days prior to angiography or PCI in patients with DM and stage 2 or 3 CKD. The incidence of CI-AKI was significantly lower in patients receiving rosuvastatin in comparison to those receiving standard treatment strategies. 62.5 patients would need to be treated to prevent one case of CI-AKI.

The strength of the present study is its large sample size (3000 patients), all diabetics and with mild CKD. Rosuvastatin prevents CI-AKI even in patients with normal lipid levels. The most beneficial effect was seen in patients with stage 2 (mild CKD).

Statins are known to exert pleiotropic effects and have anti-inflammatory action via reduced hsCRP levels. The preventive effects of rosuvastatin on CI-AKI can be because of 1) anti-inflammatory action 2) prevention of direct contrast toxicity like apoptosis of renal cells.

In my opinion, identification of patients at risk of CI-AKI and institution of measures like intravenous hydration and use of low volume of contrast is of paramount importance. Patients undergoing angiography and PCI anyway receive statins. The present study only re-emphasizes this point. The extra knowledge this study has added is that even in patients with mild CKD, emphasis should be given to prevent CI-AKI and low dose short duration statins are a newer addition to the present day preventive measures for CI-AKI.

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