

UTILITY OF J-CTO SCORE IN PREDICTING THE PROCEDURAL OUTCOMES IN CORONARY CHRONIC TOTAL OCCLUSION INTERVENTIONS: AN EXPERIENCE AT AFIC/NIHD

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ABSTRACT

Objective: To evaluate the performance of the J-CTO score for predicting final success rate of Percutaneous Coronary Intervention among Coronary chronic total occlusions (CTOs) cases performed at AFIC/NIHD.

Study Design: Descriptive cross-sectional study.

Place and Duration of Study: Inpatient department of Armed Forces Institute of Cardiology/National Institute of Heart Diseases (AFIC/NIHD), Rawalpindi, from Jul 2018 to Dec 2018.

Material and Methods: It was a descriptive cross sectional study conducted at inpatient department of AFIC/NIHD, Rawalpindi from Jul 2018 to Dec 2018. All consecutive patients scheduled to undergo PCI on a CTO of a native coronary artery were considered for enrollment. Total of 68 patients were included in this study. Coronary chronic total occlusions (CTOs) were defined as 100% occlusions in the coronary arteries with Thrombolysis In Myocardial Infarction (TIMI) flow grade 0 of at least 3 months duration. Where duration was not known, estimation of the occlusion duration was made on the first onset of angina or dyspnea and/or prior history of myocardial infarction in the target vessel territory or the results of previous angiography. The clinical and angiographic characteristics as well as procedural outcomes were compared between easy (J-CTO=0), intermediate (J-CTO=1), difficult (J-CTO=2), and very difficult (J-CTO≥3) CTO lesions. Baseline, procedural and hospitalization data were prospectively collected and entered in a dedicated database. Successful angiographic recanalization was defined as a restoration of TIMI flow grade 3 and residual stenosis 25% of the baseline value. Neither occluded arterial graft nor vein graft lesions were considered for this study.

Ethical and institutional approval was taken from the institutional ethical review board.

Results: Among 68 included patients, male patients were 56 (82.4%), while females were 12 (17.6%). ANOVA test was used to find out the association of JCTO score with age, which showed statistical significance ($p < 0.001$). Chi-square test was applied to find out the association between JCTO score and gender, diabetes mellitus, hypertension, dyslipidemia, smoking history, previous history of MI and success of procedure. Test result showed that gender, diabetes mellitus, hypertension, smoking history, previous history of MI and success of procedure are statistically significant with JCTO-score with p -value < 0.05 .

Conclusions: This study has showed utility of JCTO score in predicting the procedural outcome and its association with technical success rates in CTOs case.

Keywords: Chronic total occlusion, CTOs, PCI, Coronary angiography.

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INTRODUCTION

Percutaneous coronary intervention (PCI) of chronic total occlusions (CTOs) can be a major challenge to perform because of traditionally low success, higher complication rates and technical difficulty associated with the procedure.

Comparing the outcomes in patients with non-CTO disease, CTO is known to be associated with poorer outcomes¹⁻⁴.

Many factors have been reported responsible for failure to cross CTO lesions including existence of calcification, blunt entry point, bending at the site of the obstruction, absence of bridging collaterals, long length of lesions, greater duration of obstruction and the presence of side

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branch at the site of obstruction⁵. Although angiographic characteristics of CTO lesion predict the success rate and required procedure time⁶⁻⁸. But in general, complex CTO lesions are more likely to require longer periods of time and more frequent use of advanced crossing strategies, such as the retrograde approach and antegrade dissection and re-entry. Therefore, CTO PCI can be unpredictable, with some seemingly simple lesions turning out to be highly challenging to recanalize. Thus by helping plan the time and resources required for procedures would

to Dec 2018. All consecutive patients scheduled to undergo PCI on a CTO of a native coronary artery were considered for enrollment. Total of 68 patients were included in this study. Coronary chronic total occlusions (CTOs) were defined as 100% occlusions in the coronary arteries with Thrombolysis In Myocardial Infarction (TIMI) flow grade 0 of at least 3 months' duration¹¹. Where duration was not known, estimation of the occlusion duration was made on the first onset of angina or dyspnea and/or prior history of myocardial infarction in the target vessel

Table: Demographic and clinical characteristics.

Variables	JCTO-Score				p-value
	Easy n=8	Intermediate n=16	Difficult n=40	Very Difficult n=4	
Age (mean ± S.D)	54.5 ± 5.8 years	70.5 ± 4.2 years	55.1 ± 8.5 years	63.1 ± 1.0 years	<0.001
Gender					
Male	8 (11.8%)	12 (17.6%)	32 (47.1%)	4 (5.9%)	0.14
Female	-	4 (5.9%)	8 (11.8%)	-	
Diabetes Mellitus	8 (11.8%)	4 (5.9%)	16 (23.5%)	-	<0.001
Hypertension	8 (11.8%)	12 (17.6%)	36 (52.9%)	-	<0.001
Dyslipidemia	4 (5.9%)	4 (5.9%)	16 (23.5%)	-	0.25
Smoking History	8 (11.8%)	4 (5.9%)	20 (29.4%)	4 (5.9%)	0.01
Previous History of MI	4 (5.9%)	16 (23.5%)	20 (29.4%)	4 (5.9%)	0.04
Success of Procedure	8 (100%)	16 (100%)	24 (60%)	1 (25%)	<0.001

improve outcomes⁹.

Morino et al. combined baseline clinical and angiographic CTO parameters into a 5 point scoring system: Japan CTO (J-CTO) score. Aim of this scoring system is to assess the difficulty of CTO crossing. J-CTO score grades the difficulty in crossing a CTO within 30 minutes and overall success rate¹⁰.

The purpose of the study was to evaluate the performance of the J-CTO score for predicting final success rate among cases being performed at AFIC.

PATIENTS AND METHODS

It was a descriptive cross sectional study conducted at inpatient department of Armed Forces institute of cardiology and National institute of heart diseases, Rawalpindi from July 2018

territory or the results of previous angiography. The clinical and angiographic characteristics as well as procedural outcomes were compared between easy (J-CTO=0), intermediate (J-CTO=1), difficult (J-CTO=2), and very difficult (J-CTO≥3) CTO lesions. Baseline, procedural and hospitalization data were prospectively collected and entered in a dedicated database. Successful angiographic recanalization was defined as a restoration of TIMI flow grade 3 and residual stenosis 25% of the baseline value.

Neither occluded arterial graft nor vein graft lesions were considered for this study. When possible, arterial access was established via bilateral femoral approach, and 7F catheters were used primarily.

Ethical and institutional approval was taken from the institutional ethical review board. Data

was entered and analyzed using Statistical Package for Social Sciences (SPSS) version 23.

RESULTS

Among 68 patients included in this study, male subjects were 56 (82.4%), while female were 12 (17.6%). Mean age of subjects was 59 ± 9 years. Mean age of male subjects was 59 ± 10 years while that of female was 59 ± 8 years. Analysis of variance (ANOVA) test was used to find out the association of JCTO score with age, which showed statistical significance ($p < 0.001$). Chi-square test was used to find out the association between JCTO score and gender, diabetes mellitus, hypertension, dyslipidemia, smoking history, previous history of MI and success of procedure. Test result showed that gender, diabetes mellitus, hypertension, smoking history, previous history of MI and success of procedure are statistically significant with JCTO-score with p -value < 0.05 as shown in the table-I.

DISCUSSION

Among 68 patients included in this study, majority were male subjects i.e. 56 (82.4%). Comparing mean age among groups made on JCTO scores, intermediate score subjects had higher mean age (70.5 ± 4.2) followed by very difficult score group (63.1 ± 1.0).

Regarding coronary artery risk factors, 28 (41.2%) had diabetes mellitus, 56 (82.4%) had hypertension, 36 (52.9%) were smokers, 24 (35.3%) had dyslipidemias while 44 (64.7%) had previous history of MI. In the study reported by Faisal F *et al* 22 (31.4%) were diabetic, 39 (55.7%) hypertensive, 34 (48.6%) smokers and 13 (13%) had previous history of ischemic heart disease¹². Patients with JCTO score ≥ 2 had higher prevalence of diabetes mellitus (23.5%), hypertension (52.9%), dyslipidemia (23.5%), previous history of MI (35.9%) and smoking (35.9%). Higher prevalence of these mentioned variables were also noted in the study reported by Christopoulos G *et al*¹³.

The technical procedural success rate of PCI in CTOs is on the rise over the last 2 decades due to greater operator experience, improvement in equipment and procedural techniques. Overall

success rate for our study was 72.1%. In studies reported by Irfan *et al*¹⁴ and Taherkhani *et al*¹⁵ have declared success rate of 75.4% and 65.6% respectively.

A higher JCTO score is associated with a decline in success rate of PCI in CTOs. In our study a higher success rate was found for low JCTO score groups i.e. 100% success for each of easy and intermediate JCTO score groups, but lower for higher score groups; 60% for difficult JCTO score group and 25% for very difficult JCTO score group. Similar pattern of success, although with different rates, was found in a multi-center registry that showed a stepwise decline in technical success with more challenging lesions (97.8% for easy lesions and 73.3% for lesions with scores ≥ 3)¹³.

CONCLUSION

This study has showed an association of JCTO score with final success rate and its utility in predicting the procedural outcome and thus helping the operator to plan resources accordingly.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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