USE OF MODIFIED CHA_2DS_2-VASC SCORE FOR RISK PREDICTION IN PATIENTS UNDERGOING PCI

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ABSTRACT:

***Background:** Most of the existing risk prediction models include angiographic or procedural variables thus making it difficult for their application in decision making at the outset of treatment. This study we used modified CHA2DS2-VASC score as a simple tool for risk stratification of patients with PCI, regardless of atrial fibrillation (AF).*

***Methods:** This is a prospective observation study of patients who had undergone PCI, with diagnosis of either ACS or chronic stable angina between the age group of 18 to 85 years. Modified CHA2DS2-VASC score (CAD presence was not given one point) was calculated in the patients before PCI and followed for occurrence of MACCE or death. Score was correlated with primary outcome death or MACCE.*

***Results:** Total of 676 patients were considered for this study, Mean modified CHA_2DS_2-VASC score of the study population is 1.86± 1.26. Sub group analysis of the patients by dividing into groups with a score less than 1 and greater than 1 revealed that there is no statistical difference in either MACCE (p = 0.31) or death (p=0.6) between the groups. Subgroup analysis of ≤1 and ≥5 modified CHA2DS2VASc score has no statistically significant difference in MACCE (p=0.45), but has statistically significant difference in death rate by Fischer exact test(p=0.02) and by chi-square Yates correction (p=0.01). Further analysis also shows that patients with score ≥5 had 13 times increased risk of death when compared with score ≤1.*

***Conclusion:** Modified CHA_2DS_2-VASc Score is a simple clinical tool for predicting outcome in patients planned for PCI. Risk of death clearly correlate with the score when score was more than 5 point.*

Article received on 25 July 2016, published on 30 July 2016.
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INTRODUCTION

The prevalence of diabetes is rising worldwide reaching epidemic proportions[1].Diabetic patients have a greater Percutaneous coronary intervention (PCI) has become one of the most widely applied treatments in current-day cardiology practice, risk stratification is an important and initial step to be followed for optimal management in patients planned for revascularization. Various models for predicting the risk not only enables the clinician, patients and their families about the risks and outcomes of the revascularization procedures but also provides an objective basis. To date, several PCI mortality risk models have been published [1-4].Yet many have become outdated and do not reflect contemporary care or outcomes. Other risk models were developed on select populations and may not be generalizable. Complexity of the most currently available risk stratification models precludes their clinical usage. Most of the existing models include angiographic or procedural variables thus making it difficult for their application in decision making at the outset of treatment. Objective of present study is to investigate the predictive value of modified CHA2DS2-VASC score as a simple tool for risk stratification of patients with PCI, regardless of atrial fibrillation (AF).

MATERIALS & METHODS

The study population constituted of patients admitted to our unit of Cardiology, Nizam's institute of medical sciences between March 2014 to April 2015, with diagnosis of either ACS or chronic stable angina between the age group of 18 to 85 years, who were subjected to coronary angiogram followed by percutaneous intervention. This is a prospective study and the study design was approved by the institutional ethics committee.

According to the CHA_2DS_2-VASC score, patients were given 1 point for CHF, hypertension, age 65 to 74 years, diabetes mellitus, vascular disease, and female gender

and 2 points for age 75 years or older and previous stroke [5]. Presence of CAD itself was given one point in original CHA_2DS_2-VASC score. We have taken the modified CHA_2DS_2-VASC score by not considering the presence of coronary artery disease as a clinical variable, because in this study was done in already CAD patients and the extent of CAD can influence the outcome.

We collected the demographic & clinical features, ECG & 2D echo findings, lab parameters and details of coronary angiogram and angioplasty. Calculated the Modified CHA_2DS_2-VASC score at the time of PCI and followed for one year. At one year either clinically or telephonically we collected the MACCE. MACCE was defined as a composite of death from any cause, MI, the need for repeat revascularization (new PCI or coronary revascularization surgery) and cerebrovascular events.

STATISTICAL ANALYSIS: Data analysis was performed using Minitab version 16 software. Continuous variables were expressed as mean ± SD. Baseline parameters were compared between groups using the Student t test for continuous variables and the chi-square test for categorical variables. Results with a p value <0.05 is considered to be significant.

RESULTS

In 676 included in study cohort, with mean age of 57.836 ± 11.075 years and 25.9% were females .ACS or CSA presentation was almost equal. Some degree of LV dysfunction was present in 277 patients and in 129 patients had previous coronary intervention (Table 1).

Table 1: Baseline Demographic features of the study population.

Variable	Percentage (Total cohort n = 676)
Age (Years)	57.8 ± 11.1 years.
Female	176 (25.96%)
Hypertension	443 (65.3%)
Diabetes	333 (49.12%)
ACS	344 (50.74%)
CSA	334 (49.26%)
LV dysfunction Mild Moderate Severe	277 (40.86%) 123 (18.14%) 86 (12.86%) 68 (10.03%)
Previous PCI	129 (19.02%)

In Table 2 we mentioned the details of coronary angiogram and PCI. Predominantly Radial route was chosen for PCI. In near one third patients multi vessel angioplasty was done. Complex lesions (B2 and C) were present in 90.9% of patients and DES was used in 90% of cases.

Table: 2 Details of PCI of study population

Parameter	Percentage
Multivessel PCI	213 (31.42%)
Single vessel PCI	465 (68.59%)
Radial approach	634 (93.51%)
Femoral approach	44 (6.49%)
Type A lesion	19 (2.80%)
Type B1 lesion	43 (6.34%)
Type B2 lesion	544 (80.24%)
Type C lesion	72 (10.62%)
DES	607 (89.52%)
BMS	71 (10.47%)

Mean CHA_2DS_2-VASC score of the study population is 1.86± 1.26. Fig 1 & 2 are representing the CHA2DS2-VASc score distribution and factors distribution taken into calculation of Modified CHA2DS2-VASc in the study population.

Fig 1: Bar diagram showing the Frequency of CHA2DS2-VASc score.

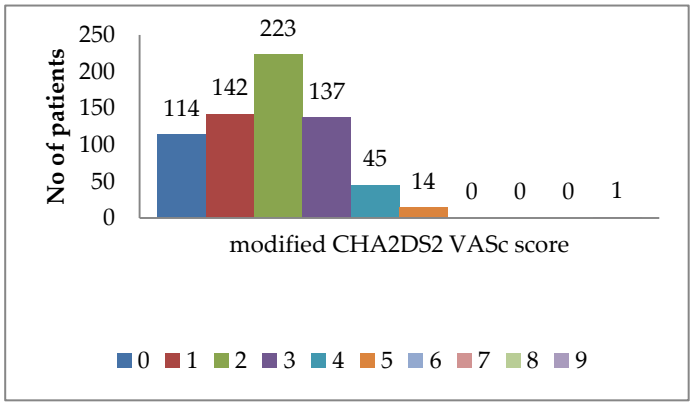
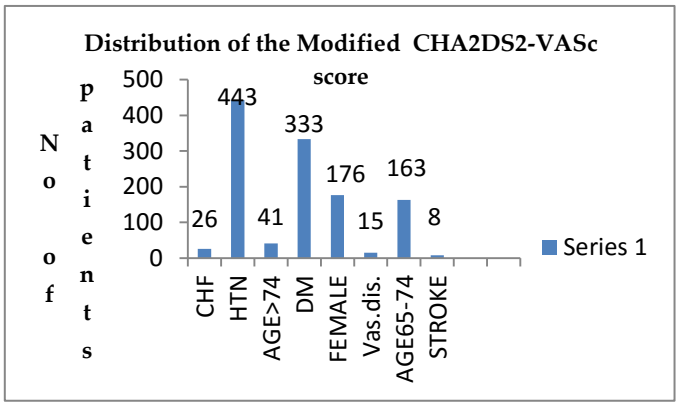


Fig 2: Distribution of components contributed for Modified CHA2DS2-VASc score calculation.



Sub group analysis of the patients by Modified CHA2DS2-VASc was done. Group 1 with Modified CHA2DS2-VASc < 1 and Group 2 with Modified CHA2DS2-VASc > 1.As expected there was difference in age in between the both the groups. Group 2 cases had lesser hemoglobin and more LV dysfunctions than Group 1 patients which were statistically significant (p=0.003, p=0.045 respectively) (Table 3) . There was no statistically difference in either MACCE (p = 0.31) or death separately (p=0.6) between the groups.

Table 3: Group 1 & 2 comparison.

Parameters	Group 1	Group 2	p value
No. of Patients	420	256	
Age (Years)	52.9 ±10.2	60.9 ±10.4	0.000
Leukocyte Count (cells/cu.mm)	9170 ± 2876	9424 ± 5849	0.7
Hemoglobin (g/dl)	13.4± 2.2	12.9±1.97	0.003
PCV (%)	36.6 ± 6.4	35.6±5.97	0.3
Blood Urea(mg/dl)	26.89 ± 15.2	29.8± 15.5	0.03
Creatinine (mg/dl)	1.17 ± 0.71	1.18 ± 0.71	0.8
LV Dysfunction	117	159	0.045
Multi Vessel Dis	72	141	0.1
Radial Route	241	390	0.5
MACCE	38	17	0.3
Death	7	3	0.6

But when we compared Group 3 (patients with Modified CHA2DS2-VASc > 5) and Group 1 then there was difference in Death occurrence. As depicted in the Table 4, there was no statistical difference of MACCE in between the both the groups, but for death there was statistical difference (p=0.026) with higher mortality in Group 3 patients. This is also confirmed by chi-square Yates correction (p=0.01). Further analysis also shows that patients with score ≥5 had 13 times increased risk of death when compared with score ≤1.

Table 4: Comparison between Group 1 &3

Parameters	Group 1	Group 3	p Value
No. of Patients	256	15	
Age (Years)	52.9±10.2	73.5± 9.4	0.000
Leukocyte Count(cells/cu.mm)	9170 ± 2876	7840 ± 1994	0.5
Hemoglobin (g/dl)	13.4 ± 2.2	12 ± 1.8	0.2
PCV (%)	36.6 ± 6.4	32.5± 6.5	0.4
Blood Urea(mg/dl)	26.9 ± 15.2	42.7 ± 31.1	0.004
Creatinine (mg/dl)	1.2 ± 0.7	1.3 ± 0.5	0.7
LV Dysfunction	117	11	0.02
Multi Vessel Disease	72	5	0.7
Radial Route	241	14	0.9
Mace	17	2	0.5
Death	3	2	0.026

Discussion

The role of CHA2DS2-VASC scores in predicting cardiovascular events was previously demonstrated in patients without AF with high cardiovascular risk [6] and CHF [7].As for patients with coronary artery disease, theCHA2DS2-VASC score has been recently evaluated as a risk stratification tool for major adverse cardiac event(including all-cause death, MI, destabilizing symptoms leading to hospitalization, and nonfatal stroke) after PCI in 1,330 patients without AF and was shown to have modest discrimination [8]. Many of the CHA2DS2-VASC score variables (i.e., age, female gender, diabetes, heart failure) are already well recognized as outcome predictors after PCI and were validated in previous studies.

Various other risk scores that were developed for risk stratification of patients planned for PCI are – SYNTAX

score, clinical SYNTAX score, modified ACEF score, Euro SCORE and Global risk score. The main advantages of clinically based scores are that they are potentially easier to perform and less subjective than purely anatomical-based scores, which require interpretation of the coronary angiogram. The clinically based risk score enable calculation at the bedside also. In Table 5 all the importance scores used to measure the short or long term outcome of PCI are summarized.

Table 5: Details of variables used in different risk scores which determined the outcomes of PCI.

RISK SCORE	Clinical variables	Angio. variables
ACC/AHA lesion classification	0	11
Syntax score	0	11
functional syntax score	0	11
Duke jeopardy score	0	
Myocardial Jeopardy Index (BARI)	0	
APPROACH Lesion Score	0	
New Mayo Clinic Risk Score	7	
Parsonnet Score	14	0
EuroSCORE	17	0
NCDR Cath PCI Risk Score	8	0
ACEF Score	3	0
Global Risk		
EuroHeart PCI Score	10	6
New Risk Classification Score (NERS)	17	33
Parsonnet + SYNTAX Score	14	11
Clinical SYNTAX Score	3	11
New York PCI Risk Score	8	1
The Texas Heart Institute Risk Score	8	2
Mayo Clinic Risk Score	6	2

In classical CHA_2DS_2-VASc Score , CAD patients are also were given as one point, mainly because that was designed to calculated the risk for the stroke in AF patients. But to use the same CHA_2DS_2-VASc Score for the determining the outcomes of the PCI requires modification as such all these patients were with CAD and the severity and extent of obstructive disease becomes an additive risk for the outcomes of PCI follow up. So, we in modified CHA_2DS_2-VASc Score, in which CAD scoring is not added.

Capodanno D et al [8] studied mainly the outcomes of PCI patients with CHA_2DS_2-VASc Score. This study was in 1437 subjects undergoing PCI, 1330 (mean age 63.6±10.9years, 75.7% male). In our series the mean age of 57.8 years who were slightly younger with same percentage of female patients than Capodanno D et al series. Capodanno D et al followed the cases for 2.7±1.2years, whereas our follow up period was for one year only.

According to Capodanno D et al, in follow-up, 3539 patient-years at risk, 187 patients had a MACE (5.3%/year) and 48 had a major bleeding (1.4%/year). The cumulative incidences of MACE were significantly stratified by both high CHA2DS2-VASc (P=0.020) or HAS-BLED (P<0.001) scores, whereas major bleeding episodes were not. The CHA2DS2-VASc and the HAS-BLED scores had similar C-statistics for MACE (0.56 vs 0.60; P=0.52) and major bleeding (0.63 vs 0.60; P=0.63). Compared with CHA2DS2-VASc, the HAS-BLED score more accurately reclassified events and no events both for MACE (NRI 8.21%) and major bleeding (NRI 6.85%). In present study we used only modified CHA_2DS_2-VASc Score, not calculated the HAS-BLED score. Our study clearly establishes the usefulness of modified CHA_2DS_2-VASc Score as a simple clinical tool for predicting outcome in patients planned for PCI whenever they had high modified CHA_2DS_2-VASc Score. Risk of death and incidence of major adverse cardiac events was shown to clearly correlate with the score (p-0.026). A major limitation of our study is that it is a study population has only 1yr follow up and it is a single center study.

In conclusion, higher modified CHA_2DS_2-VASc Score, means > 5 is associated with increased mortality at one year follow up in patients who undergone PCI . But the scoring is not help to predict the MACCE at one year.

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