Stroke Risk stratification by CHA2DS2-VASc score and short term outcomes in non valvularatrial fibrillation

Pandharipande M S[1], Shinde S V[2], Motlag M D[2], Nagpure K[2], Chopde S[3], Joshi P P[4]

ABSTRACT

Background : Atrial Fibrillation confers a high risk of stroke and is associated with significant mortality and morbidity. The new risk factor based approach expressed as CHA2DS2VASc score has been recommended by ESC guidelines for assessment of stroke risk. Apart from stroke, AF is associated with adverse outcomes.

Objectives : To estimate CHA2DS2VASc score in cases of non valvular atrial fibrillation, to asses short term outcome in AF and to find out association of CHA2DS2VASc score with outcomes.

Methodology : 64 cases (29 M, 35 F)of non valvular AF were included in this prospective observational study.CHA2DS2VASc score was calculated and cases were categorized as per score. Cases were clinically evaluated and investigated for type, etiology, complications and comorbidities. Cases were followed up and outcome was defined.

Results : CHA2DS2VASc score was determined in 64 cases of non valvular AF. In 3 cases (4.6%) it was zero indicating low risk for stroke, 8 cases (12.5%) had score as 1 had intermediate risk, and 53 cases (82.8%) had score 2 or more indicating high stroke risk ($p<0.01$). 3 (4.6%) cases of non valvular atrial fibrillation having > 2 presented with stroke. Stroke risk was significantly higher in cases of CHA2DS2VASc score > 2 ($p<0.01$). Congestive heart failure was reported in 32 (50%) cases. Peripheral embolism was documented in 1 case (1.5%). Overall Mortality at the end of 3 months was reported to be 7 (10.9%). CHA2DS2VASc score > 2 was significantly associated with mortality ($p<0.01$) Cases of AF with CHA2DS2VASc score > 2 demonstrated significantly high incidence for stroke as compared to those with score as zero or one ($p<0.01$).

Conclusions : CHA2DS2VASc is a simple score to predict stroke risk in cases of non valvular atrial fibrillation and is easy to estimate. CHA2DS2VASc score > -2 is associated with mortality as a short term adverse outcome in non valvular atrial fibrillation.

Key words : CHA2DS2VAScscore, Atrial Fibrillation (AF), Mortality.

Introduction :

Atrial fibrillation is the most common sustained tachyarrythmia-affecting 1 to 2% of general population. Prevalence of AF increases with age and lifetime risk of developing AF is around 25 % after the age of 40 years[1,2]. AF confers 5-fold risk of stroke, and one in five of all strokes is attributed to atrial fibrillation. Strokes in association with AF are associated with significant mortality and morbidity[3].

[1]Associate Professor, [2]Assistant Professor,
[3]Junior Residents, [4]Professor
Department of Medicine,
Indira Gandhi Govt. Medical College, Nagpur

Address for Correspondence -
Dr. M. S. Pandharipande
E-mail : madhuripandharipande@gmail.com

Initially, CHADS2 score was used to stratify risk for stroke in non valvular AF. However, as it was demonstrated to have only a modest predictive value and it did not include many risk factors for stroke, viz. age > 75 years, and vascular diseases, hence a new risk factor based approach expressed as CHA2DS2VASc score has been recommended for assessment of stroke risk, which includes additional stroke risk factors. CHA2DS2VASc consists of congestive cardiac failure, hypertension, age > 75 years (doubled), diabetes mellitus, stroke (doubled), vascular disease age 65-74 years and female gender. This scheme is based on a point system in which 2 points are assigned for a history of stroke or TIA, or age > -75 and 1 point each assigned for age 65-74 years, a history of hypertension, diabetes mellitus, recent cardiac failure, vascular disease (myocardial infarction, complex aortic plaque and peripheral

arterial disease, prior revascularization, amputation due to peripheral vascular disease, or angiographic evidence of PAD) and female sex.[4] In cases of AF with CHA2DS2VASc score > 2, anticoagulation therapy OAC is recommended in a dose to achieve INR in the range of 2-3, unless contraindicated[5]. Even if rheumatic AF is common in India, non valvular AF is also found in significant no. of cases Very few centers are equipped with cardiac catheterization laboratories and ablation facilities and expertise and rate control is the predominant treatment practiced at many centers. Even though OACs are recommended, many of the cases are non compliant. Cost is the limiting factor for newer oral anticoagulants eg. Dabigatran. Apart from stroke , patients of AF are prone for complications viz. congestive heart failure, thromboembolic episodes, and death.[6,7]

Aims and objectives :

To estimate CHA2DS2VASc score in cases of atrial fibrillation. To assess 3 month outcome (stroke, congestive cardiac failure ,thromboembolism and death) in cases of atrial fibrillation. Tofind out association between CHA2DS2VASc score and short term outcomes (3 months) incases of atrial fibrillation (stroke, death, heart failure, thromboembolism)

Methodology :

104 cases of atrial fibrillation were screened for the study. 64 (29 M, 35 F) cases of non valvularatrial fibrillation were enrolled for this prospective observational study. Permission from institutional ethics committee was obtained. Atrial fibrillation and types (first diagnosed , paroxysmal , persistent and permanent) was defined according to ESC guidelines. Cases were evaluated for etiology and type of atrial fibrillation and CHA2DS2VASc score was calculated. Complications of AF at the time of recruitment and comorbidities were noted and anticoagulation therapy (low molecular weight heparin and / or VKA-warfarin was started if CHA2DS2VASc score 2 or more. Subjects having CHA2DS2VASc score as 1 were started on anticoagulation therapy if they have major risk factors. In cases of AF withCHA2DS2VASc score as 1 and minor risk factors, antiplatelets were prescribed. Cases were followed up and at the end of three months, outcome was defined in the form of death, congestive heart failure, stroke and thromboembolism. INR was maintained in the range of 2 -3 and concomitant treatment (diuretics, ACE - inhibitors, antihypertensive drugs, Oral Hypoglycemic agents. Stroke was defined as a focal neurologic deficit of sudden onset as diagnosed by a physician, lasting > 24 hours and caused by ischemia. Peripheral embolism was defined as Thromboembolism outside the brain, heart, eyes, and lungs.[9]

Results :

Total 64 cases (29 males & 35 females) of non valvular AF were assessed for CHA2DS2VASc score. Maximum cases 53 (82.8%) had score > 2 or more indicating high stroke risk ($p<0.01$) ***(Fig. 1).***

Stroke risk was significantly higher in cases of CHA2DS2VASc score > 2 ($p<0.01$) Amongs components of CHA2DS2VASc score in non valvular AF CHF, Hypertension & Female gender were seen in more number of cases. ***(Table 1).*** Complications of AF reported At the time of recruitment were significantly more in patients withCHA2DS2VASc score>2 score. ***(Table 2).***

Hypertension) and / or ischaemic heart disease were the common etiologic factors found to be associated with non valvularatrial fibrillation in 78.1% - 68.7% cases respectively. Thyrotoxicosis, COPD & Cardiomyopathy was the next common etiology.

Association of CHA2DS2VASc score with outcome in non valvular AF at 3 month follow up revealed CHF as most significant complication in 32 (50%) cases with CHA2DS2VASc score > 2 score Death was also significantly more in this group (07-10.9%) $p<0.001$. Cases of AF with CHA2DS2VASc score > 2 score also demonstrated high incidence of stroke as compared to those with score as zero or 1 ($p>0.001$) ***(Table3)***

Out of 64 cases of nonvalvular Af56 (87.5%) cases received anticoagulants ((LMWH / VKA warfarin). Non compliance for anticoagulation was reported in 12 (18.7 %) cases. Thromboembolism, ($p<0.02$),

stroke (p<0.01), and death (p<0.01) were more common in cases who were non compliant. Multivariate analysis was performed to find out independent association of CHA2DS2VASc score with CHF, stroke, EF < 40% type of AF with mortality, demonstrated significant association of CHA2DS2VASc score with stroke and mortality in nonvalvular AF (OR 3.9, 95% CI 2.6 to 6.0 P<0.002, OR 2.05, 95% CI 1.06 to 3.9, p<0.05 resp.)

Discussion :

Contemporary clinical risk stratifiation schemata for predicting stroke and thromboembolism (TE) in patients with atrial fi brillation (AF) are largely derived from risk factors identified from trial cohorts. Framinham study 10 reported the impact of atrial fibrillation for stroke incidence and mentioned that age adjusted incidence of stroke was near five fold when AF is present ,Euro heart survey refined the 2006 Birmingham / National Institute for Health and Clinical Excellence (NICE) stroke risk stratification schema into a risk factor-based approach by reclassifying and / or incorporating additional new risk factors. The CHA2DS2-VASc score has been validated in multiple cohorts and the accumulated evidence shows that CHA2DS2-VASc is better at identifying 'truly low-risk' patients with AF and possibly better than, scores such as CHADS2 in identifying patients who develop stroke and thromboembolism. Amongst patients with CHADS2 score = 0, the 1-year event rates can range between 0.84% (CHA2DS2-VASc score = 0), 1.75% (CHA2DS2-VASc score = 1), 2.69% (CHA2DS2-VASc score = 2), and 3.2% (CHA2DS2-VASc score = 3).

Present study demonstrated a high stroke risk (CHA2DS2VASc score>2) in 53 (82.8%) cases of non valvular AF indicating need of anticoagulant therapy and stroke prevention. Roopindersingh K et al[11] studied risk stratification schemes, anticoagulation use and outcomes in non valvular AF in 42834 cases by CHADS2 risk score, and reported 22.7% as low risk, 27.5% in the intermediate group and 49.8% to be in high risk for stroke. CHA2DS2VASc score reclassified 16,722 patients and found 7.8% in low risk, 13.8% in intermediate risk and 78.45 in high risk. Present study also demonstrated higher incidence of stroke (7.8%) in cases of non valvular AF. In subjects with CHA2DS2VASc score > 2 incidence of stroke (9.4%) was significantly higher as compared to CHA2DS2VASc score as 0 or 1, p<0.01 ALFA study[12] reported 10.8% incidence of stroke in AF and R Nieuwlaat et al[13] reported the same as 9%.

Cases with CHA2DS2VASc score > 2 had higher incidence of CHF and peripheral embolism. RAFTING study[14] reported thromboembolic events in 2.5% of cases of AF. Tejinderket al[15] reported incidence of CHF in 67% cases of AF and ALFA study as 42.6% Mortality in cases of AF with CHA2DS2VASc score > 2 was significantly higher than those having score as 0 or 1, indicating that apart from predicting stroke and vascular events, CHA2DS2VASc score > 2 may also indicate prognosis in non valvular AF. Multivariate analysis revealed independent association of CHA2DS2VASc score > with mortality at the end of 3 months. However, further long term, prospective large sample sized multcentric studies are needed to demonstrate whether CHA2DS2VASc score can be used to predict mortality in non valvular AF. Roopindersingh et al[16] demonstrated that warfarin (VKA) use was associated with substantially lower rates of death or cerebrovascular events for CHADS2 score 1 as compared to score >-2. BAFTA study[17] on 973 patients of age > 75 years determined the use of aspirin versus warfarin in stroke prevention in elderly with atrial fibrillation. The primary end point was fatal or disabling stroke, (ischaemic or haemorrhagic) intracranial haemorrhage, or clinically significant arterial embolism. The study revealed 24 primary events (21 strokes, 2 intracranial haemorrhages, and one systemic embolus) on warfarin group and 48 primary events (44 strokes, 1 intracranial haemorrhage and 3 systemic emboli) in people assigned to aspirin. Yearly risk cases on warfarin was 1.85 versus aspirin was 3.8% and absolute risk reduction as 2%, RAFTING[18] study by Dimitrios Farmakiset al reported that in 1127 cases of AF, warfarin was prescribed in 56% of patients, and in

hospital mortality was 0.8%. The Loire Valley Atrial Fibrillation project by Jonas Bjerring et al reported that in 6438 patients with non valvular AF and CHADS2 risk factors, who were not treated with anticoagulation, the stroke / thromboembolic event rate per 100 person years was 0.23 Present study also demonstrated that incidence of stroke in non valvular AF was significantly high in cases who were non compliant for anticoagulant therapy than those who received anticoagulation therapy It is also recommended that oral anticoagulants should be easily available, affordable and INR facilities made accessible for these cases of non valvular AF. It has also been demonstrated in the study that anticoagulation therapy is relatively safe, if INR is monitored. Even if newer oral anticoagulants are approved for stroke prevention in non valvular AF, cost is the limiting factor for most of our patients. It was also observed that CHF was present in significant no. of cases in cases of AF. Even if AF is not the direct cause of CHF, it is one of the important precipitating factor and one of the adverse outcome associated with AF, and is an important aspect of management in cases of atrial fibrillation.

Fig. 1 : **Distribution of CHAD2S2 score**

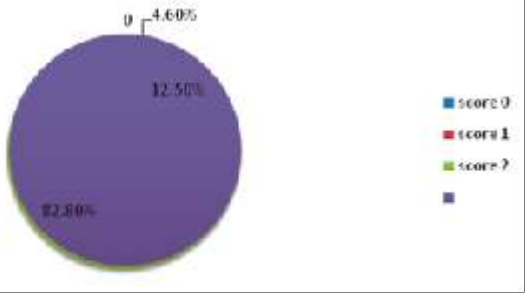

Table 1 : **Frequency distribution of Components of CHA2DS2VASc score in non valvular AF**

Component of CHA2DS2VASc score (at recruitment)	Frequency in non valvular AF (n=64)
Congestive heart failure	32 (50%)
Hypertension	50 (78%)
Age>75 years	7 (10.9%)
Diabetes mellitus	19 (29.6%)
Stroke	3 (4.6%)
Vascular disease	1 (1.56%)
Age 65 -74 years	16 (25%)
Sex category (female)	35 (54.6%)

Table 2 : **CHA2DS2VASc score and complications of AF at recruitment**

Complication	CHA2DS2VASc score 0(N=3)	CHA2DS2VASc score 1(N=8)	CHA2DS2VASc score 2(N=53)	Total(n=64)
stroke	nil	nil	2 (3.7%)	2 (3.1%) p<0.01, s
CHF	nil	2 (25%)	27 (50.9%)	29 (45.3%)
Thromboembolism	nil	nil	1 (1.8%)	1 (1.56%)
cardiogenicshock	nil	nil	7 (13.2%)	7 (10.9%)
uncomplicated	3 (100%)	6 (75%)	16 (30.1%)	25 (39%)

S = Statistically Significant

Table 3 : **CHA2DS2VASc score and complications of AF at the end of 3 months**

Complications	CHA2DS2VASc score 0 (N=3)	CHA2DS2VASc score 1(N=8)	CHA2DS2VASc score 2 (N=53)	Total (n=64)	P value
stroke	Nil	Nil	5 (9.4%)	5 (7.8%)	<0.01,s
CHF	Nil	2 (25%)	30 (56.6%)	32 (50%)	<0.001,s
Thromboembolism	Nil	Nil	1 (1.8%)	1 (1.56%)	NS
Death	Nil	Nil	7 (13.2%)	7 (10.9%)	<0.001,s
Uncomplicated	3 (100%)	6 (75%)	10 (18.8%)	19 (35%)	P<0.001,s

S = Statistically Significant

Limitations :

Cardiac catheterisation and catheter ablation facilities as well as newer oral anticoagulants are not available at our center and rate control strategy has been practised for treatment of atrial fibrillation. Short term outcomes have been assessed in the present study.

Conclusions :

CHA2DS2VASc is a simple score to predict stroke risk in cases of non valvular atrial fibrillation and is easy to estimate. Significant no of casesof AF fall in high risk group and need oral anticoagulation therapy for stroke prevention. CHA2DS2VASc score>-2. Is associated with high incidence of stroke in cases of non valvular AF. CHA2DS2VASc score>-2 is associated with mortality as a short term adverse outcome in non valvular atrial fibrillation.

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