Journal of Clinical Case Studies and Reviews

Review Article Open Access

Atrial Fibrillation: Stroke and bleeding Risk Assessment

Hussein M Ismail[1], Hussein A Yamany [2], Hassan A. Shora[3]*

[1]Department of Cardiology, Suez Canal University, Ismailia, Egypt

[2]Assistant professor, Department of Medicine, Taibah university, Almadinah Almunwara, Saudi Arabia

[3]Senior research scientist, Head of Medicine and Diabetes Center, Port-Said University and Ismailia General Hospital, Ismailia and Port-Said University, Egypt

***Correspondence to:** Hassan A Shora, Senior research scientist, Head of Medicine and Diabetes Center, Port-Said University and Ismailia General Hospital, Ismailia and Port-Said University, Egypt

Received: 13 April 2021; **Accepted:** 15 June 2021; **Published:** 22 June 2021

Abstract

Atrial fibrillation increases with increased elderly population and it increases the risk of thromboembolism that may lead to stroke. Both CHADS2 and CHA2DS2 VAS scores are widely used to assess the stroke risk according to current international guidelines. The accuracy of both scores in predicting stroke risk is only modest. Some important clinical risk factors are missing of those scores such as chronic kidney disease, Body Mass Index BMI, echocardiographic abnormalities and other biomarkers. Assessment of bleeding risk using HEMORR2HAGES, HAS-BLED, and ATRIA scores are discussed in detail.

Keywords: *Atrial fibrillation; Stroke; Bleeding; Risk assessment*

Introduction

Atrial fibrillation (AF) is the most common sustained arrhythmia encountered in clinical practice [1, 2]. It is associated with significant increase in morbidity and mortality notably stroke and thromboembolic complications [2-4].

There is a recent enthusiasm in the stroke risk and bleeding risk stratification trying to balance the potential cost/benefit ratio for optimum decision of thromboprophylaxis of AF patients, especially in the era of the novel antithrombotic therapy, such as the oral direct thrombin inhibitors (e.g. dabigatran) and oral factor Xa inhibitors (e.g. rivaroxaban, apixaban) [5].

AF and stroke epidemiology

AF is the most common sustained tachyarrhythmia [1, 2], with estimated prevalence in the developed world is 1.5-2% of the general population [6]. Recently, Friberg and Bergfeldt found the prevalence of AF in the Swedish population at least 2.9% not including the silent AF [7]. Moreover, Go and his colleagues found, in the Atria study, that the prevalence of AF is 1% in all age groups, and it increases with age, reaching 4% in people aging 60 years or more and 9% of people aging 80 years or more [8]. Hypertension, diabetes mellitus, old age, heart failure, and hyperthyroidism were reported as risk factors for developing atrial fibrillation [1]. AF is associated with significant morbidity and mortality, and is an independent risk factor for stroke, increasing the risk about four times [2, 3]. Moreover, it significantly increased the cost of stroke hospitaliza¬tions [4]. Recently, Sussman et al, in November 2013, found that AF increased the health-related cost of ischemic stroke, hemorrhagic stroke, and transient ischemic attacks by 20%[9]. It was found that AF-associated stroke is more severe than stroke without AF [4]. Interestingly, AF is found to be independently associated with increased risk of myocardial infarction in women (HR=2.2) and blacks (HR=2.5) [10].

Although most patients with AF are identified because they have symptoms, many patients with AF are asymptomatic in fact, it is sometimes first diagnosed when patients present with complications as heart failure, thromboembolism or stroke [11,12]. In a recent meta-analysis of six prospective cohort studies of 18558 general population , it was found that 3165 of them have developed AF during 22 years of follow-up. Baseline serum adiponectin was significantly associated with increased risk of first AF HR: 1.17, 95% CI 1.08- 1.27 P≤ 0.001.

Asymptomatic versus symptomatic atrial fibrillation and stroke

Asymptomatic attacks of AF are more frequent than symptomatic ones amongst patients with paroxysmal AF. Page and his colleagues found that asymptomatic AF occurs 12-fold more frequently than symptomatic attacks [13]. It was found that even short episodes of asymptomatic AF carry a risk for stroke, these data found in the studies

used Holter ECGs and the studies used implanted devices [14,15]. The AFFIRM investigators studied 481 asymptomatic patients with AF based on ambulatory ECG. They found that their patients have significantly more cerebrovascular attacks but with less adverse cardiac events [16].

Hohnloser et al found in the ACTIVE W trial that paroxysmal AF carries similar risk of stroke and thromboembolism to sustained AF under treatment [17]. There is strong relationship between AF burden and thromboembolism. Capucci et al studied 725 patients with an implanted dual chamber pacemaker due to brady-tachy syndrome. They followed them up for two years and found that patients with AF longer than one day (detected by the pacemaker device) were independently associated with 3–fold increase of embolic events [18]. Similar findings were reported by Glotzer and colleagues, in the TRENDS study. This study was a prospective and observational study recruiting patients with pacemakers or defibrillators that detect atrial tachycardia/ fibrillation burden. During a mean follow-up of 1.4 years, they found that patients with high atrial tachycardia/fibrillation burden have about double the annual thromboembolic risk (including transient ischemic attacks). This was a trend not reaching the statistical significance (P=0.06) [19]. Moreover, Healy et al studied, in the ASSERT trial, 2582 hypertensive patients without prior AF, in whom a pacemaker or defibrillator had been implanted. They found that device-detected subclinical atrial tachyarrhymias occured in 261 (about 10%) patients, and the risk of stroke and systemic embolism increased more than two times (hazard ratio, 2.49; 95% CI, 1.28 to 4.85; P=0.007) [15].

Assessing stroke risk in AF

The CHADS2 score is a clinical prediction score for estimating the risk of stroke in patients with non-rheumatic AF that has been widely used due to its simplicity and ease. It was emerged by combing the AF Investigators and SPAF-1 risk schemes [20]. It includes Congestive heart failure (CHF), hypertension, age of 75 years or more, (diabetes mellitus) DM, and prior stroke or TIA. Each condition has been given one point, except prior stroke or TIA has been given 2 points (see table 1) [1, 20]. The annual stroke risk increases from 1.9% for the minimum score of zero to 18.2% for the maximum score of 6 (see table 3) [20].

	Clinical Parameter	Points
C	Congestive heart failure (any history)	1
H	Hypertension (prior history)	1
A	Age ≥75 years	1
D	Diabetes mellitus	1
S2	Prior Stroke or TIA (most experts include systemic embolism)	2

Table 1: Criteria of CHADS2 score

Based on its original validation study, it categorizes a score of 0 as low risk, 1–2 as moderate/intermediate risk and >3 as high risk [20]. Nonetheless, current guidelines have changed the previous categories by defining high risk as a CHADS2 score > 2 [6]. It has become the standard score described and recommended in the 2006 American College of Cardiology/American Heart Association/Heart Rhythm Society guidelines for the management atrial fibrillation [1]. Welles et al., the Heart and Soul Study, studied 916 sinus rhythm patients (by baseline electrocardiogram) with stable coronary artery disease and do not receive anticoagulation. They studied the prognostic performance of the CHADS2 score in the coronary artery disease patients without atrial fibrillation. They found that the event rate in the sinus rhythm with the CHADS2 high score (5-6) was comparable to the AF published event rate of the intermediate CHADS2 score (1-2). But, it is not known that this group of patients will benefit from stroke prevention strategies or screening of silent AF or not [21].

Although, the CHADS2 score has become widely used, there are many concerns. First, it does not include common stroke risk factors in atrial fibrillation as, female gender, and vascular disease [22-24]. Secondly, studies found that 30-50% of AF have CHADS2 score=1, and the risk of bleeding and the risk of stroke is similar in this subset of patients. Therefore, the recommendation was to use either aspirin or oral anticoagulation. This resulted in a large proportion of AF patients without clear thromboprophylaxis policy [20, 25]. To complement the CHADS2 score by inclusion of additional stroke risk factors as age 65-74 years, female gender, and vascular disease, the CHA2DS2-VaS score has been emerged [26], and recommended by the ESC guidelines [6].

The CHA2DS2-VaS score or Birmingham Schema is a refinement of CHADS2 score and extends the latter by including additional common stroke risk factors. The maximum CHA2DS2-VaS score is 9, but it places 2 risk factors (age more than 75 years, and previous stroke and/or TIA) as major risk factors by allocating 2 points for each (see table 2). The other risk factors are allocated one point for each, they are (systolic heart failure, hypertension, diabetes, age 65–74 years, vascular disease and female gender), with total scores ranging from 0 to 9 [26].

	Condition	Points
C	Congestive heart failure	1
H	Hypertension	1
A_2	Age = or > 75 years	2
D	Diabetes Mellitus	1
S_2	Stroke	2
V	Vascular disease	1
A	Age 65–74 years	1
Sc	Sex category (female)	1

Table 2: CHA_2DS_2-VaSc score

Congestive heart failure is the first criterion of the acronym the CHA2DS2-VaS score [26], while, history of heart failure is not considered a risk factor for stroke. Nevertheless, decompensated heart failure requiring hospitalization (regardless of ejection fraction) is a stroke risk factor [27, 28]. It was found that moderate to severe LV systolic

dysfunction as an independent risk factor of stroke non-valvular AF cohorts [27, 29, 30]. Therefore, in patients with moderate to severe LV systolic dysfunction the relative risk of stroke is 2.5 (1.5 to 4.4), p<0.001 [31]. Whereas, the odds ratio for stroke for abnormal LV ejection fraction is 1.8 (1.2 to 2.7), p=0.003 [32]. Other less important risk factors, as obesity and chronic lung disease were not found to be independent stroke risk factors on multivariate analysis [33]. Moreover, thyroid disease (or of current hyperthyroidism), in contrary to the older and conflicting data, was not an independent stroke risk factor the Swedish Atrial Fibrillation cohort study [33].

The CHA2DS2-VaS score has been validated by several studies as the Euro Heart survey on AF [26], data base from UK General Practice Research Database [34], and hospitalized patients in Denmark [35]. Moreover, Olesen and his colleagues studied more than 47 thousands patients with chads2 (score 0-1). From this apparently low to moderate risk patient for stroke by the CHADS2 score, the patients were further categorized according to the CHA2DS2-VaS score. They found that about 15.8% of their studied population was the CHA2DS2-VaS score of 0, 21.2% were the CHA2DS2-VaS score of 1, 30.1% were the CHA2DS2-VaS score of 2, 29.8% were the CHA2DS2-VaS score of 3, and 3.1% were the CHA2DS2-VaS score of 4. The stroke/thromboembolism risk increases with increasing the CHA2DS2-VaS score. The previously labeled low-risk patients by the CHADS2 score are not truly low-risk by the CHA2DS2-VaS score [36]. It is well known, nowadays, that the CHA2DS2-VaS score is better than the CHADS2 score in identifying the true low risk patients [33]. Thus, the CHA2DS2-VaS score improves the predictive value of CHADS2 score and refines the stroke risk assessment of the low risk patients of CHADS2 [36]. Furthermore, both scores performance was modest in assessing stroke risk may be because several other important clinical risk factors are not included such as renal dysfunction, the exact type of AF (persistent vs paroxysmal)m BMI, Echocardiographic abnormalities and novel blood biomarkers.

Lone AF

The term lone AF was introduced by Evans and Swann in 1953 [37]. Currently, lone atrial fibrillation is considered when clinical and echocardiographic evidence of cardiovascular or pulmonary disease has been excluded. Also, conditions as hypertension, diabetes mellitus, thyrotoxicosis, recent cardiothoracic or abdominal surgery, and acute infections should be ruled out [38]. Patients, who are below 65 years of age and have lone AF, have significantly low stroke rates. Therefore, female patients with gender alone as a risk factor is considered low risk patient for stoke if they have fulfilled the 2 criteria of age below 65 and lone AF, although they still have CHA2DS2-VaS score of 1 [36, 39]. Thus, the 2012 ESC focused update on AF strongly recommends meticulously identifying 'truly low-risk' patients with AF (as age below 65 years of age and lone AF'), who do not need any antithrombotic treatment [6].

Annual Stroke Risk (Percent / Year)		
Score	$CHADS_2$ Score [1, 20]	CHA2DS2-VaSc score [6, 26]
0	1.9	0
1	2.8	1.3
2	4.0	2.2
3	5.9	3.2
4	8.5	4
5	12.5	6.7
6	18.2	9.8
7		9.6
8		6.7
9		15.2

Recommendations for Antithrombotic Treatment

The CHA2DS2-VaS score of 0 is considered low risk, and no antithrombotic therapy is recommended [6, 28]. The CHA2DS2-VaS score = 1 'intermediate risk' [28] recommend antithrombotic therapy with oral anticoagulation or antiplatelet therapy, but preferably oral anticoagulation [6]. Patients, at the intermediate risk category, should be treated with anticoagulation rather aspirin, because under treatment is more harmful than overtreatment. Nevertheless, patient preference should be considered [40, 41]. Moreover, according to the BAFTA trial, there was no difference in major bleeding between aspirin (75 mg daily) and oral anticoagulant warfarin (target INR 2-3) in an AF elderly population [42]. The CHA2DS2-VaS score > 2 'high risk category' recommends oral anticoagulation [6, 28].

Bleeding Risk Assessment

The approach to thromboprophylaxis of AF needs balancing the benefits of the anticoagulation against the risk of bleeding. The most feared bleeding complications is intracranial cranial haemorrhage (ICH). Thus, bleeding risk assessment remains a corner stone in management of AF anticoagulation policy. Hughes and his colleagues who developed the NICE (the National Institute for Clinical Excellence in the United Kingdom) guidelines reported that the risk factors for bleeding due to anticoagulation in patients with AF were "advanced age, uncontrolled hypertension, history of myocardial infarction or ischemic heart disease, cerebrovascular disease, anaemia or a history of bleeding, and the concomitant use of other drugs such as antiplatelet agents" [43]. Factors as controlled hypertension, diabetes and gender are not significant bleeding risk factors in the AF patients [44].

There are 3 scores for anticoagulation-related bleeding risk have

been validated in the AF patients. They are HEMORR2HAGES, HAS-BLED, and ATRIA scores. The first one is HEMORR2HAGES score that includes "hepatic or renal disease, ethanol abuse, malignancy, older (age ≥75 years), reduced platelet count or function, Re-bleeding risk, hypertension (uncontrolled), anaemia, genetic factors, excessive fall risk, and stroke". Each risk factor has been allocated 1 point, except that prior bleeding has been allocated 2 points [45]. The second score is the ATRIA score "Anticoagulation and Risk factors In Atrial fibrillation". It includes anaemia, severe renal disease, age ≥ 75 years, any prior haemorrhage diagnosis, and diagnosed hypertension [46]. The third one is the HAS-BLED score that has been emerged and recommended to be used by the recent (ESC and Canadian) guidelines. It includes "hypertension, abnormal renal/liver function, stroke, bleeding history or predisposition, labile INR, elderly (e.g. age .65, frailty, etc.), drugs/alcohol concomitantly" [47]. It has been validated by several studies in different patient population [33] [47-49]. The difference between the HAS-BLED score from the ATRIA score is that it has a better predictive value, and includes factors that can be managed to reduce the risk of bleeding [50, 51]. It has been found to be well correlated with the risk of ICH [33]. For any given HAS-BLED score, it was found that the rate of major bleeding and ICH was similar between those patients on aspirin and those on warfarin [33]. The ESC guidelines recommend assessing the bleeding risk routinely for all patients with AF, this gives the clinician an objective assessment of the risk. The risk assessment should not be used merely to exclude patients from OAC, but assesse the risk to be able to balance the risk benefit ratio of anticoagulation decision in AF patients. Patients with a HAS-BLED score ≥3 should be treated with caution with regular checks when appropriate, moreover, all the potentially correctable risk factors should be managed: as uncontrolled hypertension, labile INR, use of non-steroidal anti-inflammatory drugs (NSAIDs) [6].

References

1. Fuster V, Ryden LE, Cannom DS, Crijns HJ, Curtis AB, et al. "ACC/AHA/ESC 2006 Guidelines for the Management of Patients with Atrial Fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Revise the 2001 Guidelines for the Management of Patients With Atrial Fibrillation): developed in collaboration with the European Heart Rhythm Association and the Heart Rhythm Society". Circulation **114**(2006): 257-354.
2. Lip GY, Lim HS. "Atrial fibrillation and stroke prevention". Lancet Neurol **6**(2007): 981-93.
3. Wolf PA, Abbott RD, WB. Kannel. "Atrial fibrillation as an independent risk factor for stroke: the Framingham Study". Stroke **22**(1991): 983-988.
4. Wang G, Tong X and George MG. "Atrial Fibrillation Associated Costs for Stroke Hospitalizations of Medicare Beneficiaries in the Stroke Belt of the United States". J Atr Fibrillation 5(2013):7-11.
5. Patel M.R, Mahaffey KW, Garg J, Pan G, Singer DE, et al. " Rivaroxaban versus warfarin in nonvalvular atrial fibrillation". N Engl J Med **365**(2011): 883-891.
6. Camm AJ, Lip GYH, Caterina RD, Savelieva I, Atar D, et al. "2012 focused update of the ESC Guidelines for the management of atrial fibrillation: an update of the 2010 ESC Guidelines for the management of atrial fibrillation". Developed with the special contribution of the European Heart Rhythm Association. Eur Heart J 33(2012):2719-2747.
7. Friberg L, Bergfeldt L. "Atrial fibrillation prevalence revisited". J Intern Med 2013 **274**:461-468.
8. Go AS, Hylek EM, Phillips KA, Chang Y, Henault LE, et al. " Prevalence of diagnosed atrial fibrillation in adults: national implications for rhythm management and stroke prevention: the AnTicoagulation and Risk Factors in Atrial Fibrillation (ATRIA) Study". JAMA 285(2001):2370-2375.
9. Sussman M, Menzin J, Lin I, Kwong WJ, Munsell M, et al. "Impact of atrial fibrillation on stroke-related healthcare costs". J Am Heart Assoc **2**(2013):000479.
10. Soliman EZ, Safford MM, Muntner P, Khodneva Y,et al. "Atrial Fibrillation and the Risk of Myocardial Infarction". JAMA Intern Med 174(2014): 107-114.
11. Savelieva I, Camm AJ. " Clinical relevance of silent atrial fibrillation: prevalence, prognosis, quality of life, and management". J Interv Card Electrophysiol **4**(2000):369-382.
12. Lin HJ. "Newly diagnosed atrial fibrillation and acute stroke. The Framingham Study". Stroke **26**(1995):1527-1530.
13. Page RL, Wilkinson WE, Clair WK, McCarthy EA, Pritchett EL. "Asymptomatic arrhythmias in patients with symptomatic paroxysmal atrial fibrillation and paroxysmal supraventricular tachycardia". Circulation, **89**(1994): 224-227.
14. Binici Z, Intzilakis T, Nielsen OW, Kober L, Sajadieh A, et al. "Excessive supraventricular ectopic activity and increased risk of atrial fibrillation and stroke". Circulation **121**(2010):1904-1911.
15. Healey JS, Connolly SJ, Gold MR, Israel CW, Gelder ICV, et al. "Subclinical atrial fibrillation and the risk of stroke". N Engl J Med **366**(2012):120-129.
16. Flaker GC, Belew K, Beckman K, Vidaillet H, Kron J, et al. " Asymptomatic atrial fibrillation: demographic features and prognostic information from the Atrial Fibrillation Follow-up Investigation of Rhythm Management (AFFIRM) study". Am Heart J 149(2005):657-663.
17. Hohnloser SH, Pajitnev D, Pogue J, Healey JS, Pfeffer MA, et al. "Incidence of stroke in paroxysmal versus sustained atrial fibrillation in patients taking oral anticoagulation or combined antiplatelet therapy: an ACTIVE W Substudy". J Am Coll Cardiol 50(2007): 2156-2161.
18. Capucci A, Santini M, Padeletti L, Gulizia M, Botto GL, et al. " Monitored atrial fibrillation duration predicts arterial embolic events in patients suffering from bradycardia and atrial fibrillation implanted with antitachycardia pacemakers". J Am Coll Cardiol **46**(2005):1913-1920.
19. Glotzer TV, Daoud EG,Wyse G, Singer DE, Ezekowitz MD, et al. "The relationship between daily atrial tachyarrhythmia burden from implantable device diagnostics and stroke risk: the TRENDS study". Circ Arrhythm Electrophysiol **2**(2009): 474-480.
20. Gage BF, Waterman AD, Shannon W, Boechler M, Rich MW, et al. " Validation of clinical classification schemes for predicting stroke: results from the National Registry of Atrial Fibrillation". JAMA **285**(2001): 2864-2870.
21. Welles CC, Whooley MA, Na B, Ganz P, Schiller NB,et al. " The CHADS2 score predicts ischemic stroke in the absence of atrial fibrillation among subjects with coronary heart disease: data from the Heart and Soul Study". Am Heart J **162**(2011):555-561.
22. Benjamin EJ, Levy D, Vaziri S M, D'Agostino R B,Belanger A J, et al. "Independent risk factors for atrial fibrillation in a population-based cohort. The Framingham Heart Study". JAMA **271**(1994): 840-844.

23. Kerr CR, Humphries K. " Gender-related differences in atrial fibrillation". J Am Coll Cardiol **46**(2005):1307-1308.

24. Karthikeyan G, Eikelboom JW. " The CHADS2 score for stroke risk stratification in atrial fibrillation--friend or foe? ".Thromb Haemost **104**(2010):45-48.

25. Nieuwlaat R, Capucci A, Lip GYH, Olsson SB, Prins MH, et al. "Antithrombotic treatment in real-life atrial fibrillation patients: a report from the Euro Heart Survey on Atrial Fibrillation". Eur Heart J **27** (2006):3018-3026.

26. Lip GYH, Nieuwlaat R, Pisters R, Lane DA, Crijns HJGM, et al. "Refining clinical risk stratification for predicting stroke and thromboembolism in atrial fibrillation using a novel risk factor-based approach: the euro heart survey on atrial fibrillation". Chest **137**(2010): 263-272.

27. "Independent predictors of stroke in patients with atrial fibrillation: a systematic review". Neurology **69**(2007): 546-554.

28. Banerjee A, Taillandier S, Olesen JS, Lane DA, Lallemand B, et al. "Ejection fraction and outcomes in patients with atrial fibrillation and heart failure: the Loire Valley Atrial Fibrillation Project". Eur J Heart Fail **14**(2012):295-301.

29. "Echocardiographic predictors of stroke in patients with atrial fibrillation: a prospective study of 1066 patients from 3 clinical trials". Arch Intern Med **158**(1998):1316-1320.

30. Shelton RJ, Clark AL, Kaye GC, Cleland JGF. "The atrial fibrillation paradox of heart failure". Congest Heart Fail **16**(2010): 3-9.

31. MD E. "Echocardiographic predictors of stroke in patients with atrial fibrillation: a prospective study of 1066 patients from 3 clinical trials". Arch Intern Med **158**(1998):1316-1320.

32. Aronow WS, Ahn C, Kronzon I, Gutstein H. "Risk factors for new thromboembolic stroke in patients > or = 62 years of age with chronic atrial fibrillation". Am J Cardiol **82**(1998):119-121.

33. Friberg L, Rosenqvist M,Lip GY. "Evaluation of risk stratification schemes for ischaemic stroke and bleeding in 182 678 patients with atrial fibrillation: the Swedish Atrial Fibrillation cohort study". Eur Heart J **33**(2012):1500-1510.

34. Van Staa TP, Setakis E, Di Tanna G L,Lane D A, Lip G Y H. "A comparison of risk stratification schemes for stroke in 79,884 atrial fibrillation patients in general practice". J Thromb Haemost **9**(2011):39-48.

35. Olesen JB, Lip GYH, Hansen ML, Hansen PR, Tolstrup JS,et al. "Validation of risk stratification schemes for predicting stroke and thromboembolism in patients with atrial fibrillation: nationwide cohort study". BMJ **342**(2011):124.

36. Olesen JB, Fauchier L, Lane DA, Taillandier S, Lip GYH,et al. "Risk factors for stroke and thromboembolism in relation to age among patients with atrial fibrillation: the Loire Valley Atrial Fibrillation Project". Chest 141(2012):147-153.

37. Evans W, Swann P. "Lone auricular fibrillation". Br Heart J **16**(1954):189-194.

38. Frost L. Lone atrial fibrillation: good, bad, or ugly? ". Circulation **115**(2007):3040-3041.

39. Friberg L, Benson L, Rosenqvist M, Lip GYH. "Assessment of female sex as a risk factor in atrial fibrillation in Sweden: nationwide retrospective cohort study". BMJ **344**(2012):3522.

40. Hart RG, Pearce LA,Aguilar MI. " Meta-analysis: antithrombotic therapy to prevent stroke in patients who have nonvalvular atrial fibrillation". Ann Intern Med **146**(2007):857-867.

41. Nieuwlaat R, Olsson SB, Lip GYH, Camm AH, Breithardt G,et al. "Guideline-adherent antithrombotic treatment is associated with improved outcomes compared with undertreatment in high-risk patients with atrial fibrillation. The Euro Heart Survey on Atrial Fibrillation". Am Heart J **153**(2007):1006-10012.

42. Mant J, Hobbs FDR, Fletcher K, Roalfe A, Fitzmaurice D,et al. " Warfarin versus aspirin for stroke prevention in an elderly community population with atrial fibrillation (the Birmingham Atrial Fibrillation Treatment of the Aged Study, BAFTA): a randomised controlled trial". Lancet **370**(2007): 493-503.

43. Hughes M, Lip GY. "Risk factors for anticoagulation-related bleeding complications in patients with atrial fibrillation: a systematic review". QJM **100**(2007): 599-607.

44. Palareti G, Cosmi B. "Bleeding with anticoagulation therapy - who is at risk, and how best to identify such patients". Thromb Haemost **102**(2009):268-278.

45. Gage BF,Yan Y, Milligan PE, Waterman AD, Culverhouse R, et al. "Clinical classification schemes for predicting hemorrhage: results from the National Registry of Atrial Fibrillation (NRAF) ". Am Heart J **151**(2006): 713-719.

46. Fang MC, Go AS,Chang Y, Borowsky LH, Pomernacki NK, et al. "A new risk scheme to predict warfarin-associated hemorrhage: The ATRIA (Anticoagulation and Risk Factors in Atrial Fibrillation) Study". J Am Coll Cardiol **58**(2011):395-401.

47. Pisters R, Lane DA, Nieuwlaat R, de Vos CB, Crijns HJGM, et al. "A novel user-friendly score (HAS-BLED) to assess 1-year risk of major bleeding in patients with atrial fibrillation: the Euro Heart Survey". Chest **138**(2010):1093-1100.

48. Lip GY, Frison L, Halperin JL, Lane DA. "Comparative validation of a novel risk score for predicting bleeding risk in anticoagulated patients with atrial fibrillation: the HAS-BLED (Hypertension, Abnormal Renal/Liver Function, Stroke, Bleeding History or Predisposition, Labile INR, Elderly, Drugs/Alcohol Concomitantly) score". J Am Coll Cardiol **57**(2011):173-180.

49. Olesen JB, Lip GYH, Hansen P R, Lindhardsen J,Ahlehoff O, et al. "Bleeding risk in 'real world' patients with atrial fibrillation: comparison of two established bleeding prediction schemes in a nationwide cohort". J Thromb Haemost **9**(2011):1460-1467.

50. Apostolakis S, Lane DA, Guo Y, Buller H, Lip GYH. "Performance of the HEMORR(2)HAGES, ATRIA, and HAS-BLED bleeding risk-prediction scores in patients with atrial fibrillation undergoing anticoagulation: the AMADEUS (evaluating the use of SR34006 compared to warfarin or acenocoumarol in patients with atrial fibrillation) study". J Am Coll Cardiol **60** (2012):861-867.

51. Roldan V,Martin F, Fernandez H, Manzano-Fernandez S, Gallego P, et al. " Predictive value of the HAS-BLED and ATRIA bleeding scores for the risk of serious bleeding in a "real-world" population with atrial fibrillation receiving anticoagulant therapy". Chest **143**(2013):179-184.

Citation: Hussein M Ismail, Hassan A. Shora, Hussein A Yamany. "Atrial Fibrillation: Stroke and bleeding Risk Assessment." J Clin Case Stud (2021): 0010 doi: 10.47755/2766-9556.100110