Original Article

Study on outcome of ischemic stroke patient with atrial fibrillation

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Abstract

Background: *Atrial fibrillation (AF) is a common arrhythmia and a major risk factor for ischemic stroke, especially in the elderly patients. Patients with non-valvular AF have a 5-fold excess risk of stroke recurrence and case-fatality rate.* ***Objectives:*** *This study was to evaluate the prevalence of AF and its influence on prognosis in patients with ischemic stroke.* ***Materials & Methods:*** *Total 125 patients with ischaemic stroke were enrolled in this study. Initially they were divided into two groups by ECG - those with AF and those without AF. They were followed up after one month, three months and six months. Comparison was done between the two groups in term of recurrence, mortality and clinical improvement which were assessed by Modified Rankin Score (MRS).* ***Results:*** *Among 125 patients, 22 patients had AF. Those with AF were more frequently male, aged more than 45 years. Recurrence was significantly higher in AF group during one month follow up ($p<0.05$). The presence of AF was associated with higher mortality in 3 months ($p<0.05$) and 6 months ($p<0.05$) follow up. At 3 months follow up clinical deterioration was noted in 9.1% patient with AF compared to 2.9% patients without AF ($p<0.01$) and at 6 months follow up clinical deterioration was noted in 18.2% patient with AF compared to 4.9% patients without AF ($p<0.01$).* ***Conclusion:*** *Patients who had an ischemic stroke with accompanying AF had higher mortality, graver stroke severity, more recurrences and poorer functional status than those without AF.*

Key words: *Atrial fibrillation, Ischemic stroke, Modified rankin score.*

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Introduction

Stroke is the third commonest cause of mortality[1] and fourth leading cause of disease burden worldwide.[2] World Health Organization (WHO) defines acute stroke as rapidly developing clinical signs of focal (or global) disturbances of cerebral function, with symptoms lasting 24 hours or longer or leading to death with no apparent cause other than of vascular origin.[3,4] Stroke makes an important contribution to morbidity, mortality, and disability in developed as well as developing countries. It leaves the patients with residual disabilities like physical dependence, cognitive decline, depression, and seizures. Stroke is of two main types - ischemic and hemorrhagic.[5] A number of factors that may be classified as modifiable and non-modifiable increase the risk for ischemic stroke. Non-modifiable risk factors for stroke include older age, male gender, ethnicity, family history and prior history of stroke.

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Presumed modifiable lifestyle risk factors of ischemic stroke include cigarette consumption and illicit drug use. Non-lifestyle risk factors include arterial hypertension, diabetes mellitus, heart disease, dyslipidemia, asymptomatic carotid artery disease and low socioeconomic status.[6]

Atrial fibrillation, the most common sustained cardiac arrhythmia in the general population, affects about 1% of adults, is the most common cause for cardio embolic stroke and is a risk factor for future cerebrovascular diseases. Common causes of atrial fibrillation are coronary artery disease, valvular heart disease, hypertension, sinoatrial disease, hyperthyroidism, alcohol, cardiomyopathy, congenital heart disease, chest infection, pulmonary embolism, pericardial disease, idiopathic.[7] Patients with rheumatic atrial fibrillation have a 17-fold increase in stroke incidence.[6] Some studies showed that stroke patients with AF have been shown to have a poorer neurological outcome than stroke patients without AF. But we have very limited studies done in this field in our country perspective. So the objective of this study was to evaluate the prevalence of atrial fibrillation and its influence on prognosis in patients with a first-ever ischaemic stroke.

Materials and Methods

This was a prospective cross sectional study carried out among the patients with ischemic stroke admitted into Neuromedicine and Medicine Units of Rajshahi Medical College Hospital between the periods of January 2013 to December 2014. Total 125 patients were enrolled in the study that fulfilled both the inclusion and exclusion criteria. Initially they were assessed by Modified Rankin Score (MRS). ECG was done to find out presence of atrial fibrillation. Then they were followed up after one month, three month and six month interval. Outcome was recorded with the help of MRS. Data was collected by face to face interview, physical examination and investigations in a predesigned data collection sheet. Conditions of few patients were assessed over telephone. Their attendants were informed of Modified Rankin Score during admission so that they could help in the assessment of clinical condition of their patients. Data were collected after taking informed consent of the patient.

Results

Table I: Comparison of baseline characteristics of ischemic stroke patients with atrial fibrillation and those without atrial fibrillation (n=125)

Baseline characteristics		Ischemic stroke patient with atrial fibrillation (n= 22)	Patient without atrial fibrillation (n= 103)
Age	>45 years	18 (81.8%)	8 (7.8%)
	<45 years	4 (18.2%)	95 (92.2%)
Sex	Male	12 (54.5%)	63 (61.2%)
	Female	10 (45.5%)	40 (38.8%)
DM	Present	1 (4.5%)	16 (15.5%)
	Absent	21 (95.5%)	87 (84.5%)
Hypertension	Present	6 (27.3%)	39 (37.9%)
	Absent	16 (72.7%)	64 (62.1%)
Smoking	Present	5 (22.7%)	35 (34.0%)
	Absent	17 (77.3%)	68 (66.0%)
Chronic kidney disease (CKD)	Present	2 (9.1%)	8 (7.8%)
	Absent	20 (90.9%)	95 (92.2%)
Cardiac disease	Present	3 (13.6%)	2 (1.9%)
	Absent	19 (86.4%)	101 (98.1%)
Dyslipidaemias	Present	3 (13.6%)	16 (15.5%)
	Absent	19 (86.4%)	87 (84.5%)

Table I shows that 18 (81.8%) patients with atrial fibrillation were more than 45 years old. On the other hand patients without atrial fibrillation 95 (92.2%) were younger than 45 years. Among the patients with atrial fibrillation 12 (54.4%) were male i.e. there were slight male dominance. In the atrial fibrillation group 1 (4.5%) had Diabetes, 6 (27.3%) had hypertension, 5 (22.7%) were smoker, 2 (9.1%) had CKD, 3 (13.6%) had cardiac disease and 3 (13.6%) had dyslipidemias.

Table II: Comparison of clinical status (Modified Rankin Score) during admission between ischemic stroke patients with atrial fibrillation and those without atrial fibrillation

Clinical status (Modified Rankin Score)	Ischemic stroke patient with Atrial Fibrillation (n=22)	Ischemic stroke patient without Atrial Fibrillation (n=103)
Modified Rankin Score 0 (no symptom)	0 (0%)	0 (0%)
Modified Rankin Score 1 (no significant disability except symptoms)	0 (0%)	0 (0%)
Modified Rankin Score 2 (slight disability)	5 (22.7%)	6 (5.8%)
Modified Rankin Score 3 (moderate disability)	3 (13.6%)	16 (15.5%)
Modified Rankin Score 4 (moderately severe disability)	2 (9.1%)	28 (27.2%)
Modified Rankin Score 5 (severe disability)	12 (54.5%)	53 (51.5%)
Modified Rankin Score 6 (death)	0 (0%)	0 (0%)

Table II shows that severe disabilities were present more in patients who had atrial fibrillation (54.5% versus 51.5%). P value is <0.05 (2 =8.434, df = 3, p<0.05). So it is statistically significant.

Table III: Comparison of clinical improvement (Modified Rankin Score) between ischemic stroke patients with atrial fibrillation and those without atrial fibrillation

Improvement		Ischemic stroke patients with atrial fibrillation (n=22)	Ischemic stroke patients without atrial	t (P)
After 1 month	Improved	10 (45.5%)	65 (63.1%)	1.559 (>0.05)
	Static	12 (54.5%)	37 (35.9%)	
	Deteriorated	0 (0%)	1 (1.0%)	
After 3 month	Improved	16 (72.7%)	97 (94.2%)	3.039 (<0.01)
	Static	4 (18.2%)	3 (2.9%)	
	Deteriorated	2 (9.1%)	3 (2.9%)	
After 6 month	Improved	18 (81.8)	96 (93.2%)	2.847 (<0.01)
	Static	0 (0%)	2 (1.9%)	
	Deteriorated	4 (18.2%)	5 (4.9%)	

Table III shows that after one month 10 (45.5%) patients improved, 12 (54.5%) were static and no patient deteriorated clinically in atrial fibrillation group. On the other hand 65 (63.1%) patients improved, 37 (35.9%) patients remained static and 1 (0.88%) patient deteriorated in non-atrial fibrillation group. P value ($t = 1.559$, $df = 123$, $p > 0.05$). It is statistically insignificant.

After three month 16 (72.7%) patients improved, 4 (18.2%) were static and 2 (9.1%) patient deteriorated clinically in atrial fibrillation group. On the other hand 97 (94.2%) patients improved, 3 (2.9%) patients remained static and 3 (2.9%) patients deteriorated in non-atrial fibrillation group. P value ($t = 3.039$, $df = 123$, $p < 0.01$). It is statistically significant.

After six month 18 (18.8%) patients improved, no patient was static and 4 (18.2%) patients deteriorated clinically in atrial fibrillation group. On the other hand 96 (93.2%) patients improved, 2 (1.9%) patients remained static and 5 (4.9%) patients deteriorated in non-atrial fibrillation group. P value ($t = 2.847$, $df = 123$, $p < 0.01$). It is statistically significant.

Table IV: Comparison of recurrence of ischemic stroke between patients with atrial fibrillation and those without atrial fibrillation

	Ischemic stroke patient with atrial fibrillation (n=22)	Ischemic stroke patient without atrial fibrillation (n=103)	X^2 (p)
Recurrence at 1 month	4 (18.2%)	2 (1.9%)	0.009 (<0.05)
Recurrence at 3 month	1 (4.5%)	3 (2.9%)	0.544 (>0.05)
Recurrence at 6 month	0 (0%)	3 (2.9%)	0.557 (>0.05)

Table IV shows that recurrence of stroke occurred in 4 (18.2%) patients out of 22 patients with atrial fibrillation and in 2 (1,9%) patients out of 103 patients without atrial fibrillation at one month follow up. $P < 0.05$ reached from chi square test, so the test was statistically significant.

At three month follow up recurrence of stroke occurred in 1 (4.5%) patients out of 22 patients with atrial fibrillation and in 3 (2.9%) patients out of 103 patients without atrial fibrillation at 3 months follow up. $P > 0.05$ reached from chi square test. So the test was statistically insignificant.

At six month follow up recurrence of stroke did not occur in patients with atrial fibrillation but 3 (2.9%) patients out of 103 patients without atrial fibrillation had. $P > 0.05$, reached from chi square test. So the test was statistically insignificant.

Table V: Comparison of mortality between ischemic stroke patients with atrial fibrillation and those without atrial fibrillation

Death	Ischemic stroke patient with Atrial Fibrillation (n=22)	Ischemic stroke patient without Atrial Fibrillation (n=103)	§ ^{2} (P)
After 1 month	1 (4.5%)	1 (1.0%)	1.471 (>0.05)
After 3 month	3 (13.6%)	3 (2.9%)	4.562 (<0.05)
After 6 month	5 (22.7%)	5 (4.9%)	7.868 (<0.05)

Table V shows that after one month 1 patient died in each group. P value ($X^2 = 1.471$, $df = 1$, $p > 0.05$). It is statistically insignificant.

After three month 3 patients died in each group. P value ($X^2 = 4.562$, $df = 1$, $p < 0.05$). It is statistically significant. After six month 5 patients died in each group. P value ($X^2 = 7.868$, $df = 1$, $p < 0.05$). It is statistically significant.

Discussion

During the study period, we identified that among 125 patients with a first-ever ischemic stroke atrial fibrillation were present in 22 patients by ECG evaluation on admission. Mean age at stroke onset was 61 years SD 14 years (62.71 years in men and 58.26 years in women). So male patients had an older age in our study which are mostly similar with previous studies done by Lin et al.[8], Cogen et al.[9] but mean age at stroke onset deferred from other studies such as the study done by Steger et al.[10], Lopes et al.[11] and Thygesen et al.[12] who had higher mean age. In our study there was male predominance in atrial fibrillation group.

Similar male predominance was found by Kimura et al.[13] by analyzing patients with acute ischemic stroke (15831) who were registered in the Japan Multicenter Stroke Investigators' Collaboration registry and in a study done in our country by Elyas et al.[14]. On the other hand female predominance was found by Steger et al.[10], Lopes et al.[11], Thygesen et al.[12], Cogen et al.[9] and Gogu et al.[15]

In this study Diabetes mellitus was present in 4.5% of patients in atrial fibrillation group. It is 14.6% in the study by Thygesen et al.[12], 15.9% in the study by Cogen et al.[9], 25.5% by Saposnik et al.[15], 16.9% by Kimura et al.[13] So most of the study had higher incidence of diabetes. In this study Hypertension was present in 27.3% of patients in atrial fibrillation group. In the study by Cogen et al.[8] it was 65.2%. It was 68.1% in the study by Saposnik et al.[15], 54.1% in the study by Thygesen et al.[12], 48.7% by Kimura et al.[13] So most of the study had higher incidence of hypertension.

In this study 22.7% of patients were smoker in atrial fibrillation group. In the study by Cogen et al.[8] 7.2% were smoker, in the study by Kimura et al.[12] 10.2% were smoker and in the study by Thygesen et al.[12] 20.5% were smoker. So most other studies had lower incidences of smoking. About 9% patients had chronic kidney diseases in atrial fibrillation group in our study and Cardiac disease was present in 13.6% of patients in atrial fibrillation group. In our study dyslipidemia was present in 13.6% of atrial fibrillation group when comparing with previous study done by Thygesen et al.[12] who had 32.5% patients having dyslipidemia in atrial fibrillation group. In the study by Cogen et al.[9] they mentioned rate of dyslipidaemia in atrial fibrillation to be 18.8%. Dyslipidaemia was 9.5% in the study by Kimura et al.[13] So, most of these studies had higher rate of dyslipidemia.

In this study MRS score analysis showed that there was significant clinical deterioration in atrial fibrillation group ($t = 2.847$, $df = 123$, $p<0.01$). In this study overall recurrence rate was higher in atrial fibrillation group in comparison to non-atrial fibrillation group (22.7% versus 7.8%, $p<0.05$). Similar outcome was found in the study by Marini et al.[16] (6.6% versus 4.4%, $p = 0.046$), Lip and Beevers[17] (23% versus 34%, $p<0.001$) although they studied patients for 1 year. Recurrence was significant at one month follow up but not at 3 months and six months follow up.

Clinical improvement was not significant within one month but significant deterioration was noted in atrial fibrillation group after six months (18.2% VS 4.9%). One month mortality was not significant in atrial fibrillation group when compared with non-atrial fibrillation group (4.5% versus 1.0%, $p>0.05$) but after 3 months follow up there was significant case fatality in patients with atrial fibrillation (13.6% versus 2.9%, $p<0.05$) and after 6 months follow up it was also significant (22.7% versus 4.9%, $p<0.05$). Similar high mortality was noticed in AF group by different studies done by Saposnik et al.[15], Lin et al.[8], Gattellari M et al.[18], Kimura et al.[13] when compared with non-atrial fibrillation.

So in our study we found mortality, clinical outcome and recurrence was significantly worse in ischemic stroke patients with atrial fibrillation in comparison to those without atrial fibrillation. Recurrence was more significant at one month follow up. Although there were some dissimilarities, findings of our study are mostly similar with previous studies. From our findings we conclude that stroke in AF patients is associated with a poor clinical improvement, an increased rate recurrence, graver stroke severity, and high mortality and neurological complications than in patients without AF. These findings stress the importance of primary and secondary prophylaxis of stroke or embolism as soon as AF is diagnosed. Whenever atrial fibrillation is found in any ischemic stroke patients they should be extensively investigated and followed up in the short term and long term.

Conclusion

From our findings we conclude that stroke in AF patients is associated with a poor clinical improvement, an increased rate recurrence, graver stroke severity, and high mortality and neurological complications than in patients without AF. These findings stress the importance of primary and secondary prophylaxis of stroke or embolism as soon as AF is diagnosed. Whenever atrial fibrillation is found in any ischemic stroke patients they should be extensively investigated and followed up in the short term and long term.

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