Estimated prevalence of silent atrial fibrillation in acute ischemic stroke patients

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Abstract

Background: Atrial fibrillation (AF) affects over 34 million people globally and is linked to a five-fold increase in the risk of ischemic disease, which is the primary cause of mortality and long-term disability. Aim: identify silent AF prevailing in acute ischemical stroke. Methods: The present research was conducted on (100) ischemic stroke patients. All patients were subjected to complete clinical examination, ECG and CT brain. In 56% of patients, the normal sinus rhythm and 44%, AF were previously diagnosed with 12%, while 26% were newly diagnosed (undiagnosed AF). Results: Average stroke age was 64.19 ± 12.26 with an incidence almost equal between males and females. The heart rate was within the normal range of 89% of the patients and only 11% experienced tachycardia. The bulk of patients (96%) show normal Echo values whereas just 4% show congestion. All patients (9% in ISU versus 91% in ward) were admitted to hospital, 96% of them remained alive and just 4% perished. Roughly 18% of strokes had ECG-assessed AF at presentation and approximately 44% had an earlier AF history. Conclusion: identification of AF is extremely essential in patients with unknown origin after a stroke, especially since the presence or absence of AF is of considerable clinical significance, particularly with respect to the use of oral anticoagulation and possible future episodes of persistent AF.

Key words: Silent, Atrial, Fibrillation, Ischemic, Stroke.

1. Introduction

Atrial fibrillation (AF) affects about 34 million people globally and involves five-fold higher risk of ischemic stroke, a major cause of mortality and long-term incapacity. AF-caused strokes are categorised as cardioembolic, with atrial fibrillation encouraging the development of blood clots inside the heart that may distally embolize the brain[1].

The percentage of AF-based strokes rose with age because this arrhythmia is more common with age in the general population with the main form of nonvalvular atrial fibrillation. Atrial fibrillation is the most frequent substrate for cerebral embolism in elderly individuals and represents one half to two thirds of cardiac emboli [2].

Atrial fibrilation is defined as paroxysmal AF, episodes which are autonomous and less than 1 week, episodes lasting more than 7 days are referred to as persistent and chronic AF refers to AF without intercourse of the sinus [3].

Atrial fibrillation should be undetectable on admission in a single electrocardiogram (ECG). Sustained atrial flooding, sick syndrome of the sinus, left atrial thrombus, left atrial myxoma, mitral stenosis, prohetic valve, infectious endocarditis, recent anterior myocardial infarction and dilated heart myopathy [4] are all high-risk situations for cerebral embolization.

Cardiembolic strokes are symptomatic suddenly occurring, maximum from the outset and linked to high morbidity and death. The participation of numerous cerebral vascular regions is indicative of cardiac embolism. The probability of early hemorrhagic transition in cardiac embolism is approximately double that of other stroke subtypes[5].

This research is aimed at assessing the incidence of silent atrial fibrillation in ischemic acute stroke patients

2. Patients and methods

This is cross-sectional study will be carried out on (100) patients arrived to benha university hospital with clinical presentation and radiological investigations of ischemic stroke. Our planned time will be one year from October 2020 to October 2021.

2.1. Inclusion criteria
- Patient with ischemic stroke.
- Patients aged more than 16 – years old.
- Both genders.

2.2. Exclusion criteria
- Patient aged less than 16 – years old.
- Patients refuse to be included in the study.

2.3. All patients were subjected to resuscitation, full history taking, complete clinincal examination, and investigations as:

Electrocardiogram (ECG): We analyzed the first ECG made at the moment of admission and another one later during hospitalization.

Computer Tomography (CT): At the moment of admission has the possibility to show the location of lesions, size or unspecific images like diffuse cerebral edema.

Other tests:
- Chest – X – Ray.
- Echocardiography.

2.4. Statistical analysis

IBM's SPSS statistics (Statistical Package for the Social Sciences) for windows (version 25, 2017) was used for statistical analysis of the collected data.

Shapiro-Wilk test was used to check the normality of the data distribution. All tests were conducted with 95% confidence interval. P (probability) value < 0.05 was considered statistically significant. Charts were generated using SPSS' chart builder and Microsoft Excel for windows 2019. Descriptive: Quantitative variables were expressed as mean and standard deviation, median, inter-quartile range, minimum and maximum as appropriate while categorical variables were expressed as frequency and percentage. Categorical Group differences: Fisher exact and Chi square tests were used for inter-group comparison of nominal data using the crosstabs function. Correlations: Bivariate Correlations were assessed using Pearson's or Spearman's correlation coefficient depending on the nature of data. Risk assessment: Association between AF and mortality in the current study was assessed using odds ratio.

3. Results

The demographic data of the patients were illustrated in which the mean values of age was 64.19 ± 12.26 (Median 63.50). As regard gender, 58% of cases were male and 42% are females as seen in table (1).
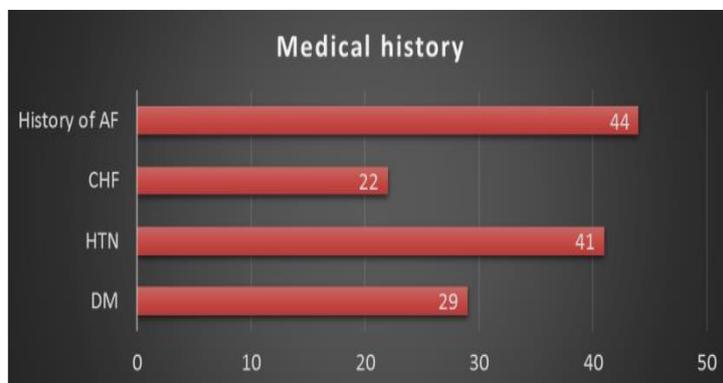
The medical history of the studied subjects were demonstrate in which the percentages of DM, HTN, CHF and history of AF were 29%, 41%, 22% and 44% respectively as seen in fig. (1).

The Systolic, diastolic blood pressures and respiratory rate of the participants were demonstrated in which the mean values of SBP was 127.20 ± 15.832, for DBP was 81.70 ± 8.768 and for RR was 16.18 ± 3.089 as seen in table (2)

The Glasgow coma scale (GCS) of the studied patients evaluates the majority of cases were fully conscious (GCS= 15) representing about (88%). The remaining 12% were disturbed with score ranging from 6 to 14 by GCS. The cardiac examination parameters (Pulse, ECG, Echo) of the studied patients evaluate that 89% of the studied patients had normal pulse, while 11% of which had tachycardia. 82% of the studied cases had normal sinus rhythm while 18% of which complaining of AF. As regards Echo, 96% had normal Echo parameters and 4% only revealed abnormal as seen in table (3)

Table (1) Patients' demographic characteristics

		All patients (n= 100)				
		Mean ± SD	Median	Minimum	Maximum	IQR
Age		64.19 ± 12.26	63.50	35	94	56, 74
Gender	**Male**			58% (58)		
	Female			42% (42)		

Fig (1) Medical history of the studied subjects.

Table (2) Systolic, diastolic blood pressure and respiratory rate of the participants

	All patients (n= 100)				
	Mean ± SD	Median	Minimum	Maximum	IQR
SBP	127.20 ± 15.832	120.00	100	160	120.00, 140.00
DBP	81.70 ± 8.768	80.00	60	110	80.00, 90.00
RR	16.18 ± 3.089	16.00	10	22	14.00, 18.00
Data is expressed as mean and standard deviation, median, Minimum, Maximum and Inter-quartile range.					

The studied patients:

The radiological investigation of the studied patients reveals that, 77% of cases had ischemic changes, while the remaining 23% of cases had normal CT brain. As regard chest x-ray, about 73% of cases had normal chest x-ray, while the remaining 27% of cases had abnormal ECG findings (such as dilated cardiomyopathy, weak ejection fraction) as seen in fig. (2).

Table (4) shows the length of the hospital stay in the current study according to the size of infarction of ischemia in which mean length of hospital stay were 5.13 ± 1.08, 15.03 ± 3.84, 3.26 ± 0.73 and 7.56 ± 1.67 for cases with No AF, MCA infarction, Lacunar infarction and Lobar infarction respectively.

All participated patients were admitted in hospital, 91% of which were admitted in ward and 9% only were admitted in ICU. As regards outcomes, 4% were died while 96% of cases were still alive as seen in table (5)

As regard History, the majority of stroke cases had normal sinus rhythm (82%), while the remaining 18% had AF. On the other hand, by ECG, about 56% of cases only had normal sinus rhythm while the remaining 44% had AF from which 18 % were previously diagnosed and 26% are diagnosed for the first time (i. e first diagnosed AF) with highly statistically significant difference among both groups **(P= < 0.001)** as seen in table (6).

In cases with history of AF, odds ratio (OR) was 0.411 while in cases with AF in ECG the OR was 1.549 as seen in table (7).

Table (3) Cardiac examination of

		All patients (n= 100)	
		Frequency	**Percentage**
Pulse	**Normal**	89	89%
	Tachycardia	11	11%
ECG	**Sinus**	82	82%
	AF	18	18%
Echo	**Normal**	96	96%
	Abnormal	4	4%
Data is expressed as percentage and frequency.			
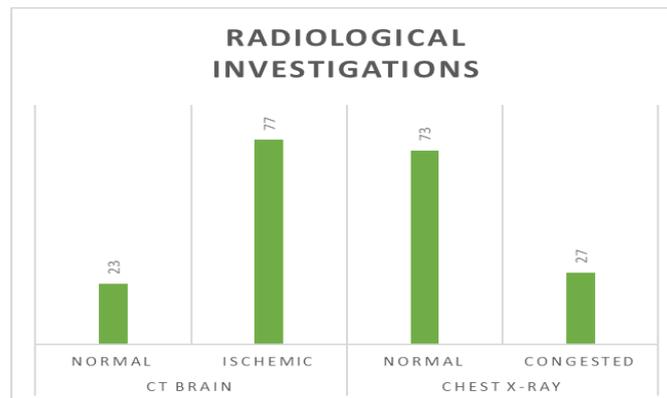
Fig. (2) Radiological investigations of the studied patients.

Table (4) Length of the hospital stay in the current study

Length of the hospital stay (days)	
No AF	5.13 ± 1.08
MCA infarction	15.03 ± 3.84
Lacunar infarction	3.26 ± 0.73
Lobar infarction	7.56 ± 1.67
Data is expressed as mean and standard deviation	

Table (5) Admission and prognosis of the participants

		All patients (n= 100)	
		Frequency	**Percentage**
Admission	**Ward**	91	91%
	ICU	9	9%
Outcome	**Alive**	96	96%
	Died	4	4%
Data is expressed as percentage and frequency.			

Table (6) Relation between patients with AF history and AF on ECG at admission

| | | History | | P |
		Sinus (n= 82)	AF (n= 18)	
ECG	Sinus (n= 56)	56	0	
	AF (n= 18)	0	18	< 0.001
	First diagnosed AF (n= 26)	26	0	

Data is expressed as percentage and frequency.

Table (7) Association between AF and mortality in the current study

| | Mortality | |
	Odds Ratio	95% CI
History of AF	0.411	0.041, 4.09
AF in ECG	1.549	0.152, 15.81

4. Discussion

The present research showed that 91 patients were admitted to the office, whereas only 9% needed ICU. In addition, patients' results showed that 96 percent of cases remained alive and just 4 percent perished.

This is not in accordance with Mollah et al. [6], which showed that 50% had recovered partly and 35% had recovered well and that 7 (6,6%) had died. Furthermore, they showed that the average hospital stay time was 5.25 +/- 2.19 days.

In addition, Mansour et al [7] showed 25 (19.7 percent) patients who died in hospital and 75 (56.7 percent) who had three months of poor result. In conjunction with this, Essa et al.[8] found a 25% mortality rate in stroke.

The changes in results are attributable to related comorbidities and other risk factors, including diabetes mellitus, HTN, smoking and older ages that interfere with results.

The present research showed that the incidence of atrial fibrillation in stroke patients was significantly correlated (P=0.3). About 82% had normal sinus rhythm upon admittance, while only 18% developed AF (by history). On the contrary, ECG showed that 44% of patients had AF, which implies approximately 26% of cases with no history of AF were first identified (i.e. about 26 percent undiagnosed AF).

In accordance with Hannon et al.[9], the current research indicated that a significant population incidence of AF-associated stroke was observed. They coupled rigorous overlapping case-sensing with thorough clinical definition of individual patients, providing a complete picture of the AF-related stroke in a broad section of Irish population (almost seven percent). It is essential to include community-treated patients and very older people who are at risk from AF-related disease and are frequently omitted from hospital and clinical trial registers to prevent bias in such research.

While Cheng-Yang et al. [10] showed that only 14% of stroke cases were considered to pose a high risk of undetected AF based on the CHASE-LESS score and recommended that long term ECG surveillance should be reserved for those with high CHASE-LESS and a high Holter score of 24 hours.

This shift in results may be explained by a lack of follow-up and poor socio-economic level of Egyptian patients seeking medical care recently, as well as a lack of medical understanding and professional guidance for frequent use.

Thus, the diagnosis of AF in patients with ischemic stroke alters the approach of prevention of the stroke since oral anticoagulation under such conditions is preferable to antiplatelet therapy[11].

The present research has shown that in 18 (18 percent) out of 100 ischemic stroke patients the existence of AF at stroke start and throughout the acute phase has been verified by a conventional ECG.

Accordingly, Marini et al.[12] demonstrated an increased incidence of AF in individuals with ischemic stroke. The existence of AF was verified using a conventional ECG in 869 (24.6 percent) of 3530 ischemically-impaired individuals during the acute period. In patients without arythmia, women with AF were more common, aged 80 and older, with coronary artery disease and peripheral artery disease.

5. Conclusion

ECG and echocardiographic examination are mostly suggested for studying problems related with AF in stroke patients. Undiagnosed AF in stroke patients with other research that highlight other risk factors such as involvement of heredity, sensitivity to family, dyslipidemia, smoking, etc. Further investigations are required to confirm or rule out the relationship between the stroke and AF, since AF is prevalent in older people who are typically at risk for other stroke types until a certain date has not been established. The occurrence of AF in a stroke patient thus does not necessarily imply a causative connection.

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