Role of Left Atrial Volume in Prediction of Atrial Fibrillation in Cryptogenic Ischaemic Stroke Patients

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Background

Atrial fibrillation (AF) is one of the major causes of stroke. Unfortunately, AF can be paroxysmal and as such can be difficult to detect even with prolonged cardiac monitoring. About 25% of all the strokes are thought to be AF related, and a similar numbers are cryptogenic. A large proportion of these cryptogenic strokes could be secondary to undiagnosed paroxysmal AF not detected on 24 hour Holter monitor. Studies like CRYSTAL AF[1] and EMBRACE AF[2] proved that prolonged cardiac monitoring in cryptogenic stroke patients identified up to 13% more patients of AF. However, recent evidence[3] suggests that treating all cryptogenic stroke patients empirically can be harmful and suggested that there may be other aetiologies (e.g. atheromatous plaques in locations other than carotid arteries) contributing to stroke. Hence, surrogate markers to predict AF are required to separate AF related cryptogenic strokes from cryptogenic strokes of alternate aetiologies to ensure that costly investigations are targeted to those at greatest risk of AF. Previous work has suggested that AF associated stroke has an association with an enlarged left atrium (as measured by left atrial volume indexed to body surface area, LAVi).

Methods

We conducted a retrospective audit of 95 patients admitted to the Stroke Unit at Fiona Stanley Hospital with radiologically confirmed acute ischemic stroke. We reviewed data for approximately 250 consecutive patients and 95 patients met entry criteria for the study. Data regarding demographics, risk factors, ECG, Holter monitor, echocardiogram, basic blood tests, carotid neck imaging and cranial imaging were available in most patients. Based on this information, strokes were divided into 4 groups: 1. Stroke due to small vessel disease (SVDS), 2. Stroke due to large vessel disease (LVDS), 3. Stroke due to AF (AFS) confirmed either on ECG or 24 hour Holter monitoring, and 4. Cryptogenic strokes / Embolic Stroke of undetermined source (ESUS). LAVi was calculated on all patients using same Biplane Method and using same formula (Canadian Society of Echocardiography). Normal Value for LAVi with this calculator is 34ml/m2 or less.

Results:

We entered 95 patients into our study. Mean age was 68 years, 43.2 percent were female. Atrial fibrillation and cryptogenic strokes were the most frequent. Stroke due to AF patients were older and female sex was more common compared to the other 3 groups. Valvular heart disease, hypertension and renal impairment were more frequent in AF related stroke patients. Smoking and dyslipidemia were more common higher in LVDS.

Mean LAVi was significantly greater in AF related strokes (49.6 ml/m2) compared with large artery stroke (31.8 ml/m^2, p = 0.023) Mean LAVi was also larger in AF related strokes as compared to SVDS (37.9 ml/m2) but not statistically significant. Interestingly mean LAVi was significantly larger in AF related strokes as compared to cryptogenic strokes (33.6). (Table).

Discussion

Our study demonstrated that LAVi was the single most important predictor of cardioembolic stroke (CES). LAVi is considered a marker of increased left atrial pressure. A large left atrium is also associated with atrial fibrillation. Possible other causes for left atrial enlargement include valvular disease and diastolic dysfunction. As it is difficult to measure diastolic dysfunction during AF, we were unable to accurately assess the relationship in our cohort.

Conclusion

LAVi is significantly higher in patients with stroke due to AF. This may be a useful parameter to select patients with cryptogenic stroke to subject to long term monitoring. This result can also be used for future ESUS trials to select patients for empirical anticoagulation.

(A) Stroke Classification Based on Aetiology	(B) Stroke Classification Based on Aetiology	Mean Difference (A-B)	Sig.	95% Confidence Interval (LB)
AF related Strokes	Small Vessel Strokes	11.718	.138	-2.38
	Large artery Strokes	17.184	.025	1.60
	Cryptogenic Strokes	16.065	.005	3.77

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