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ASSESSMENT OF PRO-THROMBOTIC STATE IN PATIENTS WITH NONVALVULAR ATRIAL FIBRILLATION BY LEFT ATRIAL DEFORMATION ANALYSIS

Han Myint Oo, Kyaw Swar, Ni Ni Win

No (2) Military Hospital (700 Bedded) Aung Ban

INTRODUCTION

- In clinical practice, atrial fibrillation is the most common arrhythmia and major risk factor for thromboembolism and stroke.
- Transesophageal echocardiography (TEE) is the gold-standard for the assessment of pro-thrombotic risk (thrombi/SEC in LAA, LAA emptying velocity and LAA emptying fraction).
- Transthoracic echocardiogram with speckle tracking analysis given its non-invasiveness offers the advantage of being potentially used for serial assessments and evaluation of the patient devoid of the limitations, mainly tolerability, of TEE.

JUSTIFICATION

- In setting of TEE unavailable area, identification of the proportion of pro-thrombotic risk by using two-dimensional speckle tracking echocardiography in patients with nonvalvular AF and timely diagnosis of pro-trombotic state in those patients lead the way to receive proper treatment which include anticoagulation with resultant reduction of morbidity and mortality.

AIM

The aim of this study was assessment of pro-thrombotic state in patient with nonvalvular AF by left atrial deformation analysis using speckle tracking echocardiography.

OBJECTIVES

- To determine demographic and clinical characteristics of patients with nonvalvular AF
- To evaluate left atrial deformation (global PALS) by using 2-D TTE speckle tracking echocardiography in patients with nonvalvular AF
- To explore left atrial appendage Thrombus/SEC, LAA emptying velocity and LAA emptying fraction by using TEE in patients with nonvalvular AF
- To find out the correlation between left atrial deformation parameter (global PALS) by using speckle tracking echocardiography and pro-thrombotic state in patients with nonvalvular AF

MATERIALS AND METHODS

- Hospital- based cross-sectional analytical study
- No.1 DSGH (Yangon) and No.2 DSGH (Naypyitaw)
- From October 2019 to September 2021
- 78 Nonvalvular AF patients
- All patients underwent with transthoracic echocardiogram including speckle tracking echocardiogram and TEE

DATA COLLECTION TOOLS

- Analysis of clinical data and echocardiographic results of nonvalvular AF
- Correlated between left atrial deformation with left atrial appendage thrombus /SEC, LAA emptying velocity and LAA emptying fraction

WORKING DEFINATION

Left atrial deformation

Left atrial deformation defined as fractional change in length of a left atrium segment. It was expressed as global peak atrial longitudinal strain (global PALS).
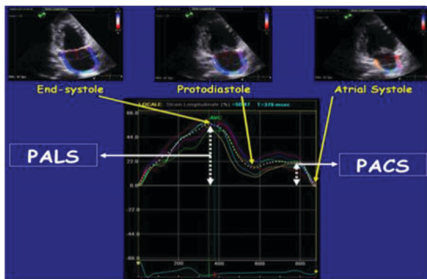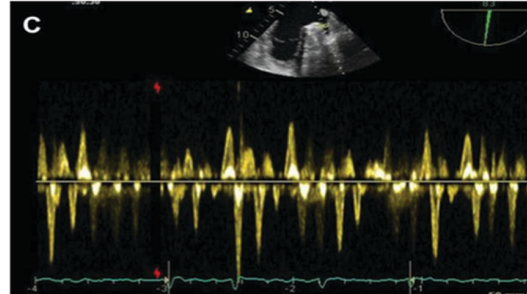

Spontaneous echo contrast (SEC)

The spontaneous echo contrast (SEC) was defined as dynamic, smoke-like echoes swirling slowly in a circular pattern within the LA or LAA cavity.
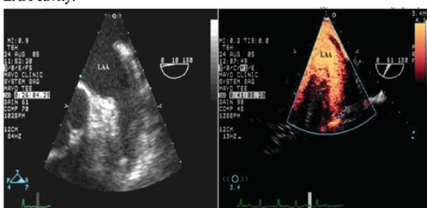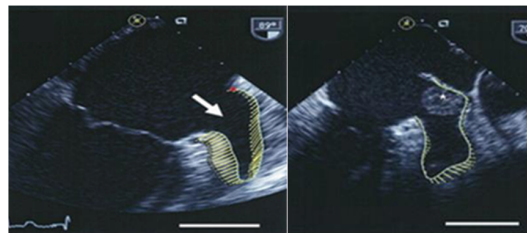

LAA emptying velocity

LAA flow velocity was assessed with a pulsed Doppler sample placed 1 cm from the entry of the LAA into the body of the LA.

LAA emptying fraction

LAA emptying fraction was assessed as (maximum volume-minimum volume)/maximum value x 100 during a cardiac cycle by using Simpson's method.

RESULTS

Table 1: Clinical characteristics of the patients with nonvalvular AF

Clinical characteristics	Mean ± SD
Age	62.8 ±7.9
Sex (Male/Female)	57/21
CHA2DS2-VASc	1.7±1.1

Table 2: Mean distribution of left atrial deformation by speckle tracking echocardiography in nonvalvular AF patients

Left atrial deformation parameters	Mean ± SD
global PALS	16.1 ±6.9%

Table 3: Distribution of pro-thrombotic parameters by TEE in patients with nonvalvular AF

TEE Parameter		Number	Percent
With thrombus/SEC	Yes	29	37.2
	No	49	62.8
	Total	78	100
LAA emptying velocity ≤20 (cm/s)	Yes	32	41.0
	No	46	59.0
	Total	78	100
LAA emptying fraction ≤20 %	Yes	26	33.3
	No	52	66.7
	Total	78	100

Table 4: Association between left atrial deformation parameters and LAA thrombus/SEC in patients with nonvalvular AF

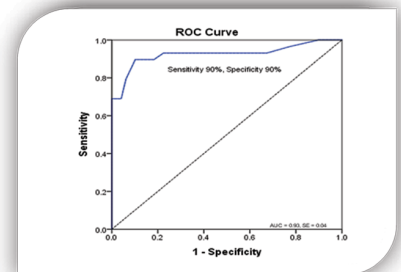| Left atrial deformation parameters	LAA thrombus/SEC	Number	Mean ± SD	P value
global PALS	Present	29	9.8±4.5	<0.001
	Absent	49	19.9±5.2	

Figure (1) ROC Curve for left atrial deformation parameter in assessment prothrombotic state in patients with nonvalvular AF

In view of ROC curve analysis, global PALS was significant predictor of LAA thrombus/SEC. Optimal cut-off value of global PALS predicting LAA thrombus/SEC was 12.5% in this study (sensitivity 90% and specificity 90%).
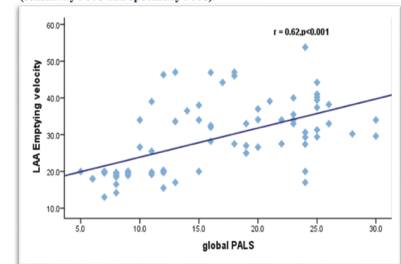

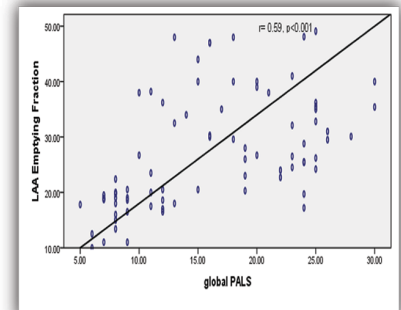**Figure (2) Correlation between global PALS and LAA emptying velocity in patients with nonvalvular AF**

Figure (3) Correlation between global PALS and LAA emptying fraction in patients with nonvalvular AF

RECOMMENDATIONS

1. Left atrial deformation parameters (global PALS) by speckle tracking echocardiography is useful for assessment of the pro-thrombotic state. The test is non-invasive, relatively simple, less expensive and no adverse events. Therefore it can be used as a non-invasive screening test for assessment of the pro-thrombotic state in nonvalvular atrial fibrillation patients.
2. Left atrial deformation parameters (global PALS) might be used as additional information to CHA2DS2VASc score for prediction of annual stroke risk and initiation of appropriate anticoagulation therapy in patient with nonvalvular atrial fibrillation.
3. There may be the possibilities of undetectable other factors for pro-thrombotic state due to some limitations of this study such as small sample size, short study period and type of the study design (the cross-sectional analytical study). Due to these limitations, doing a further study with larger sample size, longer study period and more suitable study design with long-term follow-up would be recommended in the future.

CONCLUSION

Global PALS is a sensitive parameter for pro-thrombotic state assessment in nonvalvular AF. Moreover, global PALS might be useful as a screening and serial assessment tool to assist in the detection of LAA thrombus/SEC in nonvalvular AF.