

ROLE OF THREE DIMENSIONAL ECHOCARDIOGRAPHY IN THE ASSESSMENT OF THE TRICUSPID VALVE IN RHEUMATIC HEART DISEASE PATIENTS

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Introduction

Rheumatic heart disease (RHD) remains a major health burden in low- and middle-income countries, primarily affecting the mitral and aortic valves, but the tricuspid valve (TV) is increasingly recognized for its impact on prognosis. TV involvement may be primary, due to direct rheumatic inflammation, or secondary, resulting from left-sided lesions and pulmonary hypertension. Accurate evaluation of the tricuspid valve is essential, yet conventional two-dimensional echocardiography (2D echo) often underestimates its complex three-dimensional anatomy. The advent of three-dimensional echocardiography (3D echo) has advanced valve imaging, offering superior visualization, direct valve area measurement, and improved grading of regurgitation and stenosis. In RHD, 3D echo provides greater diagnostic accuracy, refines surgical planning, and facilitates earlier intervention. Given that tricuspid disease is frequently under-diagnosed and contributes to worse outcomes, this study explores the role of 3D echocardiography in assessing tricuspid valve morphology and function in patients with rheumatic heart disease.

Aim of the work

The work aimed to study the added value of three-dimensional (3D) echocardiography in the assessment of tricuspid valve morphology and function in patients with known rheumatic heart disease.

Patients and Methods

This study was conducted at Alexandria Main University Hospital between April 2022 and April 2023 and included 100 adult patients with rheumatic valvular disease confirmed by echocardiography. Inclusion required age above 18 years and history of rheumatic fever, while patients with ischemic heart disease, non-rheumatic valve lesions, prosthetic valves, or poor imaging quality were excluded. All participants underwent thorough clinical evaluation including demographic data, medical history, physical examination, and 12-lead ECG. Transthoracic echocardiography was performed using both two-dimensional (2D) and three-dimensional (3D) modalities. Tricuspid valve morphology was assessed for leaflet number, thickening, commissural fusion, restricted motion, and coaptation defects. Hemodynamic evaluation included mean diastolic gradient, three-dimensional planimetered valve area, and regurgitation severity by Doppler parameters. Pulmonary artery systolic pressure was estimated via the Bernoulli equation. Right ventricular function was measured using two-dimensional speckle tracking strain, and associated mitral and aortic valve lesions were systematically evaluated. Data were analyzed using SPSS.

Results

Table (1):Distribution of the studied cases with TV involvement according to echocardiographic assessment of TV (n=34).

Echo to TV (if involved)	No.	%
Valve morphology		
I	13	38.2
II	15	44.1
III	6	17.6
Thickening		
0	6	17.6
1	14	41.2
2	10	29.4
3	4	11.8
Calcification [0]	0	0.0
Restricted motion		
0	5	14.7
1	15	44.1
2	8	23.5
3	6	17.6
Lack of coaptation		
0	20	58.8
1	14	41.2
Committural fusion		
No	18	52.9
Yes	16	47.1
MDG		
Min. – Max.	1.0 – 16.0	
Mean ± SD.	4.21 ± 3.61	
Median (IQR)	3.0 (2.0 – 4.90)	
3D TVA		
Min. – Max.	1.0 – 6.60	
Mean ± SD.	3.31 ± 1.74	
Median (IQR)	3.25 (1.80 – 4.60)	
TR severity		
No	2	5.9
Trace	4	11.8
Mild	8	23.5
Mild to moderate	1	2.9
Moderate	8	23.5
Severe	11	32.4

Table (2): Distribution of the studied cases with TV involvement according to the coexistence of TS and TR (n = 34).

Presence of TS and TR	No.	%
Isolated TS	2	5.9
Isolated TR	14	41.2
Combined TS and TR	18	52.9

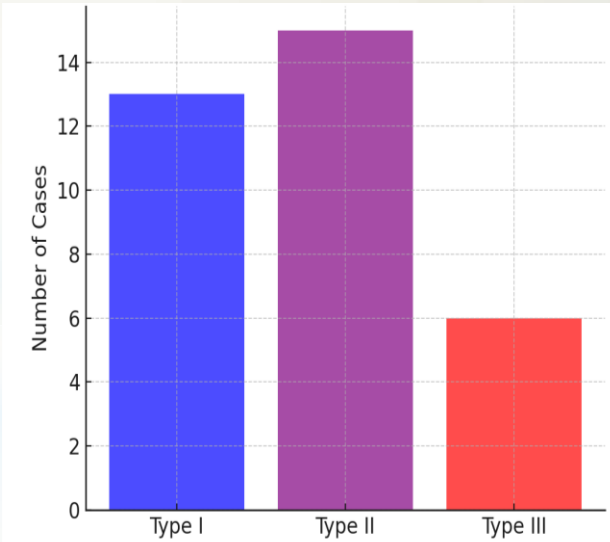


Figure (1): TV morphology distribution among the studied cases (n = 34)

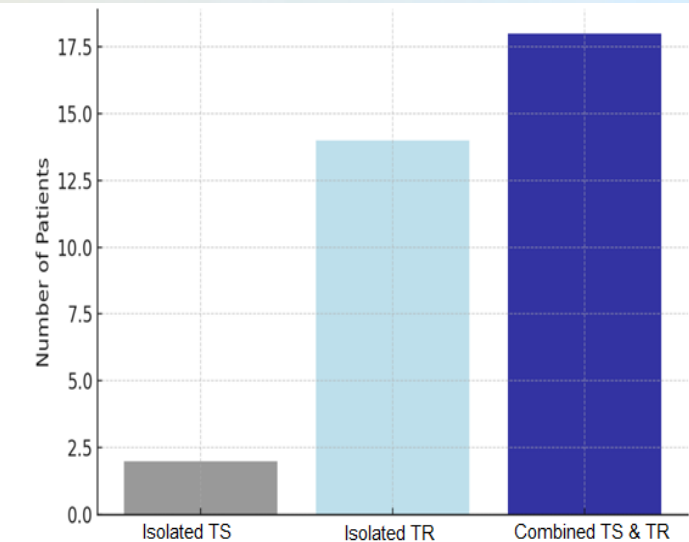


Figure (2): Distribution of the studied cases according to coexistence of TS and TR (n = 34)

Conclusion

- Tricuspid valve involvement in rheumatic heart disease is more common and clinically significant than previously appreciated.
- Three-dimensional echocardiography demonstrates clear superiority over conventional two-dimensional imaging in detecting and characterizing tricuspid pathology, as it allows better visualization of valve morphology, function, and severity, aiding earlier and more precise diagnosis.