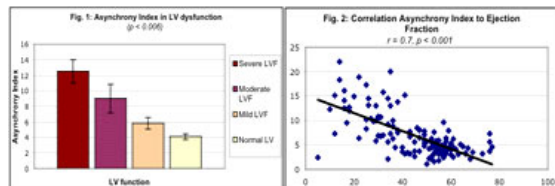


Methods: 141 patients with normal QRS duration (<120 ms) referred for assessment of LV function were investigated. Routine 2D echocardiography was followed immediately by RT3DE using the Philips Sonos 7500 with the X4 transducer. A full volume acquisition (FVA) of the left ventricle was obtained from the apical position. The 3D dataset was analysed offline (4D LV analysis, version 1.2, TomTec) to derive global and regional LV time-volume curves utilising semi-automated endocardial border detection. An asynchrony index (AI) was derived by calculating standard deviation of the time for each of the 16 segments to reach its minimum volume.

Results: The average acquisition time for 3D datasets was 7 sec. 49% had normal LV systolic function, 15.8% had mild, 16.5% moderate and 18.7% severe systolic dysfunction. The asynchrony index was 4.1±1.5, 5.8±1.8, 9±4.5 and 12.5±3.9 for each group respectively (fig. 1). There was good negative correlation between ejection fraction and AI ($r = -0.7, p < 0.001$, fig. 2).

Conclusion: RT3DE is a sensitive tool for quantifying mechanical LV asynchrony which appears to increase with increasing degrees of systolic dysfunction.



1113-161

Assessment of the Left Atrial Appendage Using Transthoracic Real-Time Three-Dimensional Echocardiography

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Background: Imaging of the left atrial appendage (LAA) is important for thrombus detection. Newly developed real-time three-dimensional (RT3-D) ultrasound equipment allows on-line acquisition and rendering of cardiac structures and may provide incremental diagnostic information about LAA morphology compared to conventional 2-D imaging. **Methods:** 40 subjects were studied (24 cardiac patients, 14 men, mean age 53.2±17.9 years and 16 normal controls of younger age, 9 men, mean age 31.6±6.9 years) using transthoracic RT3-D and 2-D imaging (3.5MHz transducer, Philips Sonos 7500). The LAA visualization was attempted in 1) parasternal short axis view, 2) apical two-chamber view, and 3) modified apical five-chamber view, dividing the LAA into two segments: body (proximal portion: anterior and posterior aspect) and tip (distal portion). All images were reviewed by two experienced echocardiographers. **Results:** 20 of 24 patients (83.3%) and 13 of 16 volunteers (81.3%) had adequate 3-D images of the LAA. Comparison results are reported in the table. In five subjects, pectinate muscles were seen by RT3-D, but not by 2-D imaging. **Conclusions:** 1) Transthoracic RT3-D echocardiography adequately visualizes the LAA in the majority of subjects without significant age differences. 2) RT3-D imaging may provide incremental diagnostic information over 2-D imaging on wall morphology, which may be useful in the evaluation of LAA pathology.

Table:

LAA Structures	Patients (n = 20)	Volunteers (n = 13)
Anterior Aspect of Body	18 (90%)	11 (84.6%)
Posterior Aspect of Body	18 (90%)	11 (84.6%)
Tip	10 (50%)	9 (69.2%)

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Geometric Deformity of the Saddle-Shaped Mitral Annulus in Patients With Ischemic Mitral Regurgitation: Real-Time Three-Dimensional Echocardiographic Study

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Objective: We sought to clarify three-dimensional configuration of the mitral annulus in ischemic functional mitral regurgitation.

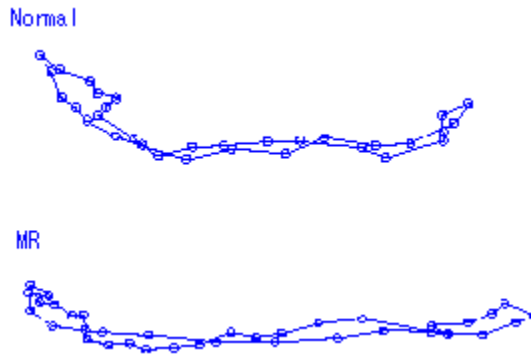
Methods: Twenty-five previous myocardial infarction patients with left ventricular dysfunction (ejection fraction<50%) and ten healthy control subjects were examined. Patients were divided into two groups: ERO<0.1cm²; non-MR group, ERO≥0.1cm²; MR group. Utilizing real-time three-dimensional echocardiography (SONOS 7500®, Philips), mitral annulus configuration was constructed in diastole and systole. Height of the saddle shaped mitral annulus was calibrated (non-planar index).

Results: In control subjects, mitral annulus configuration was appeared as non-planar 'saddle shape'. Non-planar index was 5.4±3.6mm.

In both non-MR and MR groups, three-dimensional configuration of the mitral annulus was appeared as flat shape, with less dynamic movement during cardiac cycle. In MR group, saddle shape of the mitral annulus was markedly deformed and rather warped. Non-planar index was significantly smaller in MR group, comparing with non-MR group (-1.52±4.2mm vs. 1.42±3.9mm, P<0.05).

Conclusions: Saddle shape of the mitral annulus was deformed in patients with

ischemic MR. Changes in three-dimensional configuration of the mitral annulus might play a role as one of the mechanisms in ischemic MR.



1113-163

The Role of Real-Time and Freehand Three-Dimensional Echocardiography in the Evaluation of Rheumatic Mitral Stenosis

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Three-dimensional echocardiography allows the visualization of the mitral valve in any desired plane and can be performed using real-time 3D acquisition or freehand scanning. The accuracy of these techniques for the evaluation of mitral stenosis have yet to be established. Our aim was to determine which of the clinically used Echo-Doppler methods correlates best with the mitral valvular area (MVA) acquired invasively using Gorlin's formula. **Methods:** We studied 80 pts with mitral stenosis (age 51±14 yrs). MVA was determined by conventional Echo-Doppler methods (2D planimetry, pressure half time – PHT – and PISA) and by 3D echocardiography (matrix array probe, N=50; and freehand scanning, N=30). The results were compared with MVA determined by the invasive Gorlin method. Average MVA, linear regression (r) and intraclass correlation coefficients (ICC) were computed for each method. Measurements were performed by two independent observers and repeated by one of them to determine the inter- and intra-observer variability. **Results:** Determination of MVA by 3D echo had the best correlation with the Gorlin's method (table). Inter-observer variability was similar for 3D (ICC=0.90) and PHT (ICC=0.95). In addition, intra-observer variability was also similar for RT 3D (ICC=0.96) and PHT (ICC=0.92). **Conclusions:** RT 3D echo is an accurate and highly reproducible technique for assessing MVA in patients with rheumatic mitral valve stenosis. 3D echo showed the best correlation with the invasively estimated MVA.

	Averaged MVA	r	ICC (95% confidence interval)
PHT	1.28±0.39	0.73 (p<0.001)	0.68 (0.39-0.75)
2D	1.39±0.37	0.80 (p<0.001)	0.62 (0.38-0.72)
PISA	1.24±0.39	0.57 (p<0.001)	0.49 (0.24-0.66)
3D	1.26±0.43	0.97 (p<0.001)	0.84 (0.74-0.89)
Gorlin	1.30±0.48		

1113-164

Assessment of the Proximal Aorta by Real-Time Three-Dimensional Echocardiography

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Background: Transesophageal echocardiography (TEE) is the most widely used imaging technique to evaluate the aortic arch. However, the proximal portion of the aortic arch is not visualized due to the interposition of the trachea. The more easily performed three-dimensional transthoracic (3D TTE) imaging may provide a noninvasive means of viewing the entire proximal aorta. **Methods:** Real-time 3D TTE with full volume acquisition (Philips SONOS 7500) was performed to image the proximal aorta through a lateral suprasternal or suprasternal window. Twenty-seven patients were imaged (mean age=57 ± 15 y, 52% male). The thoracic aorta was subdivided into the proximal ascending, distal ascending, proximal aortic arch, distal aortic arch, and proximal descending thoracic aorta. The images were reviewed by two cardiologists to determine the extent of the vessel circumference visualized (not visualized, less than 50%, 50 -75% and greater than 75%). **Results:** See Table. Greater than 75% of the circumference of the proximal arch was visualized in two-thirds of the patients. **Conclusions:** 1) Transthoracic real-time 3D echocardiography with full volume acquisition reliably visualizes most of the proximal aorta. The posterior half of the aortic arch is always visualized while the anterior portion is more difficult to acquire. 2) The proximal arch, which is often not visualized by TEE, is visible in the majority of subjects. 3) Real-time 3D TTE could prove as a useful noninvasive method to assess for aortic arch disease.

Noninvasive Imaging