

P331

Application of 3-dimensional transthoracic echocardiography in the evaluation of implantable cardioverter defibrillator lead position

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Over the last decade there has been a significant increase in the number of implantable cardiac defibrillators (ICD) in patients with heart failure with reduced ejection fraction (HFrEF). These leads have been reported to cause or to increase tricuspid regurgitation (TR). Echocardiography is not routinely used to elucidate the mechanisms of lead interference with tricuspid valve leaflets in individual patients.

AIM: To evaluate of usefulness of 3-dimensional transthoracic echocardiography (3D TTE) in the assessment of ICD lead position and its relations to tricuspid valve.

METHODS: A population consisting of 44 consecutive patients with ICD was evaluated (43 – patients with HFrEF, 1 – patient with hypertrophic cardiomyopathy). 3D TTE full-volume images of the right ventricle and/or zoomed images of the tricuspid valve were obtained. Images were analysed off-line to determine the position of the device-lead in relation to the tricuspid valve leaflets. Severity of TR was estimated as not important (+, ++) and important (+++, ++++).

RESULTS: An evaluation of the device-lead position was impossible due to poor diagnostic quality of echocardiographic images in 4 patients (9%). Among 40 remaining subjects in 12 (30%) lead was in central position, without interfering with leaflet motion, in 14 (35%) - impinging on the posterior leaflet, 6 (15%) - impinging on the septal leaflet, 8 (20%) – lead was positioned near the posteroseptal commissure. Among 15 patients (38%) TR was assessed as important. There was no correlation between device-lead position and severity of TR.

CONCLUSIONS: 3D TTE enables to determinate ICD-lead position and its relation to tricuspid valve. 3D TTE can explain a mechanism of associated TR in individual patients. Further studies are necessary to investigate possible relationship between lead position and TR severity.