Results: In comparison to the iMVR group, pre-surgery echocardiographic findings in the cTVr group demonstrated higher mean TR severity grade (1.22 versus 2.03, respectively, $p<0.0001$) and higher mean pulmonary hypertension (45 and 54 mmHg, respectively, $p<0.020$). Long-term echocardiography parameters (median 1752 days IQR 1484, 3126) demonstrated that 72% of patients in the cTVr group regressed their TR severity grade compared to 28% of patients in the iMVR group (<0.0001). Moreover, 6.5% of patients in the cTVR group compared to 28% of patients in the iMVR group increased their TR severity grade (p=0.02) (Figure 1).
Conclusion: The addition of TV repair during MVR for rheumatic heart disease is associated with a significant decrease of late TR.

P1586
Accuracy of conventional and 3D echo-derived indices of right chamber and tricuspid annulus size to predict severe functional tricuspid regurgitation

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Right chamber dilation is considered among the supportive signs for severe functional tricuspid regurgitation (FTR). However, the thresholds for right ventricular (RV) and right atrial (RA) size in the guidelines have been derived from healthy subjects and have not been validated in FTR pts.
Purpose: To assess the accuracy of conventional and 3D echo-derived indices of right chamber and tricuspid annulus (TA) size to predict severe FTR.
Methods: A total of 182 pts with FTR of various etiologies (left heart disease, pulmonary arterial hypertension, permanent atrial fibrillation) and severities (35% moderate, 36% severe) were enrolled in two academic centers. End-diastolic RV volume (RVEDV), maximal RA volume (RAV max) and TA area in mid-systole (MS) and end-diastole (ED) by 3D echocardiography, as well as conventional measures of RV and RA size were obtained. Severe FTR was defined by ≥ 2 parameters: (1) coaptation defect; (2) vena contracta ≥ 7; (3) PISA radius >9 mm; (4) hepatic vein systolic flow reversal.
The first "definition group" (n=93) was used to select the optimal cut-off values to predict severe FTR, which were validated prospectively in a separated "validation group" (n=89). ROC curve analysis was used to compute area under curve (AUC), sensitivity and specificity.
Results: The two groups were similar in age, gender and FTR etiology (p=NS for all). In the overall population, 3D RAV max (AUC 0.78), TA MS area (AUC 0.71) and TA ED area (AUC 0.68) discriminated better than 3D RVEDV (AUC 0.61) pts with severe FTR. RA and TA size had better sensitivity than RV size to predict severe FTR (Table). 3D TA area was more specific than diameters. RV diameter was more specific than volumes or area.

Table 1

	Optimal cut-off	AUC	Sensitivity	Specificity
3D TA MS area (cm^2/m^2)	6.5	0.75	82	66
3D TA ED area (cm^2/m^2)	7.9	0.71	82	62
2D TA MS diameter (mm)	36	0.72	89	50
2D TA ED diameter (mm)	40	0.71	78	47
3D RVEDV (ml/m^2)	75	0.56	56	61
2D RVEDA (cm^2)	20	0.63	64	58
2D RV basal diameter (mm)	45	0.74	64	68
3D RAV max (ml/m^2)	74	0.77	73	62
2D RA area (cm^2)	33	0.70	71	65

Conclusions: This is the first prospective study validating thresholds of conventional and 3D parameters of right chamber and TA size for identifying pts with severe FTR.

P1587
Clinical outcome of isolated tricuspid regurgitation on stable heart failure

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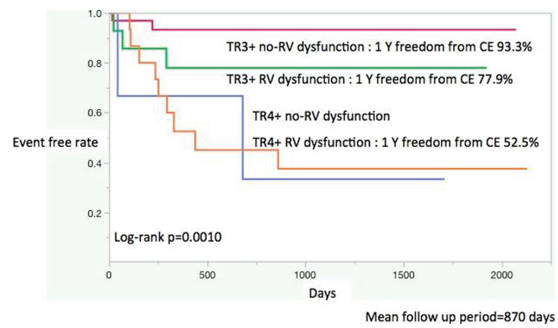
Background: Severity of tricuspid regurgitation (TR) is known to associate with poor prognosis in isolated TR. However, severity of TR grading can change according to patient's stage of Heart failure (HF). Moreover, effect of right ventricular (RV) function on prognosis of isolated TR is unclear.
Methods: Between 2012 and 2017, 409 consecutive patients with more than moderate to severe ($\geq 3+$) isolated TR (without left ventricular dysfunction, left sided valve disease, history of cardiac surgery, pulmonary hypertension and congenital heart disease) with minimally symptoms were recruited. Of those, 64 patients with multiple confirmation of moderate to severe TR were enrolled. HF hospitalization and sudden cardiac death considered cardiac events (CE). RV function measured with fractional area change (FAC).
Results: Patient background showed no differences between CE and non-CE groups. Percentage of the presence of TR4+ (75.0 vs. 14.6%), RV dysfunction defined as FAC<34% (68.7 vs. 35.4%), dilated inferior vena cava (87.5 vs. 50.0%) were significantly higher in CE than non-CE group (all, $p<0.05$). CE increased as the severity of TR worsened and presence of RV dysfunction increased (one year event free survival rate; TR3+ vs. TR4+ = 91 vs. 52%, non-RV dysfunction vs. RV dysfunction = 89 vs. 67%, both $p<0.05$). Kaplan-Mayer curve revealed, TR4+ with and without RV dysfunction was associated with highest clinical event risks. In TR3+, patients without RV dysfunction had better annual event free survival rate than that with RV dysfunction (93 vs. 78%) (Figure).



Event Free Survival Rate

Conclusions: Severe isolated TR itself is associated with high CE, whereas in moderate to severe TR, RV dysfunction could distinguish follow-up event.

P1588
Importance to identify the cause of tricuspid regurgitation by 3-dimensional echocardiography in heart failure patients after cardiac implantable electronic device implantations

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Background: In patients with cardiac implantable electronic devices (CIEDs) implantations including implantable cardioverter defibrillator (ICD) and/or cardiac resynchronization therapy (CRT), moderate to severe tricuspid regurgitation (TR) occurs at a significantly higher rate. In contrast, exacerbations of functional TR are a relatively common comorbidity in HF patients at decompensated status independent of CIEDs implantations.
Therefore, we hypothesized the causes of TR might be varied in decompensated HF patients with CIEDs, although a lead of CIEDs induced tricuspid valve (TV) dysfunction has been focused as a cause of TR. Then, this study aimed to evaluate the changes of TV morphology and the routes of leads on TV using 3-dimensional (3D) echocardiography through clinical courses after CIEDs implantations.
Methods: In 205 patients with newly implanted ICD and/or CRT devices, 51 hospitalized patients due to decompensated HF were enrolled. No patients had moderate to severe TR before CIEDs implantations. 3DE examinations were performed at immediately after CIEDs implantations, admission due to decompensated HF, and chronic phase after HF hospitalization, respectively. Using an offline software for 3D echocardiography (TomTec Imaging System, Germany), anterior-posterior (AP) length, septal-lateral (SL)length, area, and height of TV were measured.
Results: Among 51 hospitalized patients, worsened TR from trivial or mild to moderate to severe level were observed in 29 patients. As shown in Table, TV area, right ventricular basal dimension, AP length, and SL length were significantly larger in patients with worsened TR compared to patients without significant TR even at immediately after CIEDs implantations. In 29 patients with worsened TR, 15 patients were diagnosed as lead induced TR at decompensated HF hospitalizations. In remaining 14 patients, worsened TR was diagnosed as functional TR, because device leads were positioned at tricuspid annulus between

	No worsened TR (n=22)		Worsened TR (n=29)					
			Functional (n=14)			Lead induced (n=15)		
	Immediately after implantation	Hospitalization	Immediately after implantation	Hospitalization	follow-up	Immediately after implantation	Hospitalization	follow-up
TR grade none	18	17	11	0	4	4	0	0
mild	4	5	3	3	8	11	0	0
moderate	0	0	0	7	2	0	6	3
severe	0	0	0	4	0	0	9	12
RV base, mm	29.4±4.4	28.7±3.9	33.0±4.9*	35.4±5.7	34.1±4.9	35.5±6.1*	37.3±6.0	36.5±4.1
TV area, cm^2	7.4±2.1	7.2±1.7	12.6±2.7*	16.3±3.6*#	12.9±2.5	15.6±3.8*	18.5±4.0*†	19.8±3.5†
A-P, mm	31.2±5.4	29.8±4.1	36.5±4.0*	39.8±5.3*#	35.5±4.8	40.7±6.6*	43.1±5.8†	42.3±5.1†
S-L, mm	30.9±4.9	31.6±4.5	40.7±3.9*	46.2±5.2*#	39.1±5.3	44.5±6.4*	48.6±5.5†	47.3±5.7†
TV height, mm	5.1±2.5	4.6±1.9	4.5±2.1	3.7±1.5#	4.9±2.0	4.2±2.6	3.8±2.7	4.5±2.2

RV=right ventricle; A-P=anterior-posterior length; S-L=septal-lateral length
*$p<0.05$ vs. no worsened TR group at same timing,
#$p<0.05$ vs. immediately after implantation and follow-up of same group
† $p<0.05$ vs. immediately after implantation of same group

Table. Changes of TV morphology and TR