EUROVALVE, ROMA

When to operate?

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ESC/EACTS Guidelines for the Management of Valvular Heart Disease

European Heart Journal 2012 - doi:10.1093/eurheartj/ehs109 &
European Journal of Cardio-Thoracic Surgery 2012 -
doi:10.1093/ejcts/ezs455).

www.escardio.org/guidelines

EACTS

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Indications for surgery in tricuspid disease

	Class	Level
Surgery is indicated in symptomatic patients with severe TS.	I	C
Surgery is indicated in patients with severe TS undergoing left-sided valve intervention.	I	C

Vahanian, Alfieri et al Eur Heart J 2012

No recommendation for percutaneous commissurotomy in ESC/EACTS Guidelines 2012

Percutaneous balloon tricuspid commissurotomy might be considered in patients with isolated, symptomatic severe TS without TR (*Class IIb, Level of evidence C*) in ACC/AHA Guidelines 2014

Indications for surgery in tricuspid disease

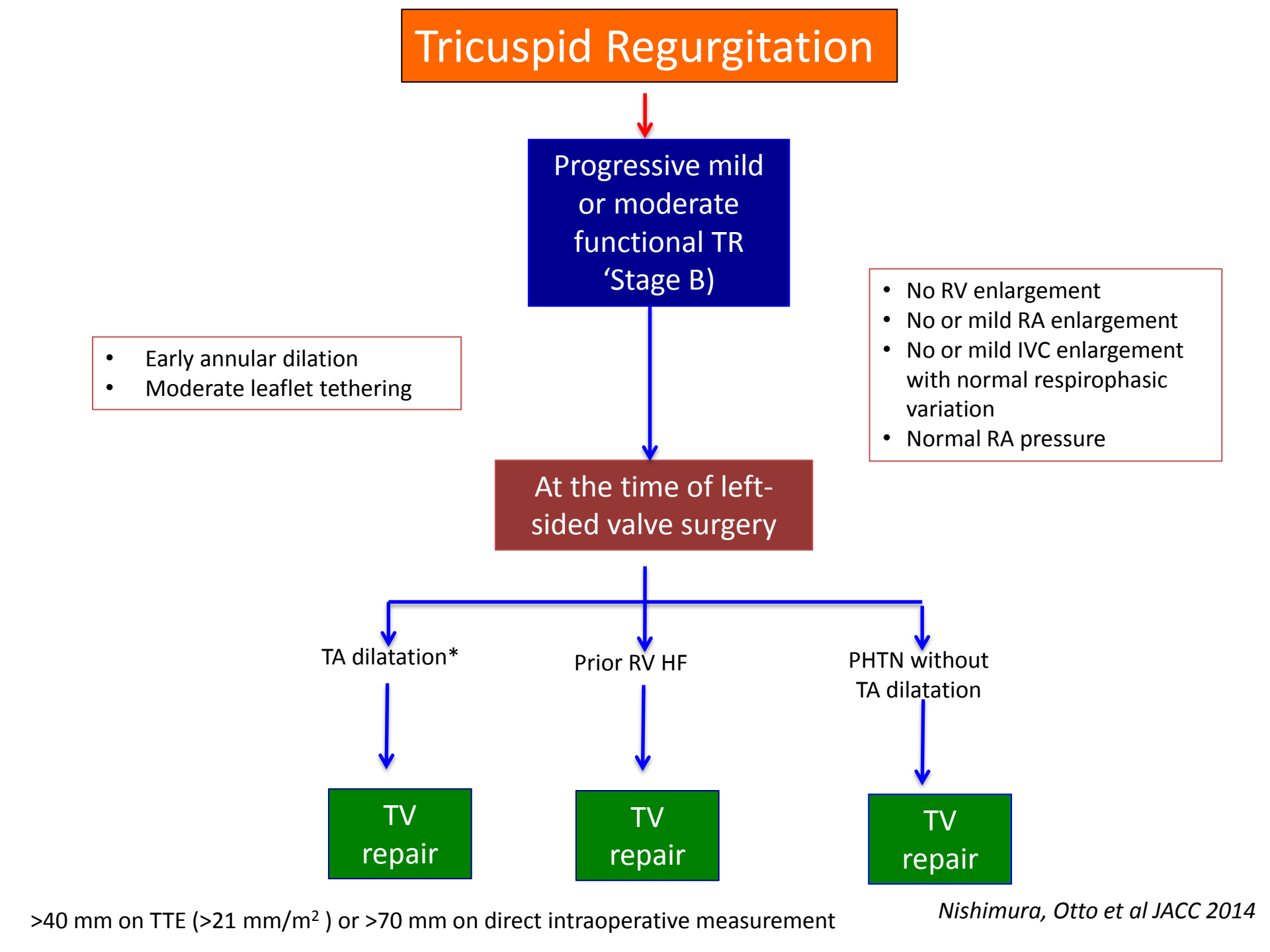
Surgery is indicated in patients with severe primary, or secondary, TR undergoing left-sided valve surgery.	I	C

Vahanian, Alfieri et al Eur Heart J 2012

Indications for surgery in tricuspid disease

Surgery should be considered in patients with moderate primary TR undergoing left-sided valve surgery. .	IIa	C
Surgery should be considered in patients with mild or moderate secondary TR with dilated annulus (≥ 40 mm or > 21 mm/m²) undergoing left-sided valve surgery.	IIa	C

Vahanian, Alfieri et al Eur Heart J 2012



>40 mm on TTE (>21 mm/m^2) or >70 mm on direct intraoperative measurement

Nishimura, Otto et al JACC 2014

Arguments

1 The treatment of left-sided valve disease only partially cures TR

2 Reoperation for severe, isolated TR after left-sided valve surgery is associated with a perioperative mortality rate of 10% to 25%

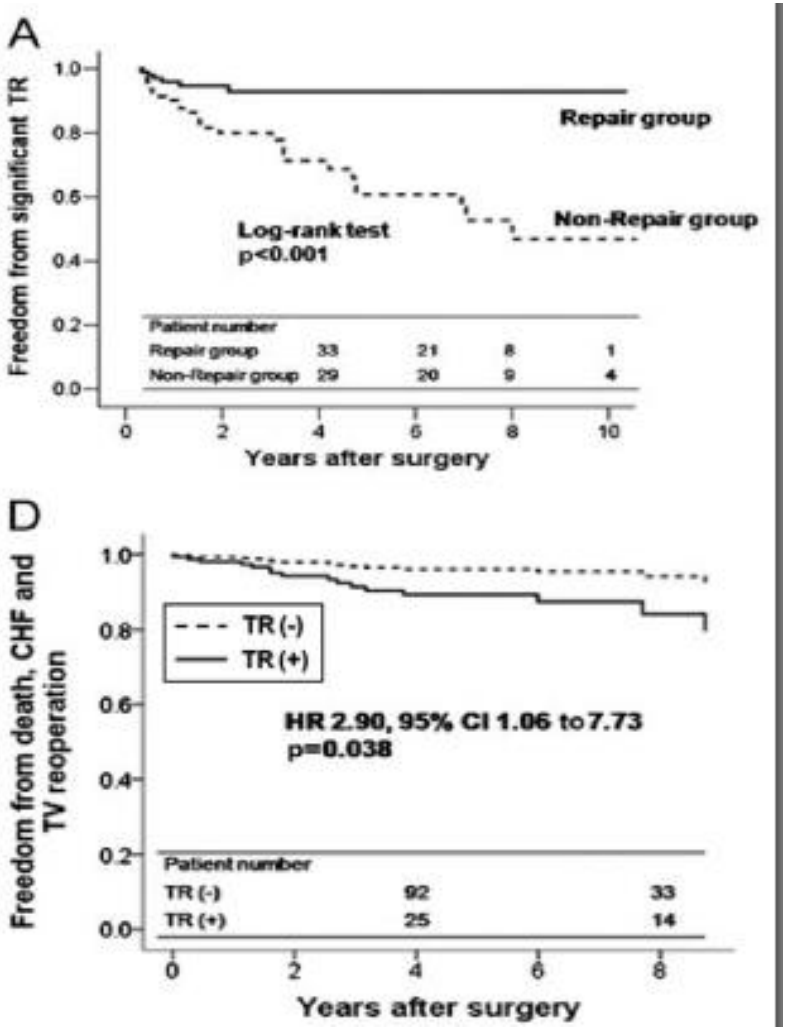
Positive results

Influence of TV repair in pts undergoing MV replacement

- 236 pts with mild to moderate TR
- MV replacement
  - With TV repair = 123
  - Without TV repair = 113

Lower freedom from moderate/severe TR
In pts without TV repair

Post-op moderate/severe TR: independent predictor of poorer event free survival

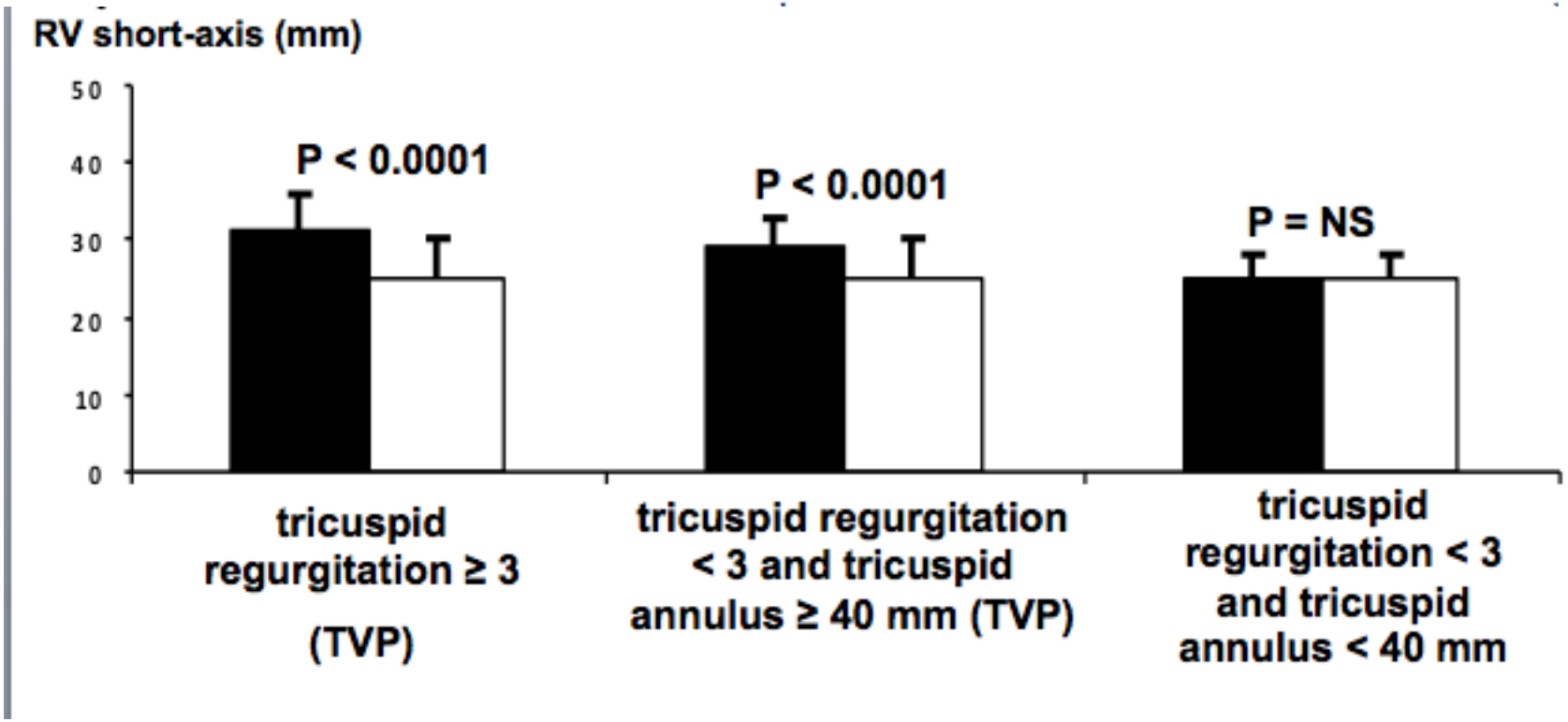


Kim et al 2011

Secondary TR and RV remodeling after TV repair

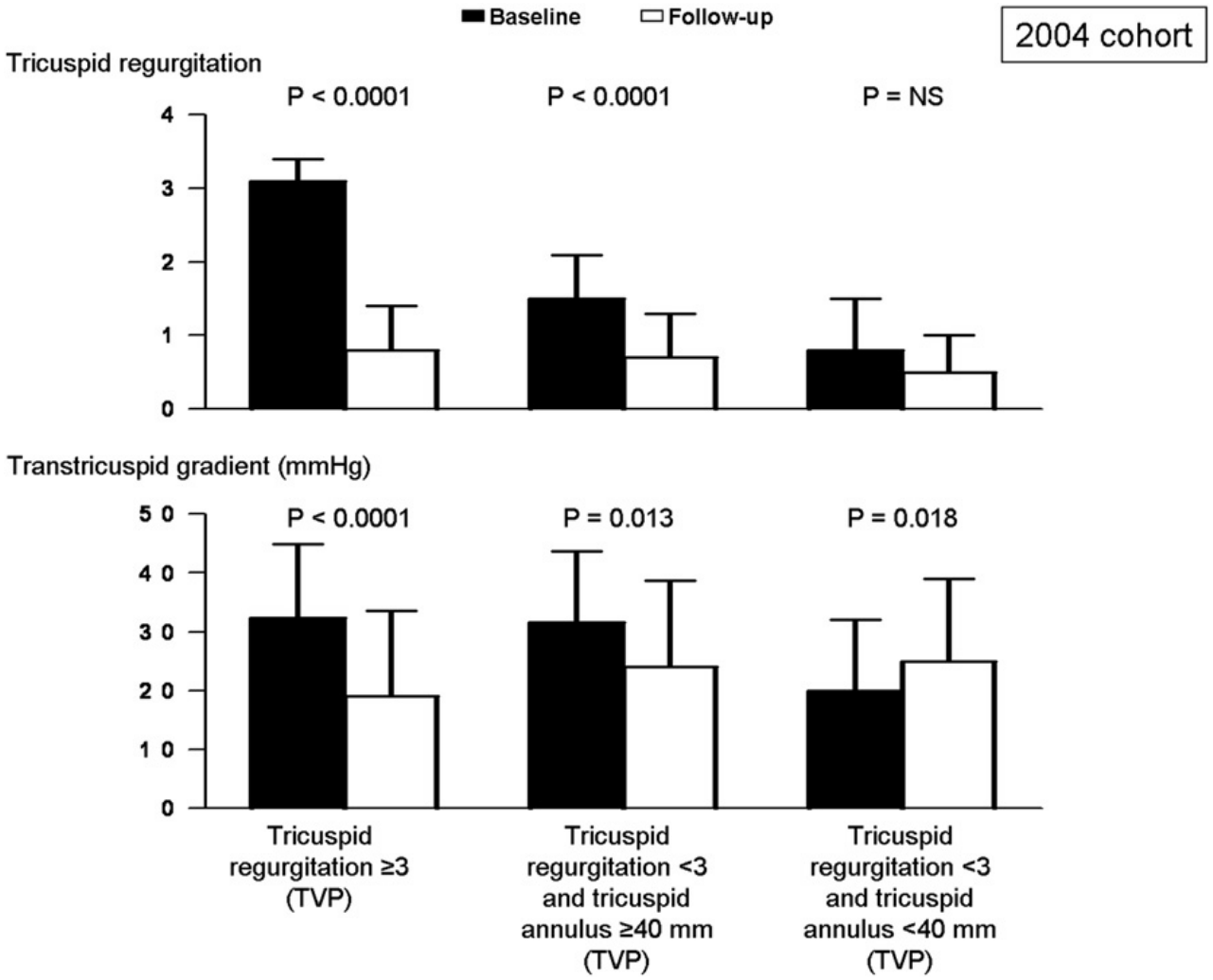
TV repair is associated with RV reverse remodeling

Tricuspid annuloplasty prevents right ventricular dilatation and progression of tricuspid regurgitation in patients with tricuspid annular dilatation undergoing mitral valve repair



Van de Veire et al. J Thorac Cardio Surg 2011

Effects of TV repair according to TR severity and tricuspid annulus diameter



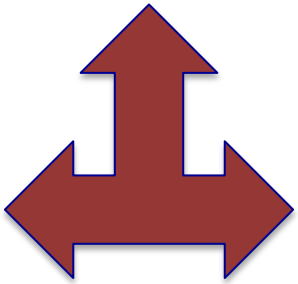
Van de Veire et al. J Thorac Cardio Surg 2011

Secondary TR and survival after prophylactic TV repair

TV repair is associated with better outcome

44 patients undergoing MVS (repair or replacement)

Moderate (≤+2) TR + TA ≥40 mm at preoperative echo



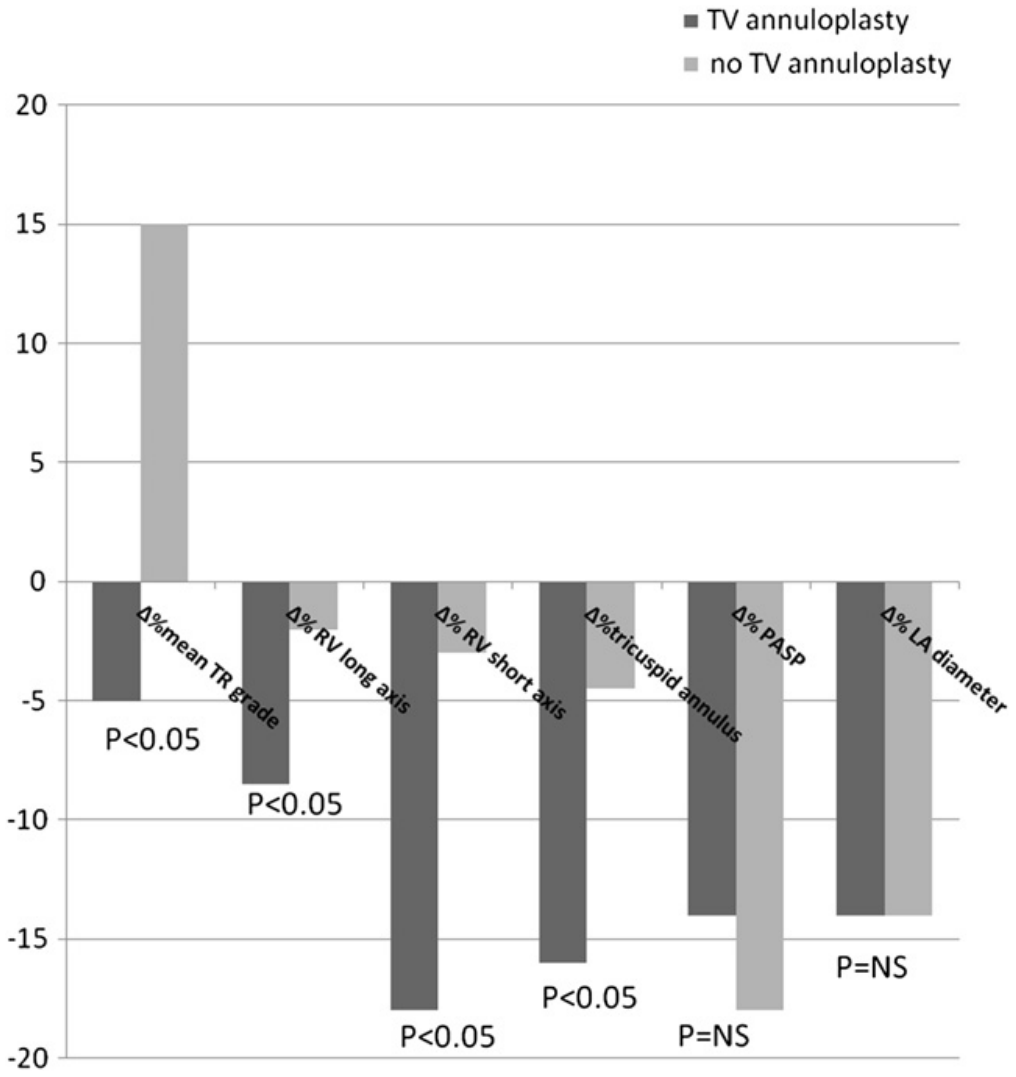
22 MVS+TV repair

22 Isolated MVS

Operative mortality	4.4%	Randomized	4.4%
At 12 months F-Up			
- Moderate/severe TR	0%		28%*
- Reverse RV remodeling	+++		+
- ↗ 6MWT	+++		+

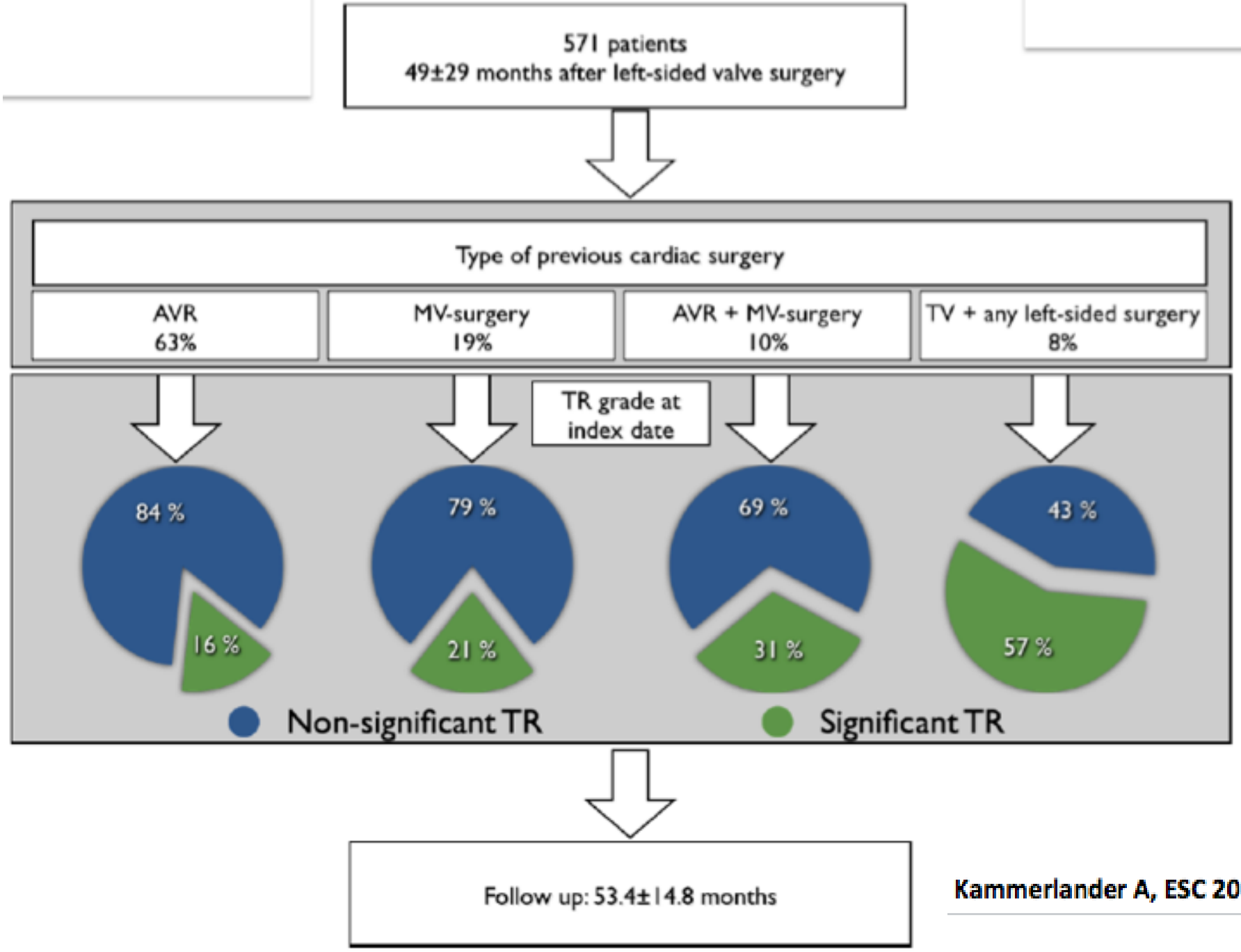
Benedetto U et al. J Thorac Cardiovasc Surg. 2012

% of improvement of echo measurements



Benedetto U et al. J Thorac Cardiovasc Surg. 2012

Controversial results



Kammerlander A, ESC 2013

Baseline characteristics

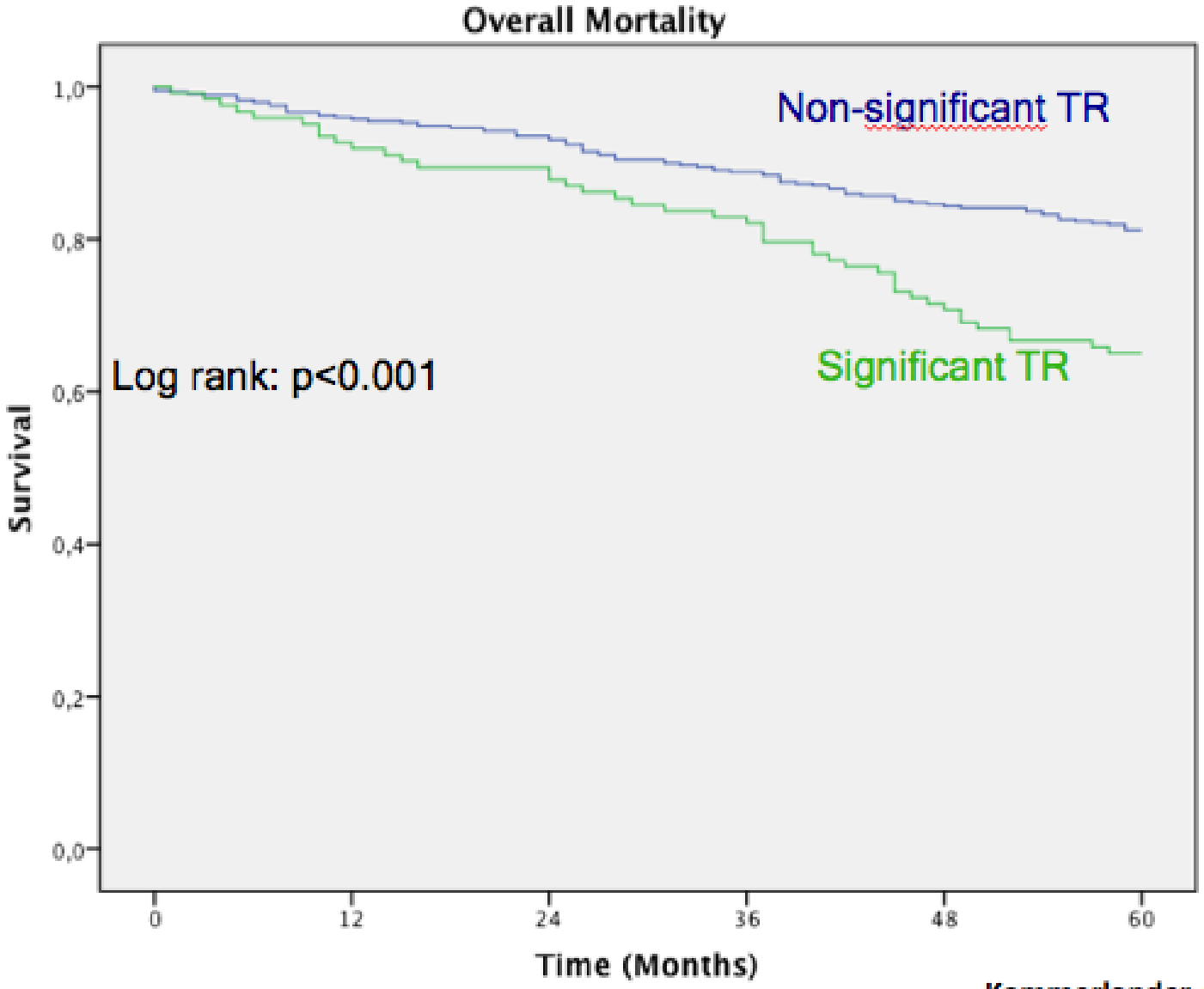
Variable	All patients n=571	Non-significant TR n=448 (78.5%)	Significant TR n=123 (21.5%)	p-value
Age [years]	69.2±11.8	68.8±11.6	70.7±12.4	0.102
Additive EuroSCORE	9.04±2.34	8.81±2.26	9.88±2.51	**<0.001**
Female [%]	52	48	64	**0.002**
Body Mass Index [kg/m^2]	26.8±4.5	26.9±4.5	26.4±4.7	0.204
Number previous valve surgeries				**0.001**
n=1 [%]	91	93	83	
n≥2 [%]	9	7	17	
Coronary Artery Disease [%]	27	28	24	0.438
Atrial Fibrillation [%]	26	20	46	**<0.001**
Hypertension [%]	62	59	71	**0.022**
Diabetes [%]	15	14	20	0.136
Hypercholesterolemia [%]	44	47	36	**0.031**
COPD [%]	9	8	11	0.257
NYHA functional class ≥2 [%]	36	31	56	**<0.001**
Creatinine [mg/dl]	1.12±0.50	1.10±0.46	1.19±0.61	0.201

Baseline echocardiogram

Variable	All patients n=571	Non-significant TR n=448 (78.5%)	Significant TR n=123 (21.5%)	p-value
LVEDD [mm]	46.7±6.0	46.5±5.6	47.3±7.2	0.275
LVEDD/BSA [mm/m²]	25.1±3.4	24.8±3.2	26.1±4.0	**0.001**
RVEDD [mm]	34.0±5.6	33.1±4.7	37.5±7.0	**<0.001**
RVEDD/BSA [mm/m²]	18.3±3.3	17.7±2.9	20.7±3.9	**<0.001**
LA [mm]	59.7±9.7	57.7±7.8	66.8±12.5	**<0.001**
LA/BSA [mm/m²]	32.2±6.2	30.9±5.0	37.0±7.5	**<0.001**
RA [mm]	57.6±9.5	55.6±7.3	64.9±12.4	**<0.001**
RA/BSA [mm/m²]	31.1±5.9	29.8±4.8	35.9±7.0	**<0.001**
Reduced (<50%) LVEF [%]	13	11	19	**0.032**
Peak TR velocity [m/s]	2.89±0.43	2.78±0.35	3.21±0.50	**<0.001**

No significant aortic or mitral valve disease / prosthesis dysfunction

Kaplan Meier Analysis, 571 patients, 50 months after previous left heart valve surgery



Kammerlander A, ESC 2013

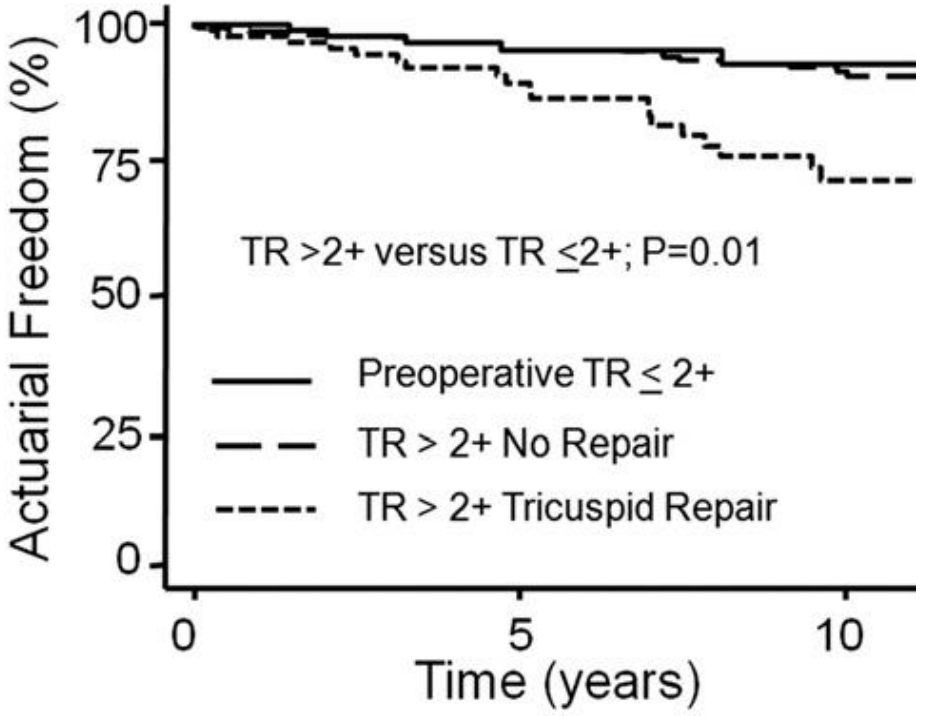
Multivariable Cox-Regression Overall Mortality

	Parameter Estimate	Standard Error	p-value	Hazard Ratio	95.0% Hazard Ratio Confidence Limits	
Age	0.074	0.013	**<0.001**	1.077	1.050	1.104
Creatinine levels	0.372	0.134	**0.006**	1.451	1.115	1.889
Peak TR velocity	0.698	0.231	**0.003**	2.009	1.278	3.159

Impact of TV repair at the time of MV replacement

624 pts

TV repair if TR>2+



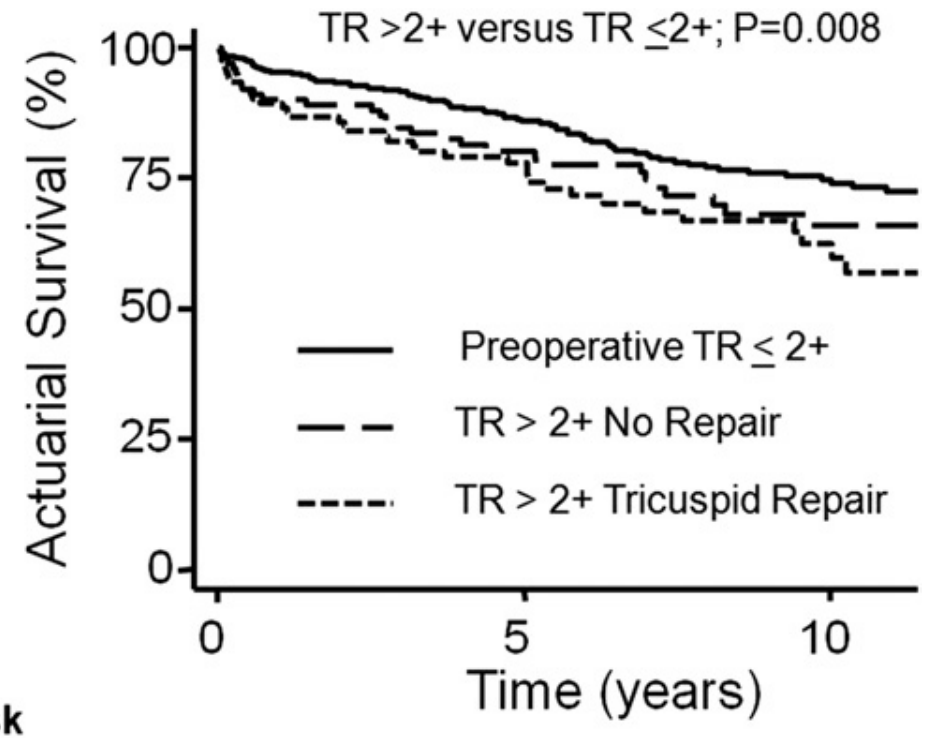
Numbers at risk

TR > 2+ Tricuspid Repair	125	66	25
TR > 2+ No Tricuspid Repair	106	64	32
TR ≤ 2 No Tricuspid Repair	393	240	109

Chan et al Ann Thorac Surg 2009;88:1209-15

TV repair in pts with TR>2 did not improve outcome

TR 2+ or less may not require repair
TA dimension alone should not dictate the performance of TV repair



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Secondary TR and Survival after TV repair: adoption of TVP guidelines into daily clinical practice

TV repair was associated with excess events

175 patients undergoing MV surgery, 89 TV repair due to TA > 40 mm or TR > gr II
Similar characteristics between groups at baseline

Clinical Outcomes After Tricuspid Valve Annuloplasty in Addition to Mitral Valve Surgery

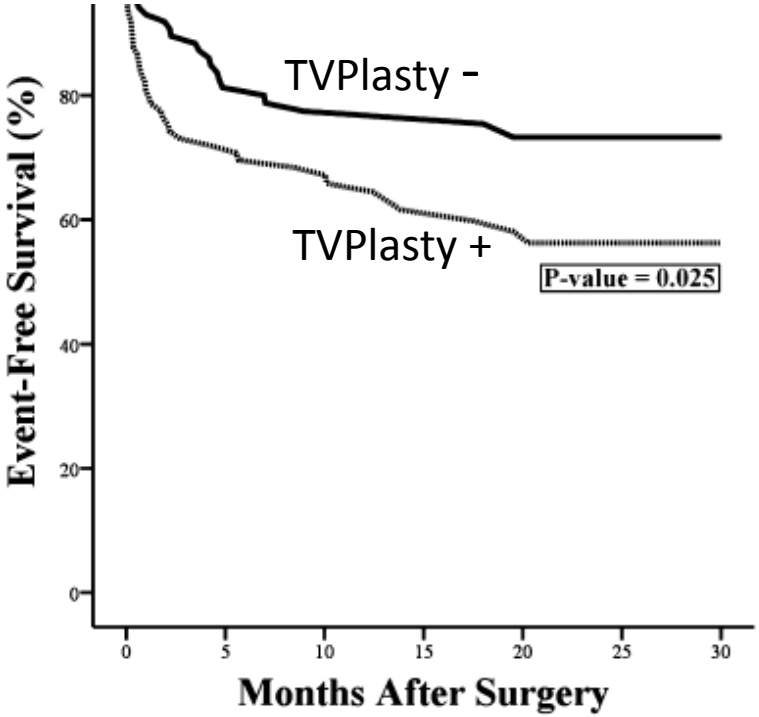


TABLE III. Surgical Characteristics

	TVP –	TVP +	*P* Value
Patients, No.	86	89	
Left-sided procedures, %			
MVP/MVR	38	52	.08
MVP/MVR+CABG	49	21	<.01
MVP/MVR+AVR/AVP	5	19	<.01
MVP/MVR+CABG+AVR/AVP	8	8	.95
Predicted mortality by the EuroSCORE, %	10	14	.06
Cross clamp time, min	151±57	152±49	.90
CPB time, min	207±76	202±58	.62

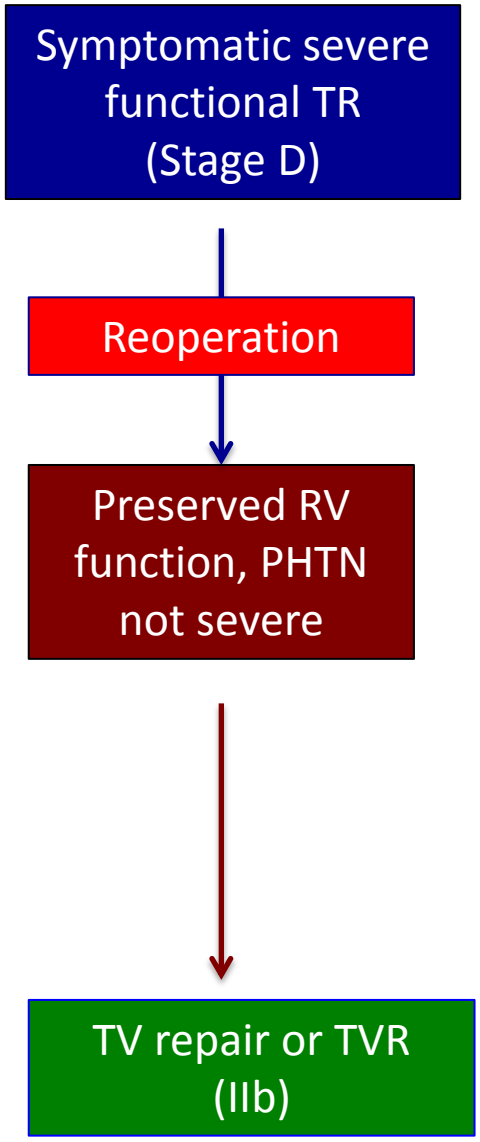
Koppers et al Cong Heart Fail 2013

Indications for surgery in tricuspid disease

Surgery should be considered in asymptomatic or mildly symptomatic patients with severe isolated primary TR and progressive right ventricular dilation or deterioration of right ventricular function.	IIa	C
After left-sided valve surgery, surgery should be considered in patients with severe TR who are symptomatic or have progressive right ventricular dilatation/dysfunction, in the absence of left-sided valve dysfunction, severe right or left ventricular dysfunction, and severe pulmonary vascular disease.	IIa	C

Vahanian, Alfieri et al Eur Heart J 2012

Tricuspid Regurgitation



- **Severe annular dilation (>40 mm or >21 mm/m^2)**
- **Marked leaflet tethering**
- **RV/RA/IVC dilation**
- **Elevated RA pressure**
- **Diastolic septal flatting**

Nishimura, Otto et al JACC 2014

What do we need to better know?

- Effects of prophylactic TV repair in randomized large-scale trials

- Optimize cut-off values for tricuspid annular measurement: which imaging technique?

- Identify patients who improve functional class and survival from TV repair after previous left-sided valve surgery

Take-home message

- When to operate TR remains frequently a difficult decision
- TR persistence or occurrence after left-sided valvular surgery carries a poor outcome
- The prognostic benefit of prophylactic tricuspid valve annuloplasty remains controversial
- Current guidelines are derived from expert consensus (all recommendations level of evidence C) underlining the urgent need for prospective studies

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