

Tricuspid Regurgitation in Mitral Valve Disease: When to Intervene



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DISCLOSURES

- E-echocardiography: Editor
- Philips Healthcare, Inc. : Education Consultant

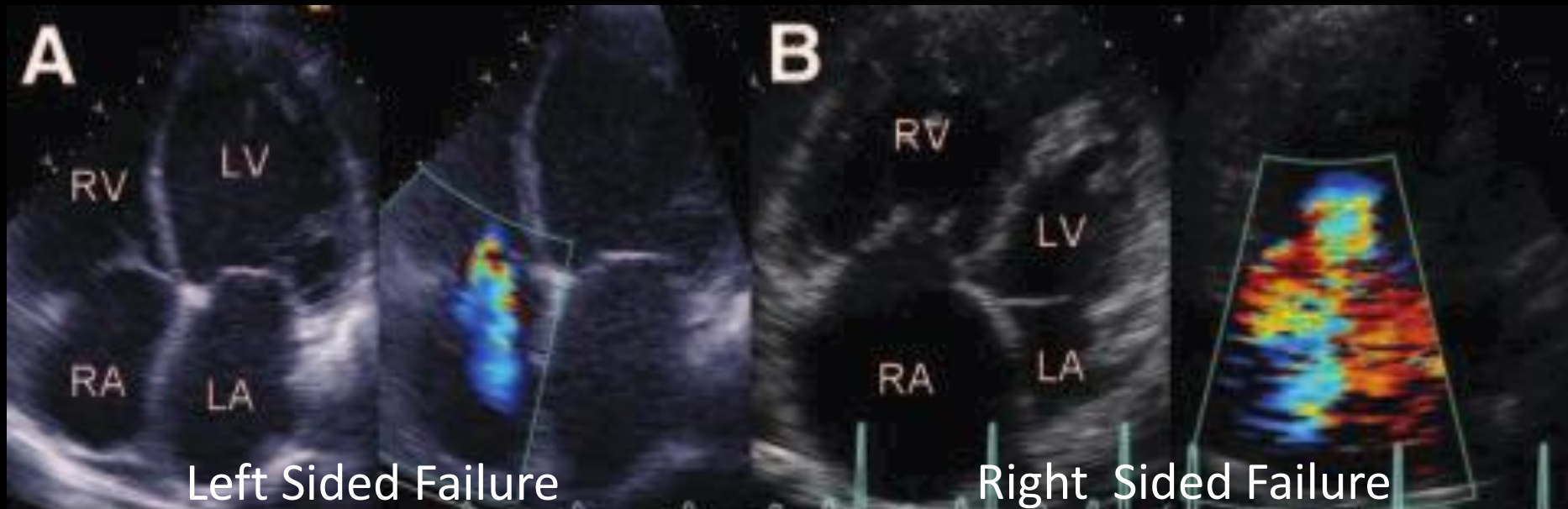
Demographics of TR in MV Disease

Moderate TR exists in $> 33\%$ of patients with mitral stenosis.

TR occurs in 23-37% of RHD 10 years after MVR, but can appear up to 24 years after surgery.

In the US, TR before and after MVR is more common in primary DTVD (Myxomatous \gg FED), but most common as secondary, FTR.

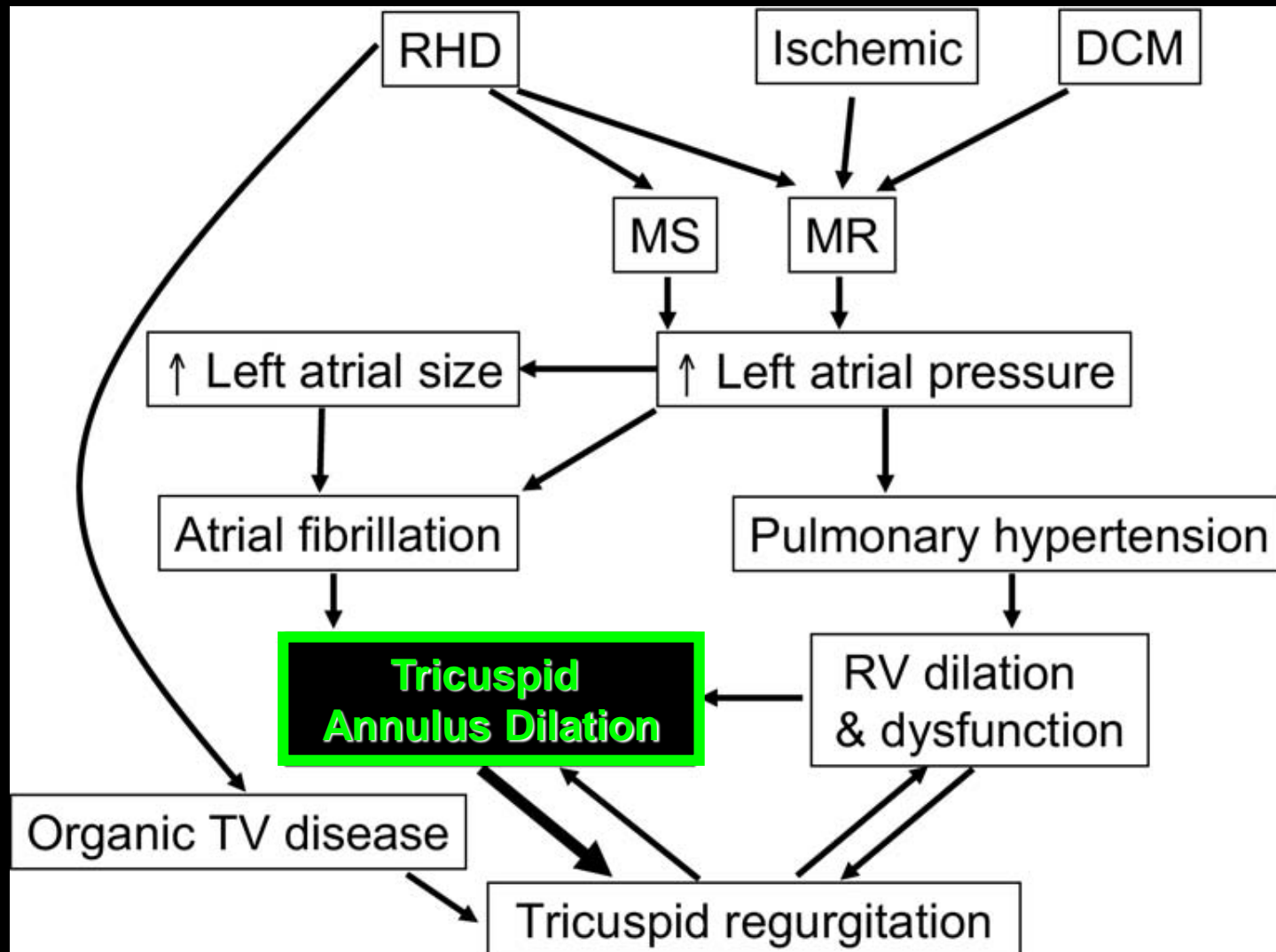
Moderate or severe TR occurs in 74% of IMR 3 years after MV repair.



Mechanism of Tricuspid Regurgitation in Mitral Valve Disease

Mechanism of TR in MV Disease:

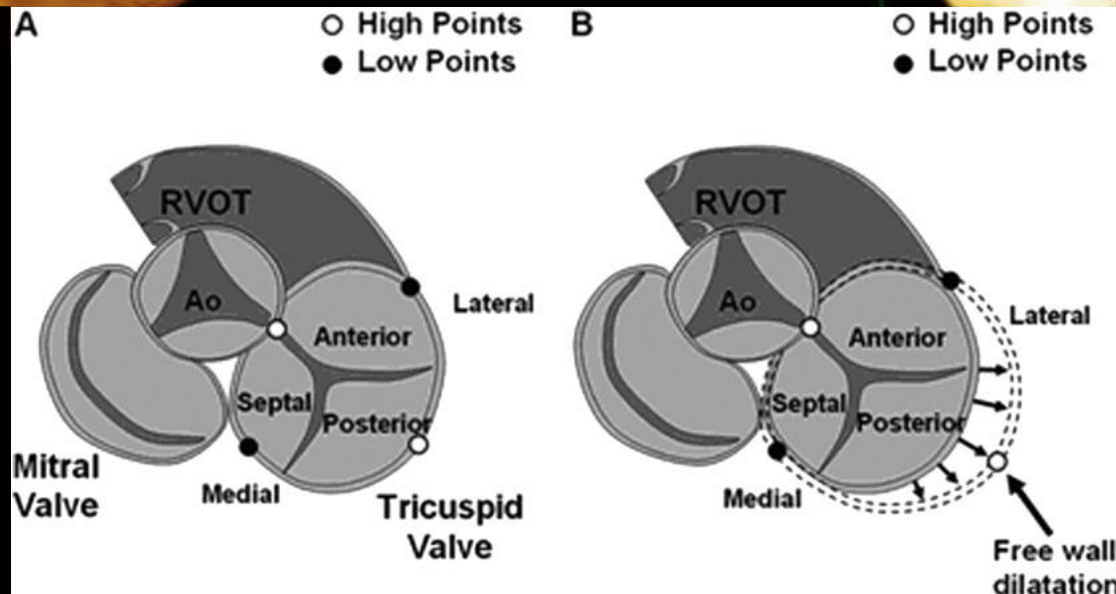
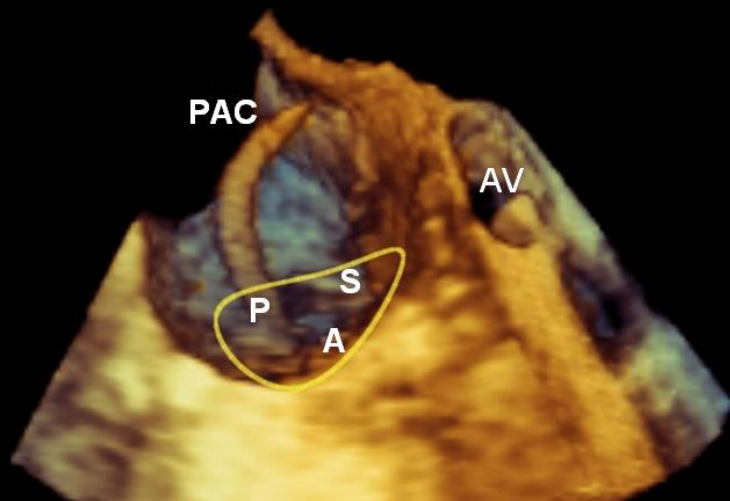
Role of ↑TV Annulus



Anatomic & Dynamic Motion of the Tricuspid Annulus

Geometric Determinants of Functional TR: Insights from 3D Echocardiography

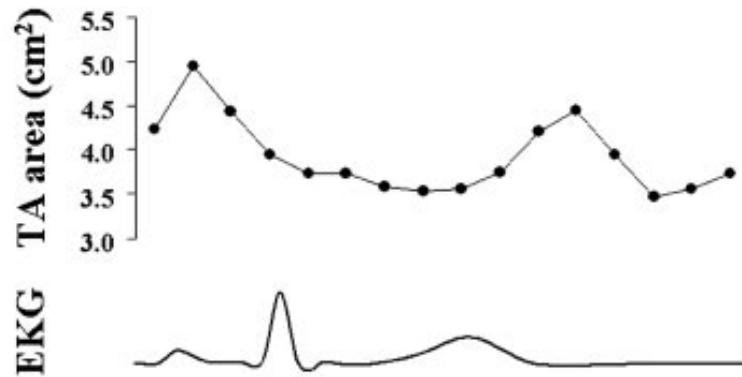
Ton-Nu. Circ 2006



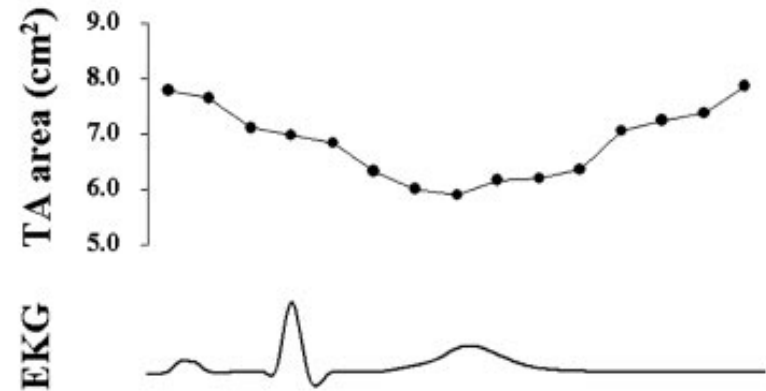
3D Geometry of the Tricuspid Annulus in Normals vs Functional Tricuspid Regurgitation

Fukuda Circ 2006

A- healthy subject



B- patient with TR



Normals: Dynamic biphasic motion with \uparrow TA in late diastole, \downarrow TA during mid-diastole and \uparrow TA from mid-systole to early diastole.

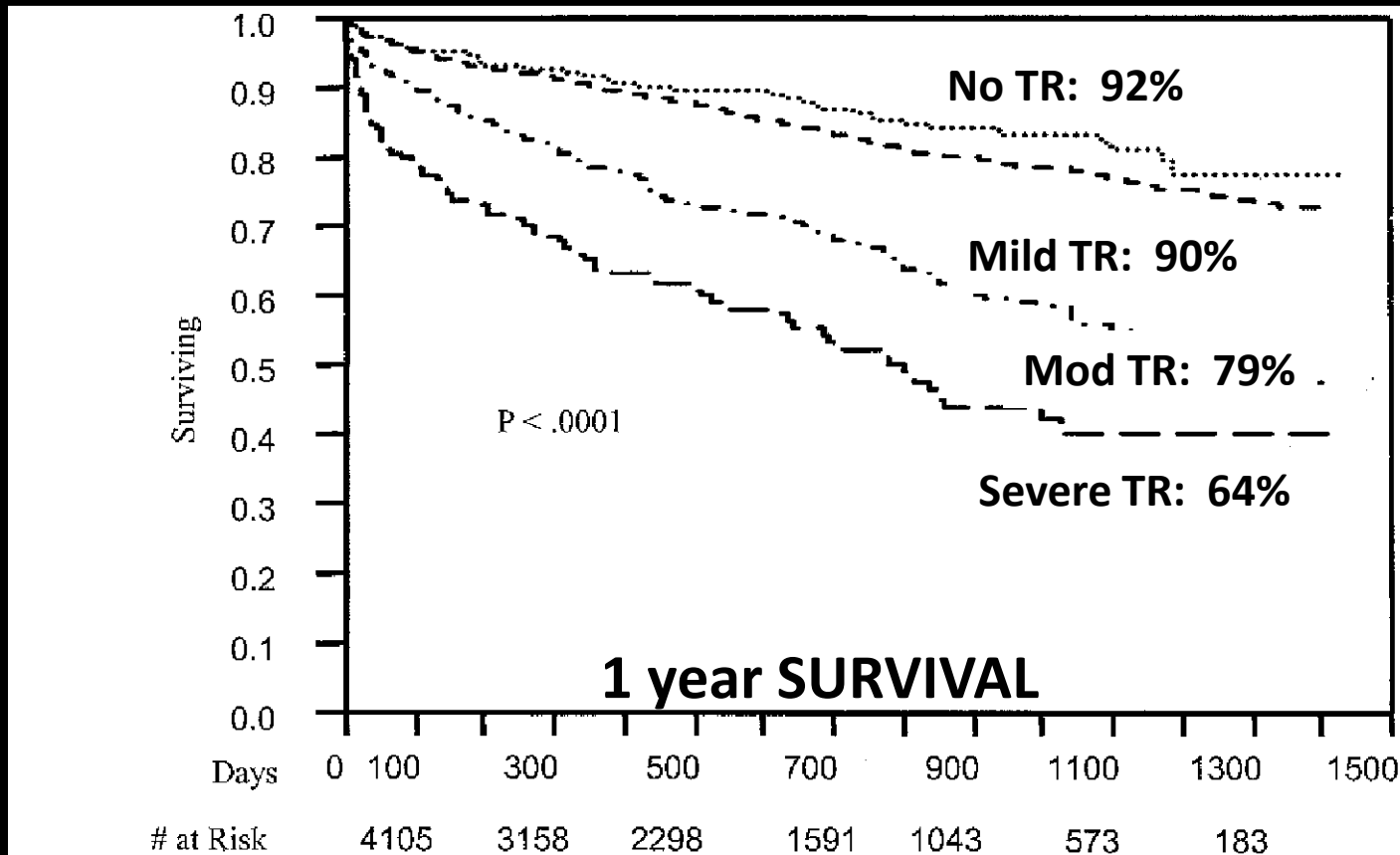
FTR: Less dynamic motion

Impact of TR on Long-Term Survival

Nath. JACC 2004

5223 pts with TR followed for 4 years

↑ Mortality with ↑ TR severity regardless of PASP



Fate of Functional TR after MV Repair for Degenerative MR

Murashita. Circ J 2013

654 MVP patients for DMVD MR (25% + TVP)

Pre-Op TR grade:

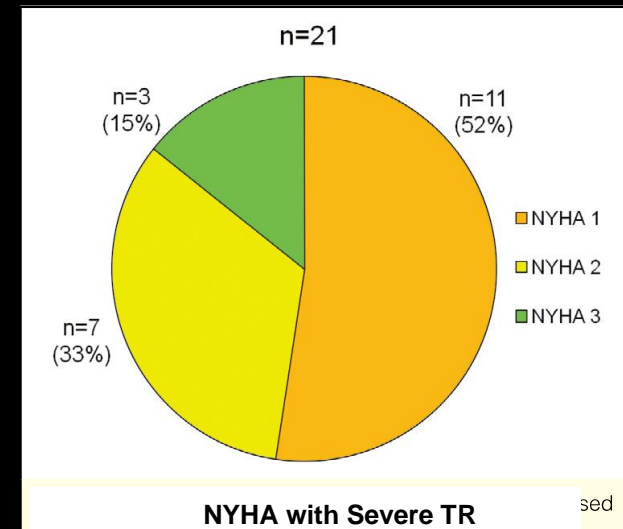
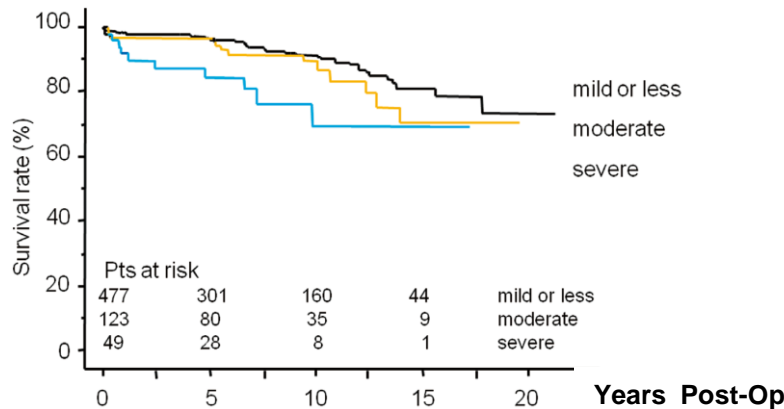
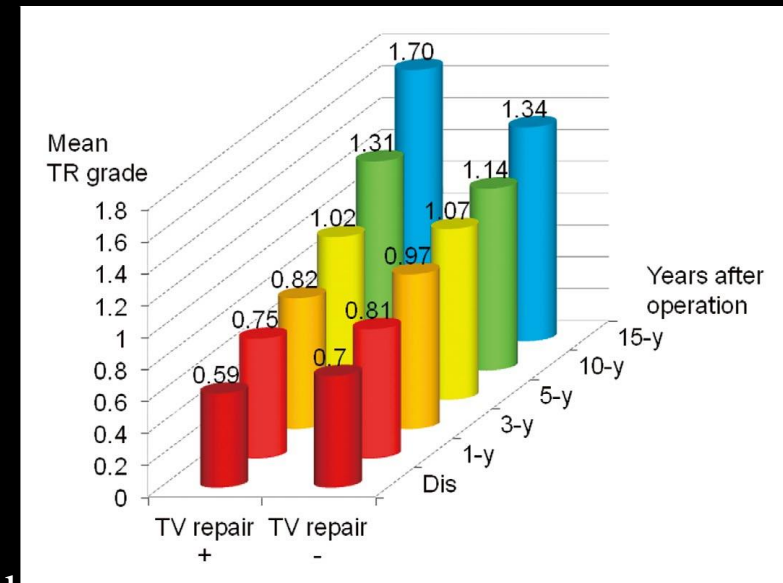
- None / Trivial / Mild (73%)
- Moderate (19%)
- Severe (8%)

Results:

- ↑ mean TR grade only after 10 years: 3 % severe TR
- Predictors of TR progression: Pre-Op AF, TR grade

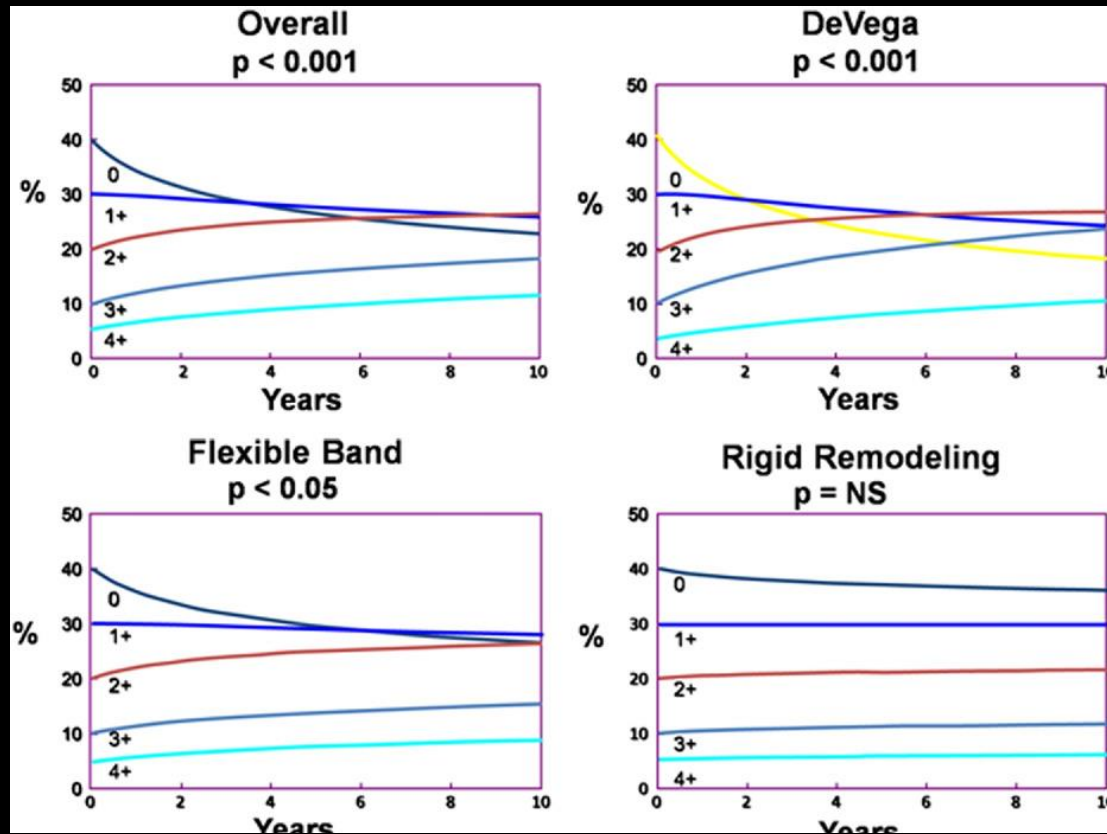
Conclusions:

Concomitant TV annuloplasty is recommended in MV surgery patients with AF or PHT, even with mild TR



TV Repair: Durability and Risk Factors for Failure

McCarthy. JTCVS 2004



Tricuspid valve annuloplasty adds little time and complexity to MV surgery and results in very few complications:

- 3+ - 4+ TR was present in 14% of patients a 1 week
- De Vega >> Flexible Band > Semi-Rigid Remodeling

Preoperative Risk Factors for Residual TR after Isolated Left-Sided Valve Surgery: A Systematic Review and Meta-Analysis

Zhu. Cardiology 2014

- A total of 3,138 patients; 11 studies
- 487 residual TR
- Predictors of residual TR:
 - Atrial Fibrillation
 - $\geq 2+$ TR
 - Rheumatic etiology
 - Enlarged LA & RA
 - Female gender
 - Older age
 - Mitral valve surgery
 - Prior valve surgery
 - Delay to surgery

Tricuspid Valve Tethering Predicts Residual TR after TV Annuloplasty

Fukuda. Circ 2005

216 TVP patients

TV annular dimension was **NOT** associated with outcome of TV annuloplasty.

Tethering distance, and pre-op TR severity were independent predictors of residual TR.

The sensitivity and specificity in predicting TR after surgery were 86% and 80% for tethering distances > 0.76 cm, and 82% and 84% for tethering areas > 1.63 cm².

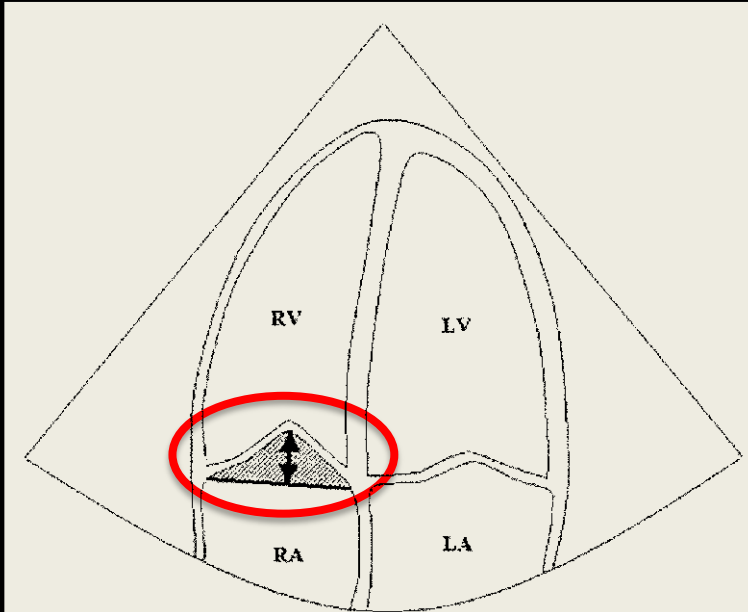


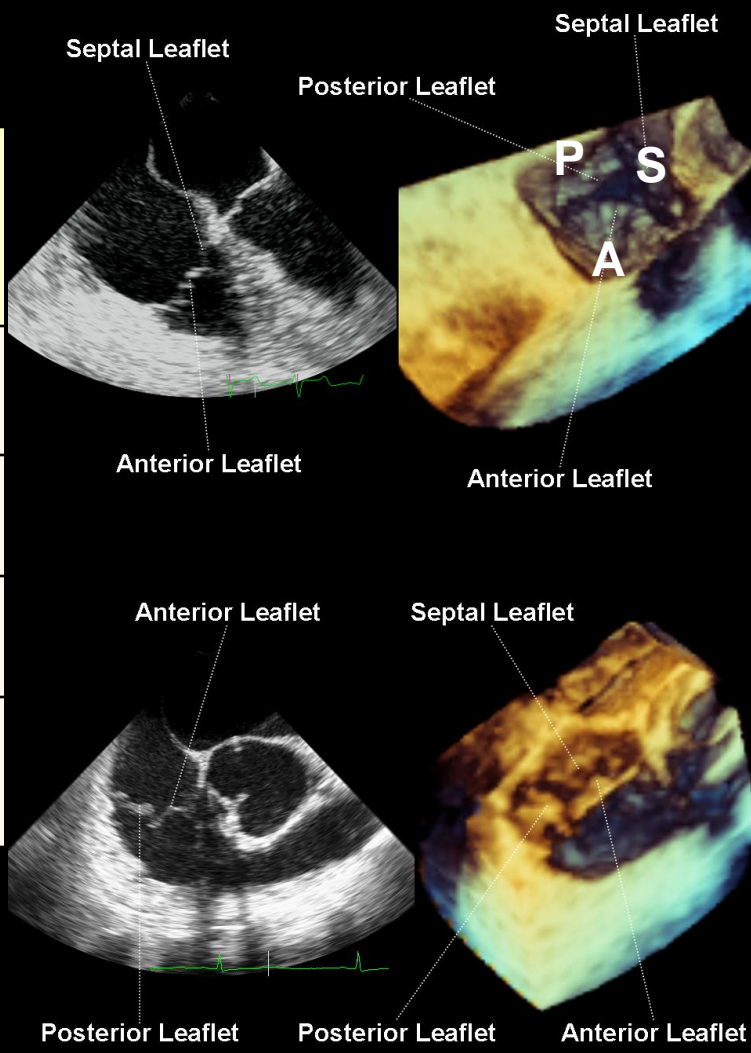
TABLE 1. Effect of Characteristic and Echocardiographic Findings on Residual TR After TV Annuloplasty

	r	Univariate P	Multivariate P
Age	0.28	<0.001	<0.001
LV ejection fraction	0.19	0.005	0.6
RV fractional area change	0.18	0.01	0.5
RA area	0.02	0.8	
RV systolic pressure	0.02	0.8	
TV annulus diameter	0.07	0.3	
TV tethering distance	0.56	<0.001	<0.001
TV tethering area	0.52	<0.001	0.4
Preoperative %TR	0.32	<0.001	<0.001

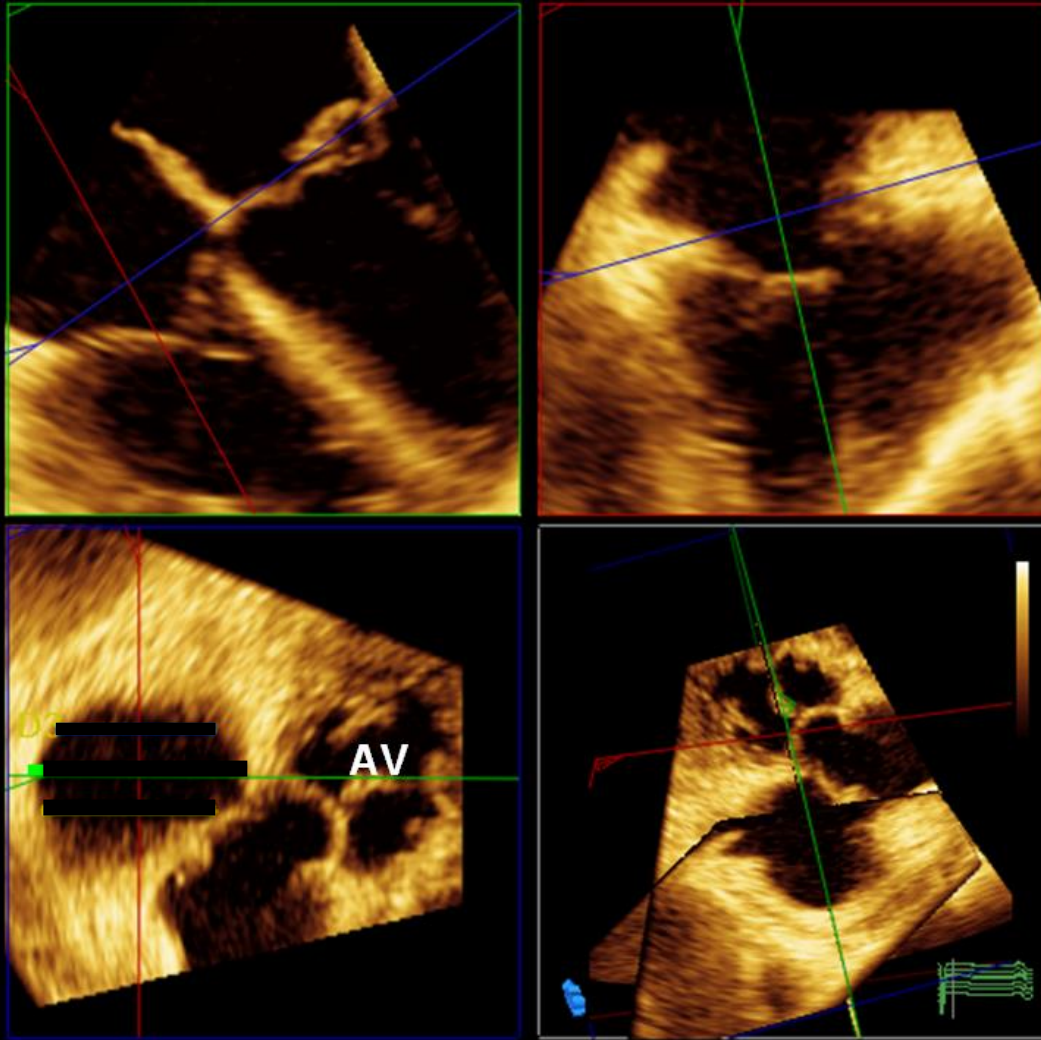
3D TEE Accurately Depicts Variability of Tricuspid Imaging Planes in Standard ASE/SCA Views

Shih R et al SCA 2012

	TV Leaflets Predicted by ASE/SCA Guidelines	Actual TV Leaflets by 3D TEE (% of patients)	Concordance between ASE/SCA and Actual
4C	Left: PL, Right: SL	Left: AL, Right: SL (92%)	8%
RVIO	Left: PL, Right: AL	Left: PL, Right: AL (85%)	85%
MBC	N/A	Left: PL, Right: AL (94%)	N/A
RVI	N/A	Top: PL, Bottom: AL (81%)	N/A



TV Annular Diameter Measurement



AHA/ACC 2014 VHD Guidelines

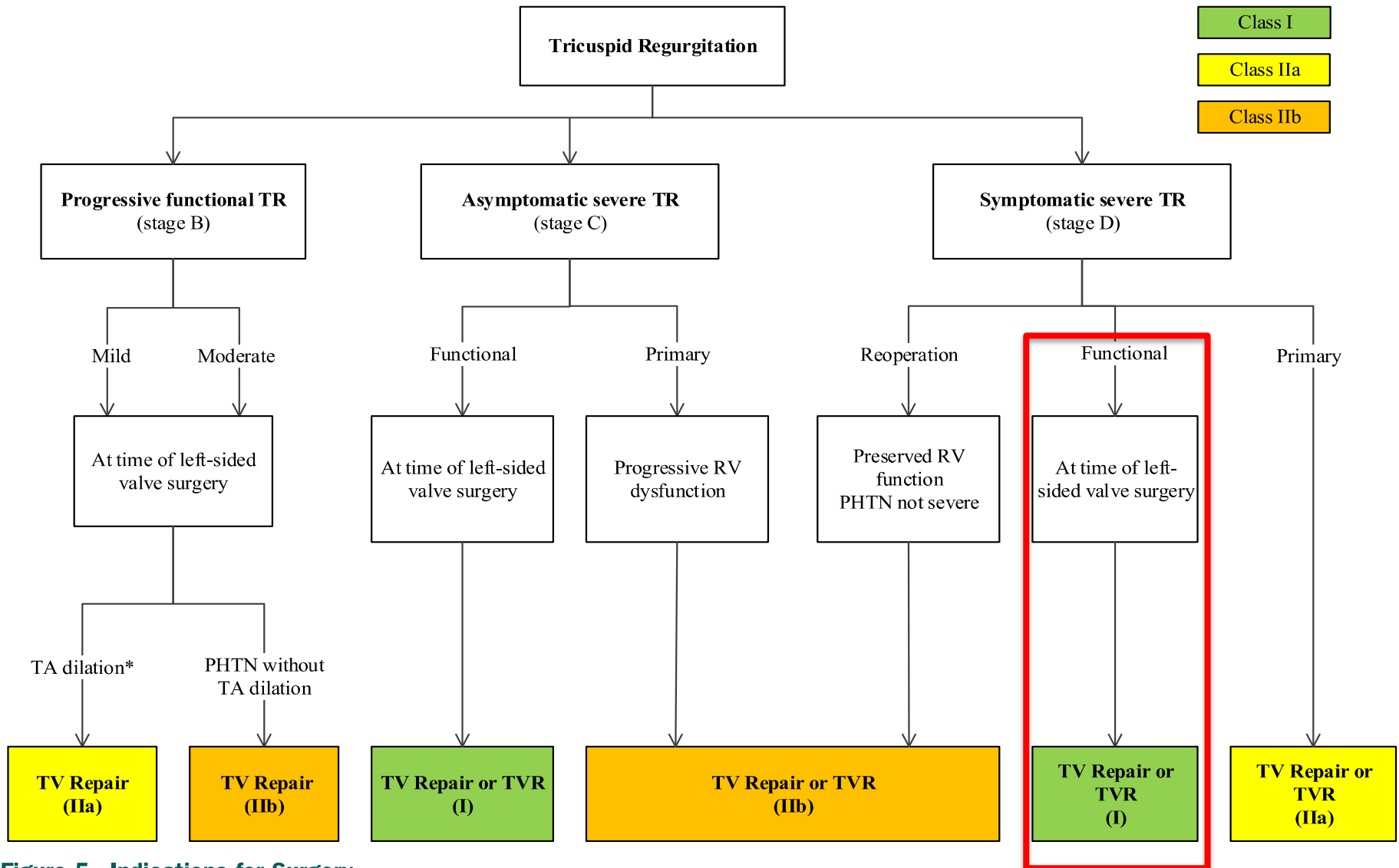


Figure 5. Indications for Surgery

TA dilation: >40 mm on TTE (>21 mm/m²), or >70 mm on direct intraoperative measurement