



Significant tricuspid regurgitation. The unknown enemy

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ATHENS BIOCLINIC

THESSALONIKI, 30-10-2015



No disclosures



A usual surgical patient

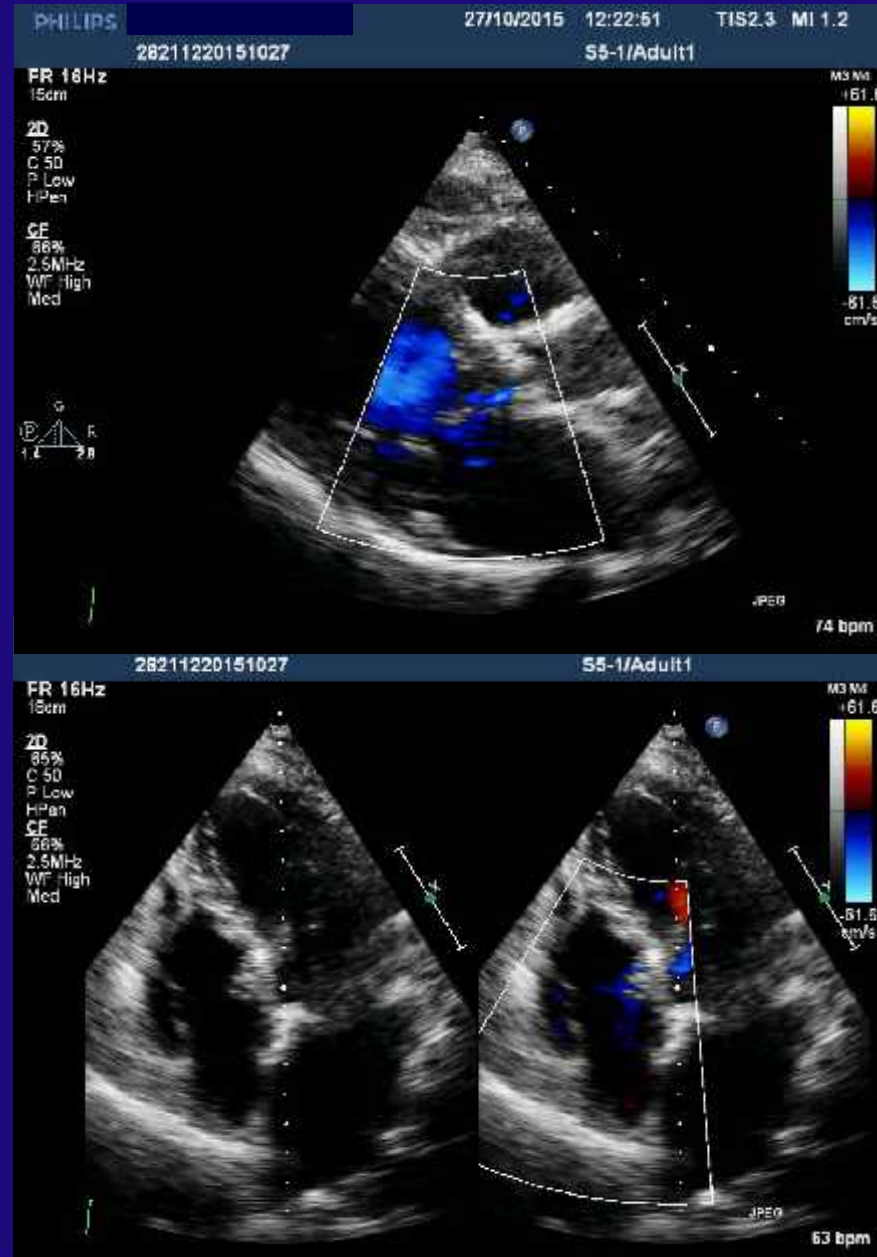
Female – 82yo

Dyspnea

No CAD

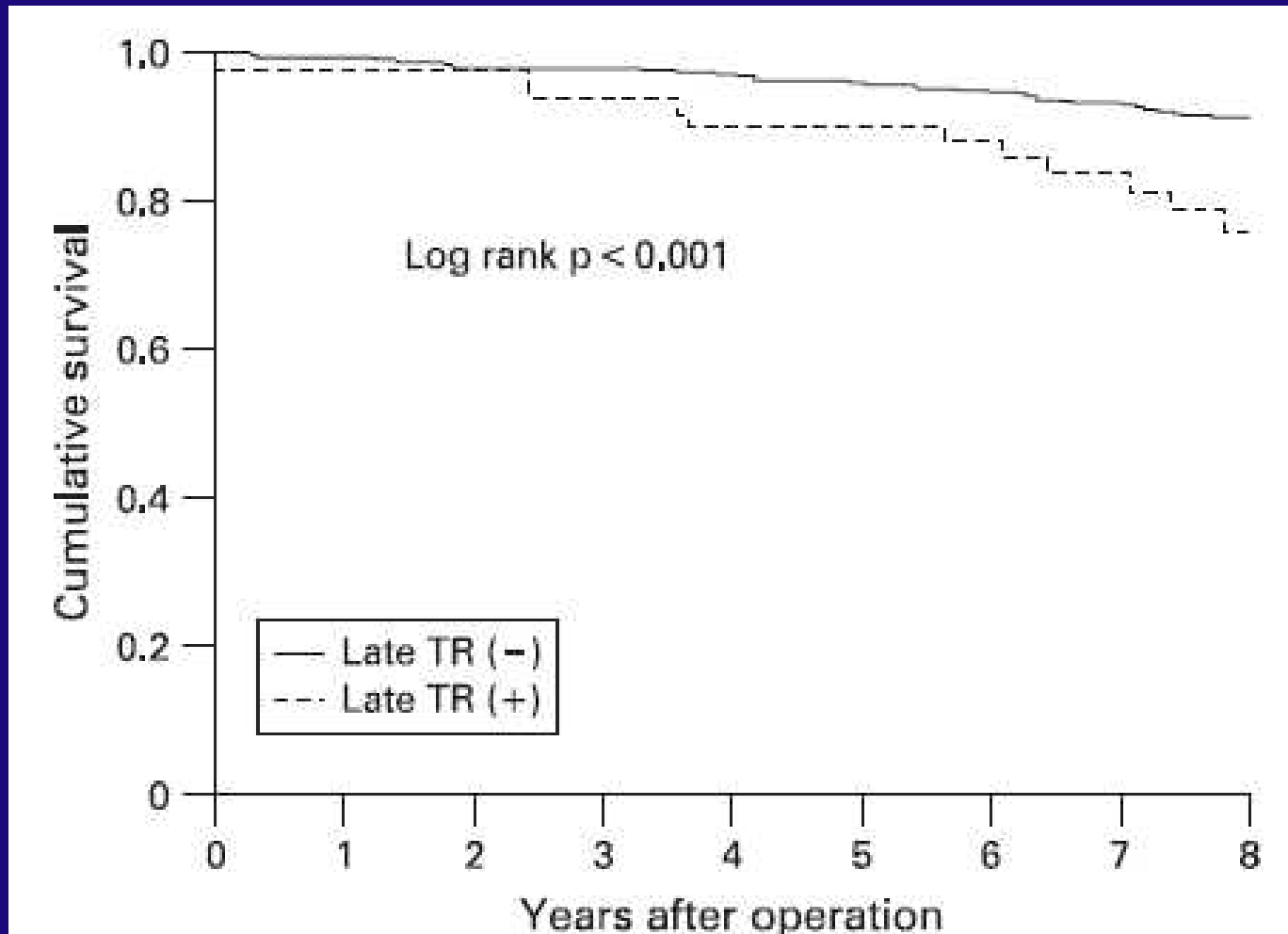
Severe AS + MR

What about the TV?





Prognosis after left-sided valve surgery

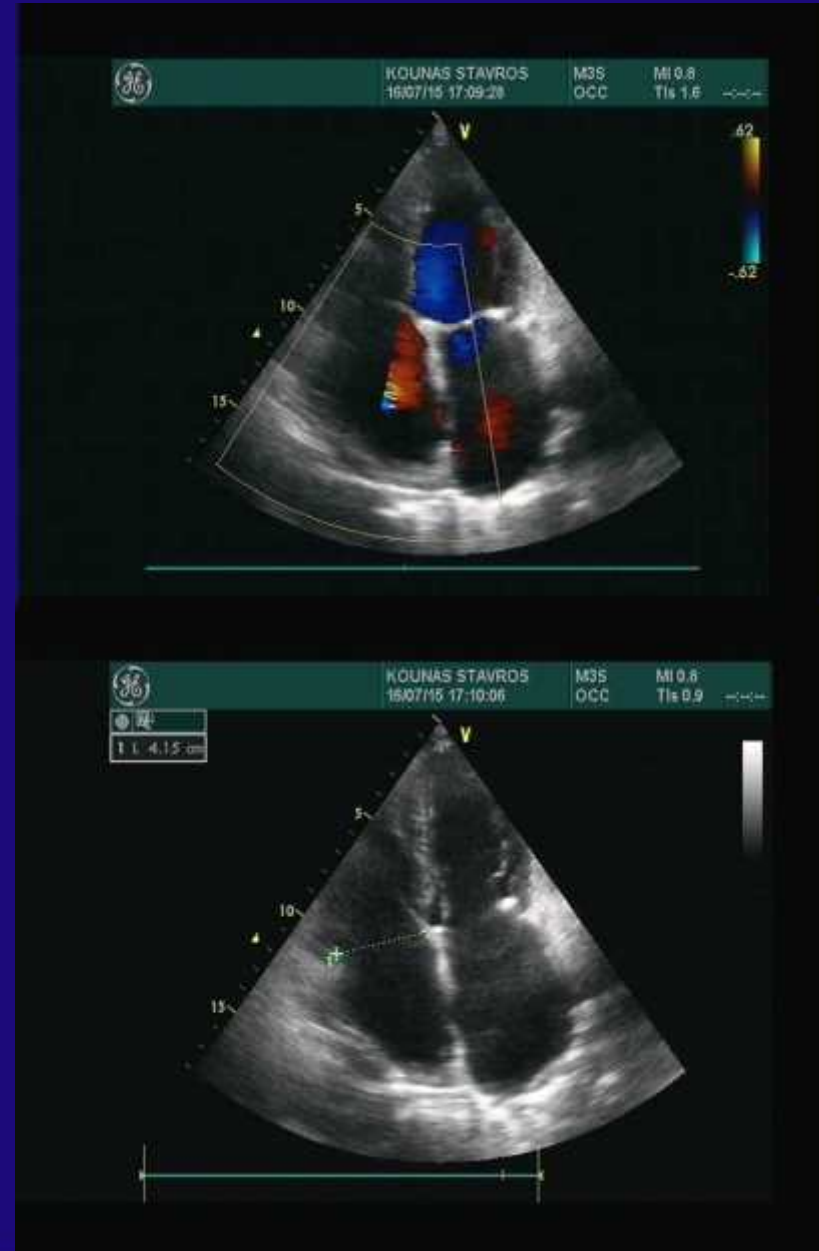


Song H, et al. Heart 2009;95:931-6.



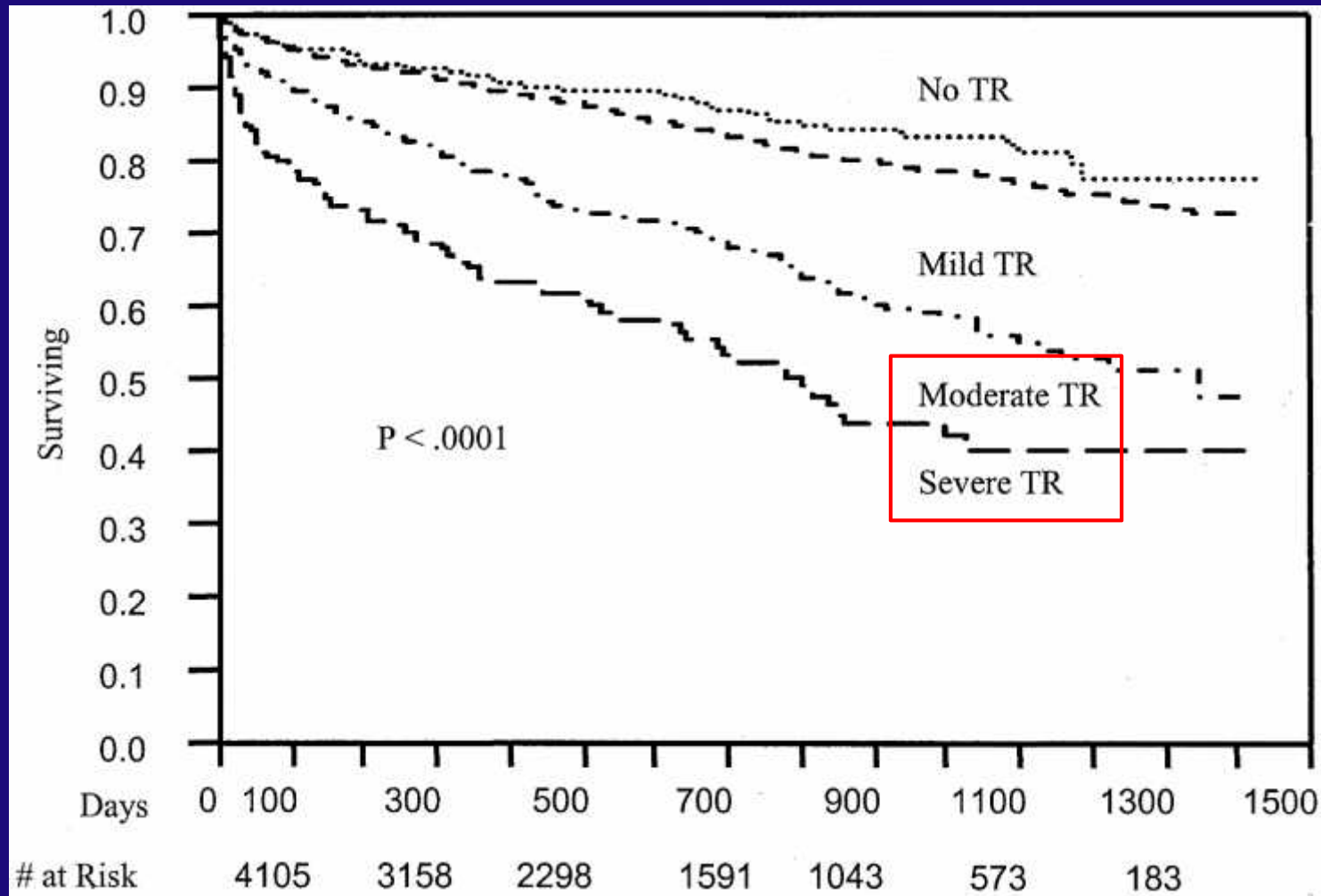
A usual patient

Female - 73yo
Chronic AF (15 years)
No CAD
Dyspnea – Leg edema
Intolerant to b-blockers
Sub-optimal rate control with
CCB+digitalis





Significant TR is a bad thing



Nath J et al. J Am Coll Cardiol 2004;43:405–409



Isolated TR

- The 10-year survival rate was lower with an ERO ≥ 40 mm² versus < 40 mm² ($38 \pm 7\%$ vs. $70 \pm 6\%$; $p < 0.0001$)
- Cardiac surgery for severe isolated TR was rarely performed (16 % at 5 years after diagnosis)

Topilsky Y, et al. JACC Cardiovasc Imaging. 2014 Dec;7(12):1185-94

- Overall and event-free survivals at 5 years were $83.5\% \pm 5.4\%$ and $77.3\% \pm 6.1\%$, respectively
- Timely surgery is advisable in patients with severe isolated TR before the development of anemia, organ dysfunction, or right ventricular dilatation

Kim JB. J Thorac Cardiovasc Surg. 2013 Aug;146(2):278-84



Facing the enemy: Causes of TR

Organic – Structural (<10%)

Rheumatic

Prolapse

Congenital (eg Ebstein anomaly)

Endocarditis

Endomyocardial fibrosis

Carcinoid deposits

Traumatic

Iatrogenic

Pace-maker/defibrillator leads

Right ventricular biopsy

Drugs

Radiation

Functional (>90%)

Left heart diseases

Primary pulmonary hypertension

Secondary pulmonary hypertension

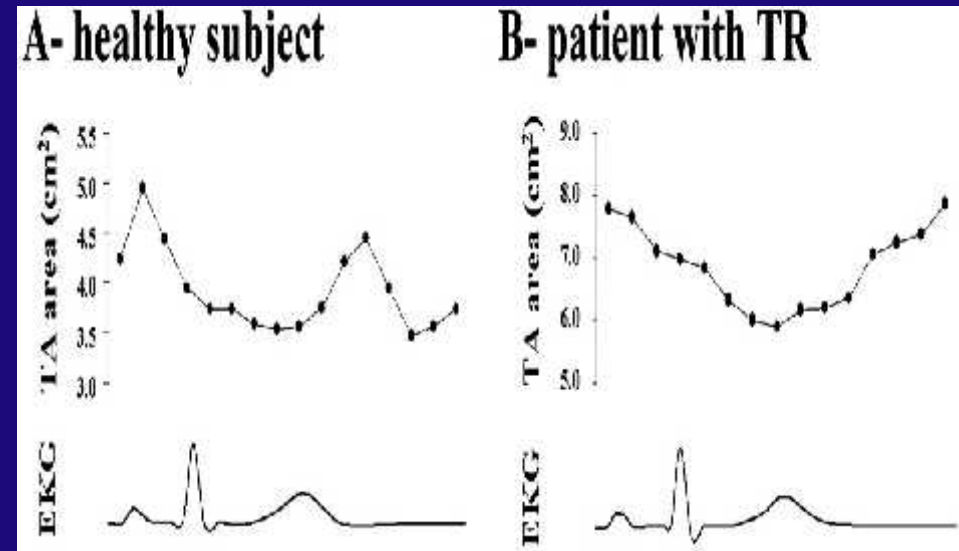
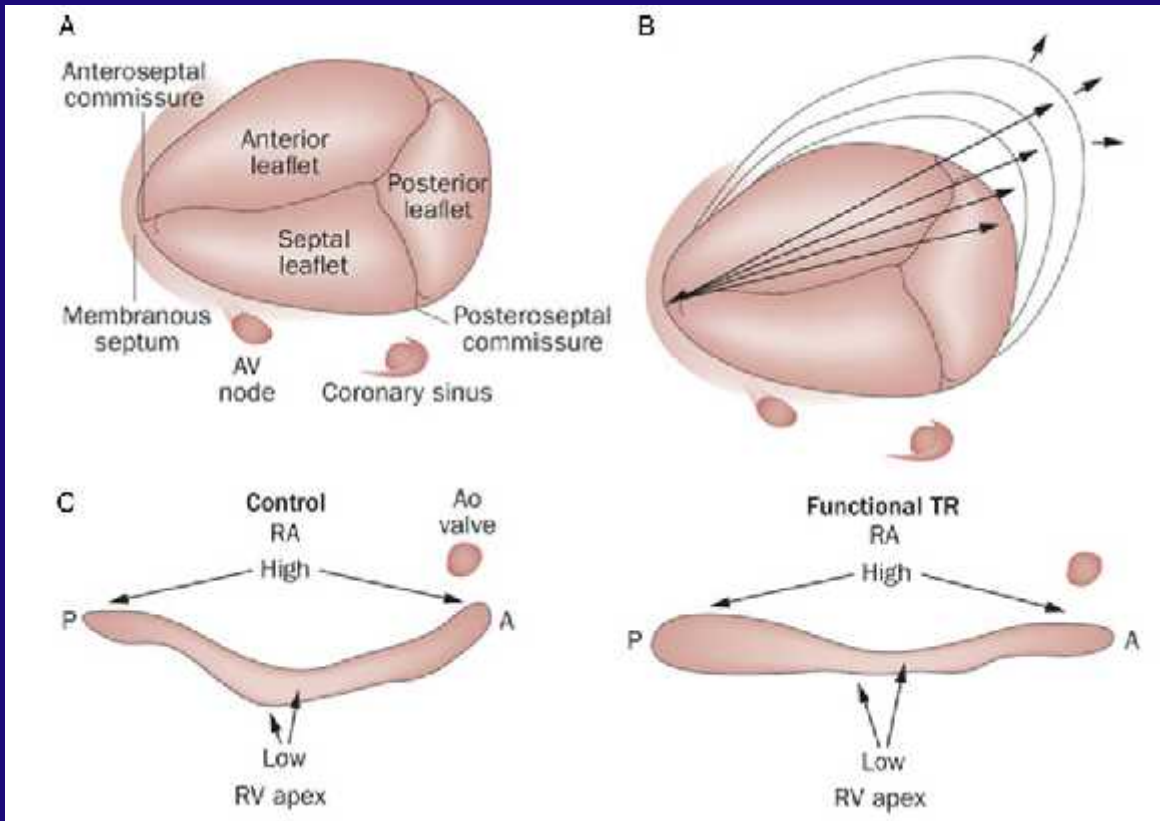
Right ventricular dysfunction

Atrial fibrillation

Cardiac tumours



Studying the enemy

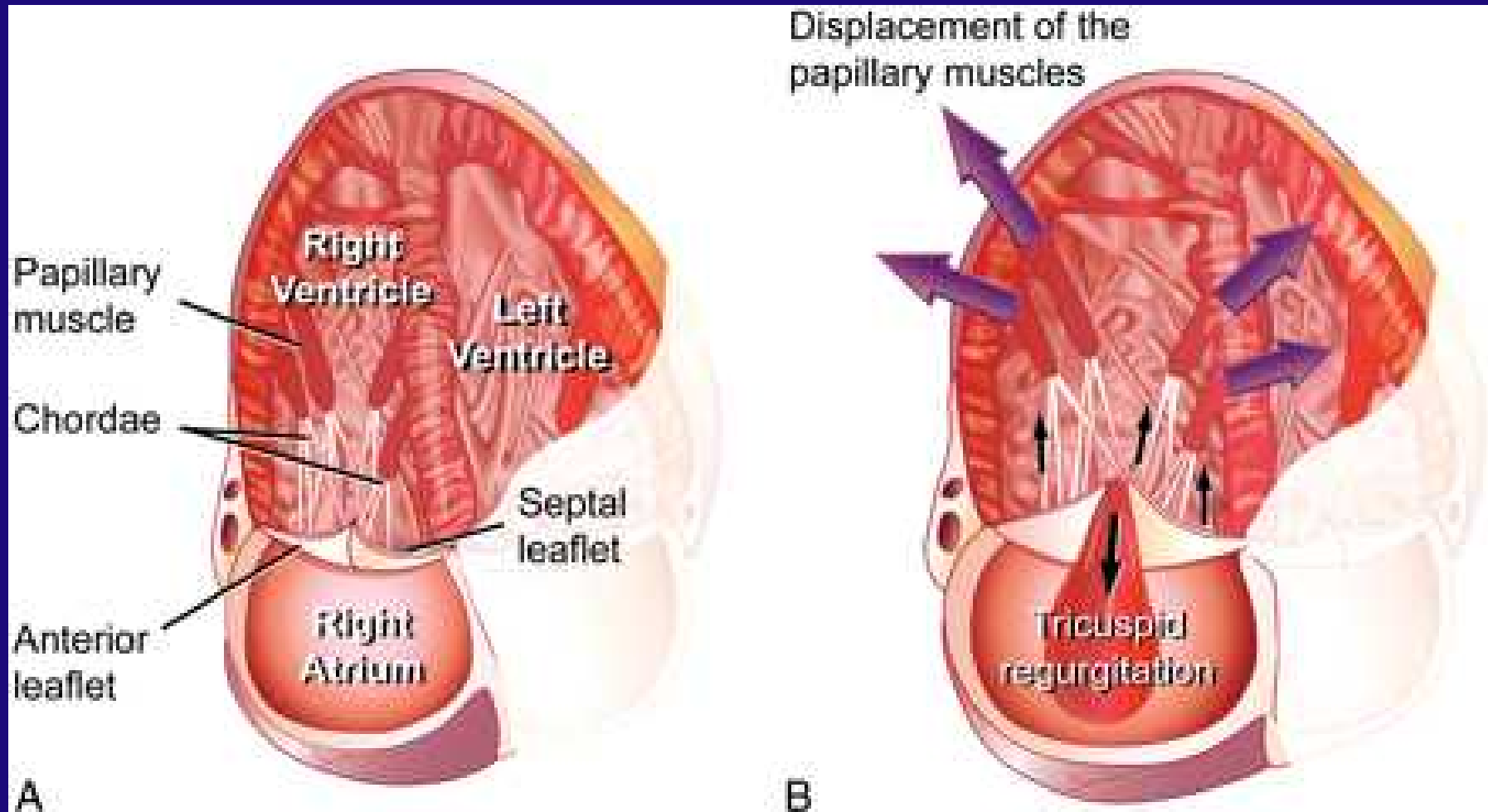


Tornos Mas P, et al. Heart 2015;101:1840–1848

Fukuda et al. Circulation 2006;114:1492–8.



Complex interaction





Other contributors for TR

Unadjusted and adjusted conditional logistic regression model for TR progression

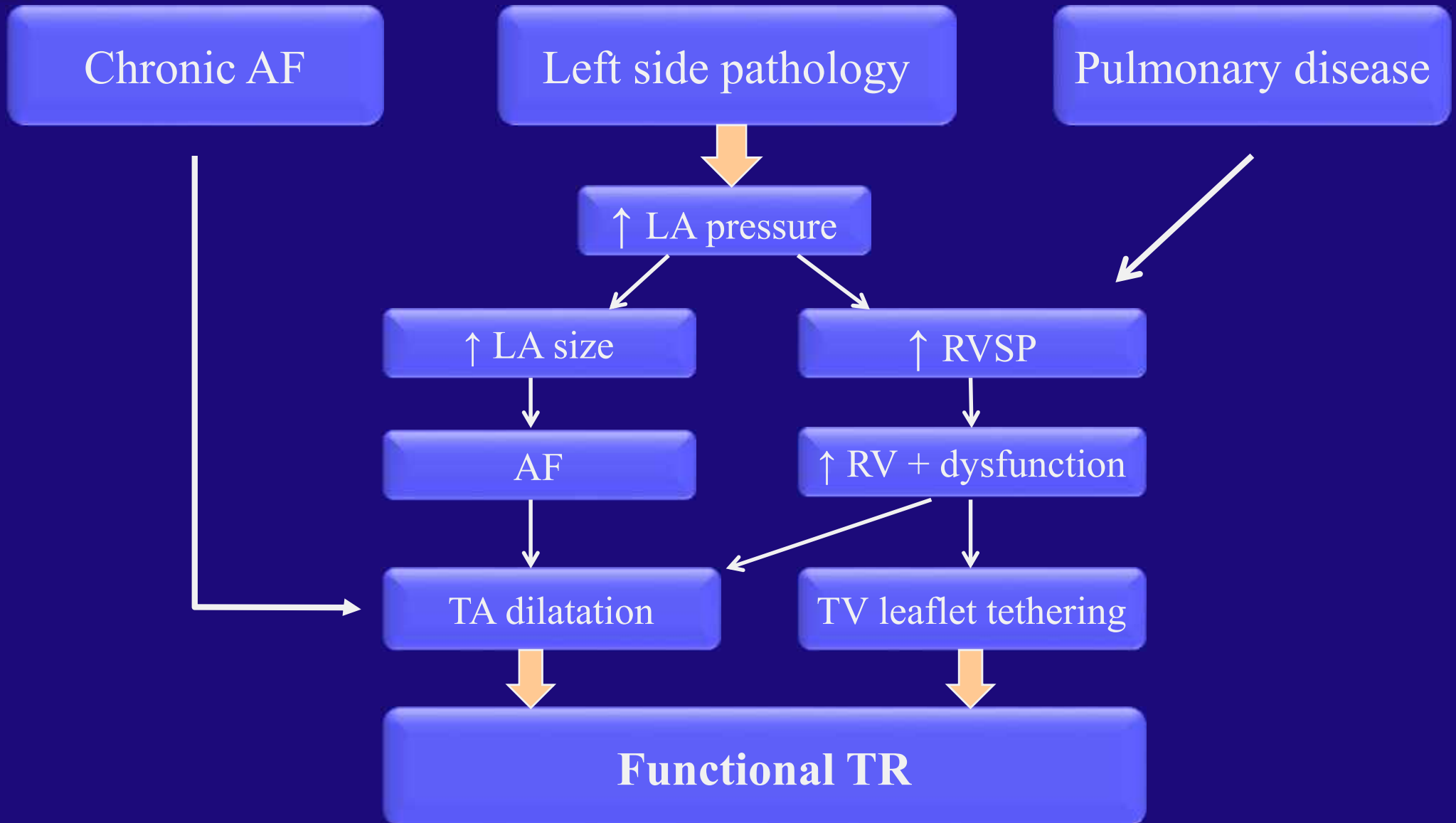
Variable	Unadjusted OR (95% CI)	p Value	Adjusted OR (95% CI)	p Value
PASP change (per 1 mm Hg)	1.12 (1.07–1.18)	<0.0001	1.14 (1.06–1.23)	<0.0001
Permanent AF	5.86 (2.63–13.06)	<0.0001	14.30 (4.63–44.19)	<0.0001
Heart failure	2.50 (1.40–4.46)	0.002	—	—
CAD	2.00 (1.05–3.80)	0.034	5.65 (1.40–22.80)	0.015

CI = confidence interval; OR = odds ratio.

Shiran A, et al. Am J Cardiol 2014;113:995–1000.

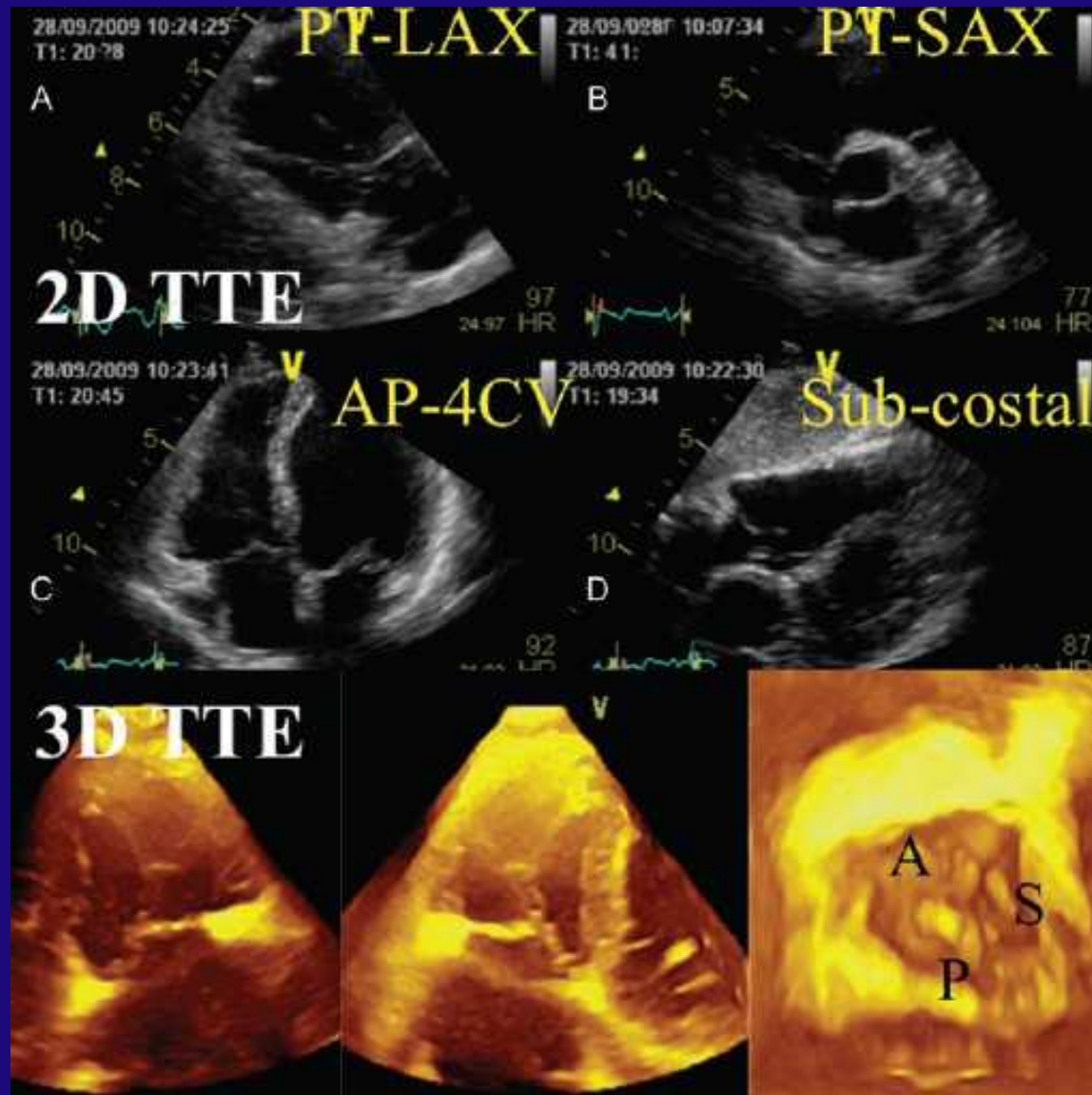


Complex Interplay



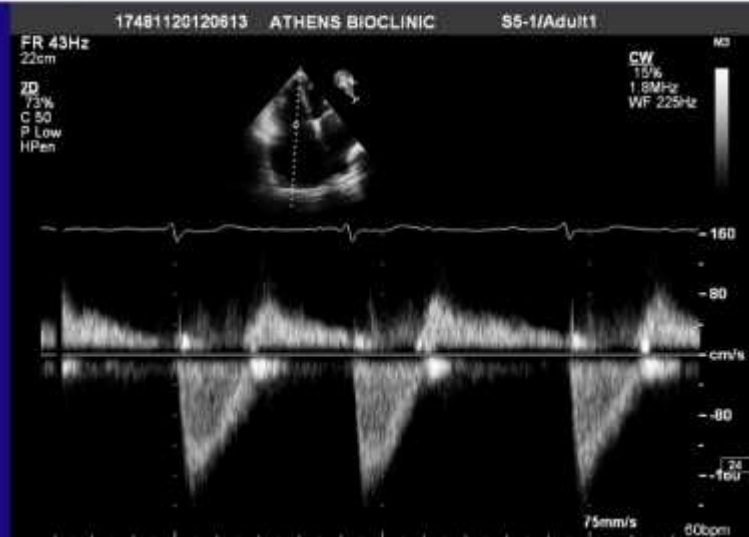


Assessment





Parameters	Mild	Moderate	Severe
Qualitative			
Tricuspid valve morphology	Normal/abnormal	Normal/abnormal	Abnormal/flail/large coaptation defect
Colour flow TR jet ^a	Small, central	Intermediate	Very large central jet or eccentric wall-impinging jet
CW signal of TR jet	Faint/parabolic	Dense/parabolic	Dense/triangular with early peaking (peak <2 m/s in massive TR)
Semi-quantitative			
VC width (mm) ^a	Not defined	<7	>7
PISA radius (mm) ^b	≤5	6–9	>9
Hepatic vein flow ^c	Systolic dominance	Systolic blunting	Systolic flow reversal
Tricuspid inflow	Normal	Normal	E-wave dominant (≥1 m/s) ^d
Quantitative			
EROA (mm ²)	Not defined	Not defined	≥40
R Vol (mL)	Not defined	Not defined	≥45
+ RA/RV/IVC dimension ^e			

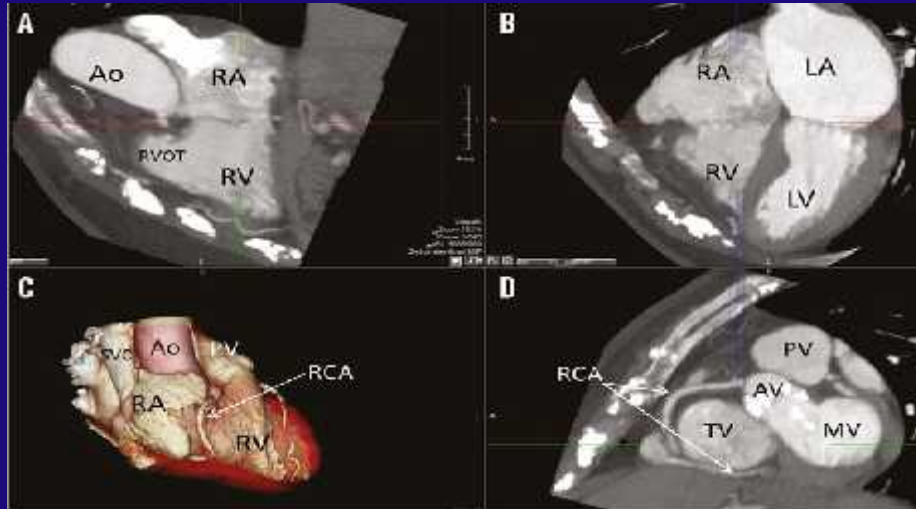
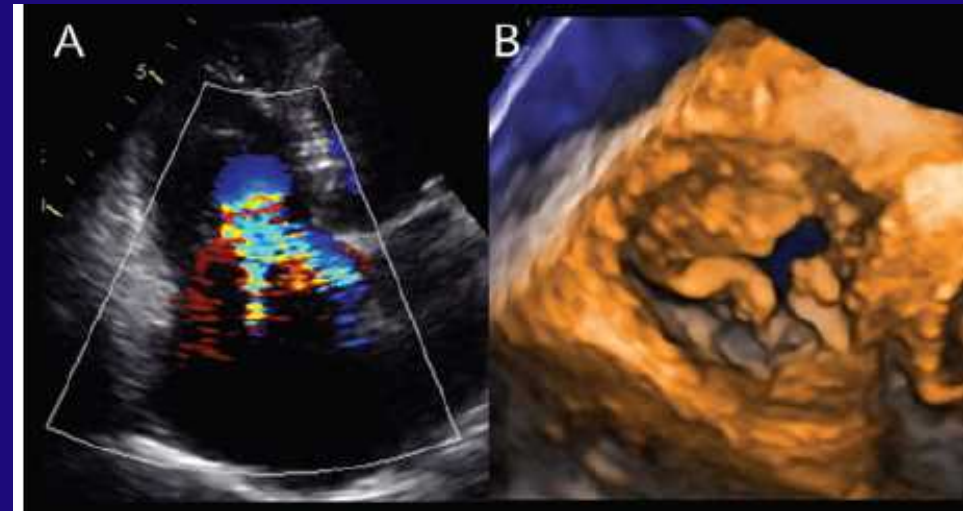


Lancellotti P. EHJ– Cardiovascular Imaging (2013) 14, 611–644



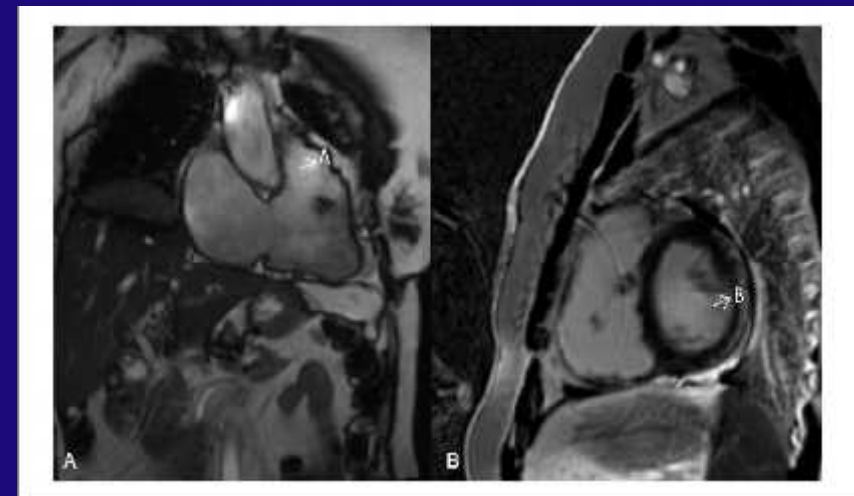
Multimodality imaging assessment

Echo to detect / diagnose / follow up



Cardiac CT for extra insights

CMR to follow up RV size - function





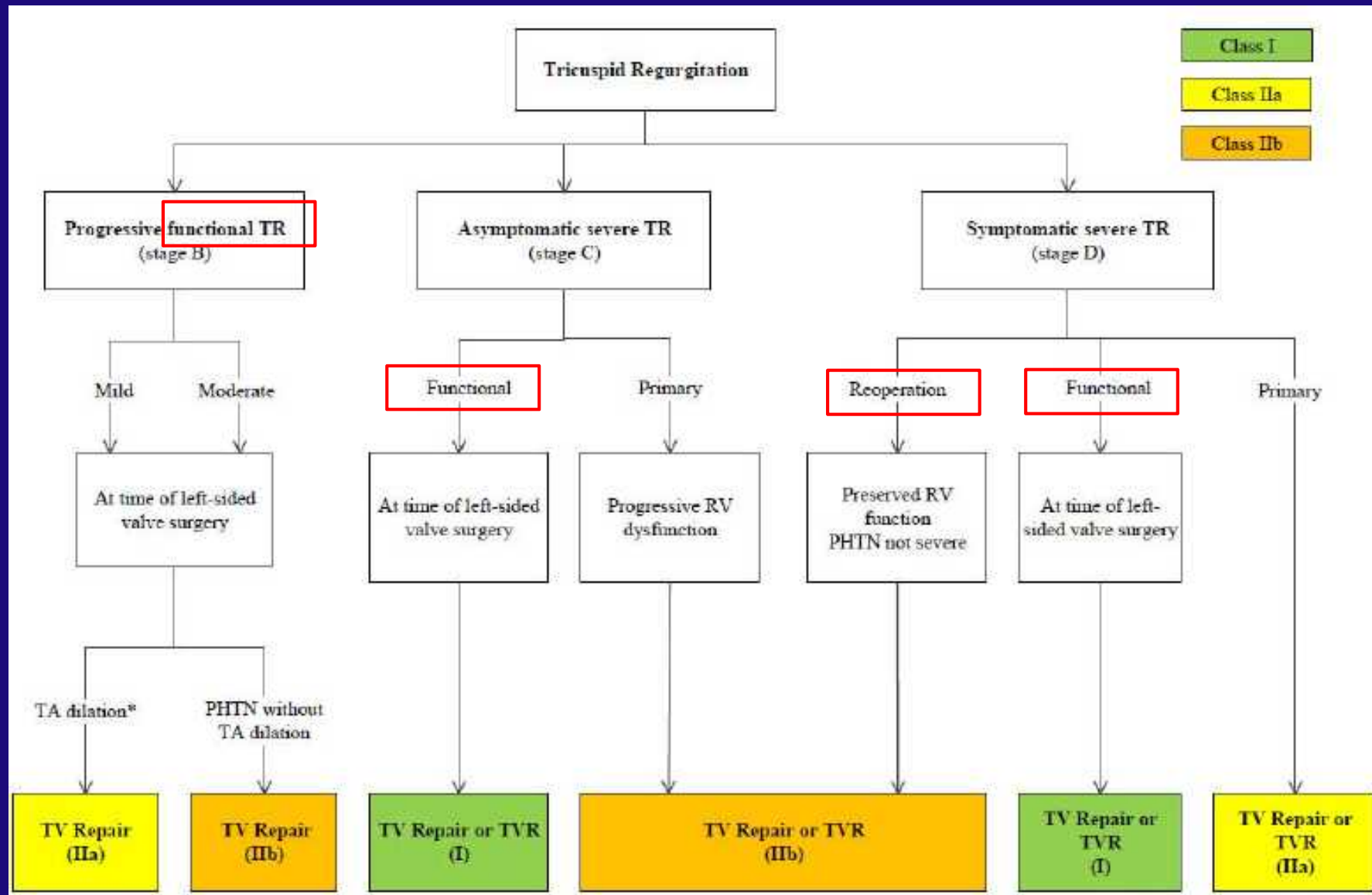
ESC Guidelines 2012

Table 16 Indications for tricuspid valve surgery

	Class ^a	Level ^b
Surgery is indicated in symptomatic patients with severe TS. ^c	I	C
Surgery is indicated in patients with severe TS undergoing left-sided valve intervention. ^d	I	C
Surgery is indicated in patients with severe primary or secondary TR undergoing left-sided valve surgery.	I	C
Surgery is indicated in symptomatic patients with severe isolated primary TR without severe right ventricular dysfunction.	I	C
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/m ²) undergoing left-sided valve surgery.	IIa	C
Surgery should be considered in asymptomatic or mildly symptomatic patients with severe isolated primary TR and progressive right ventricular dilatation 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

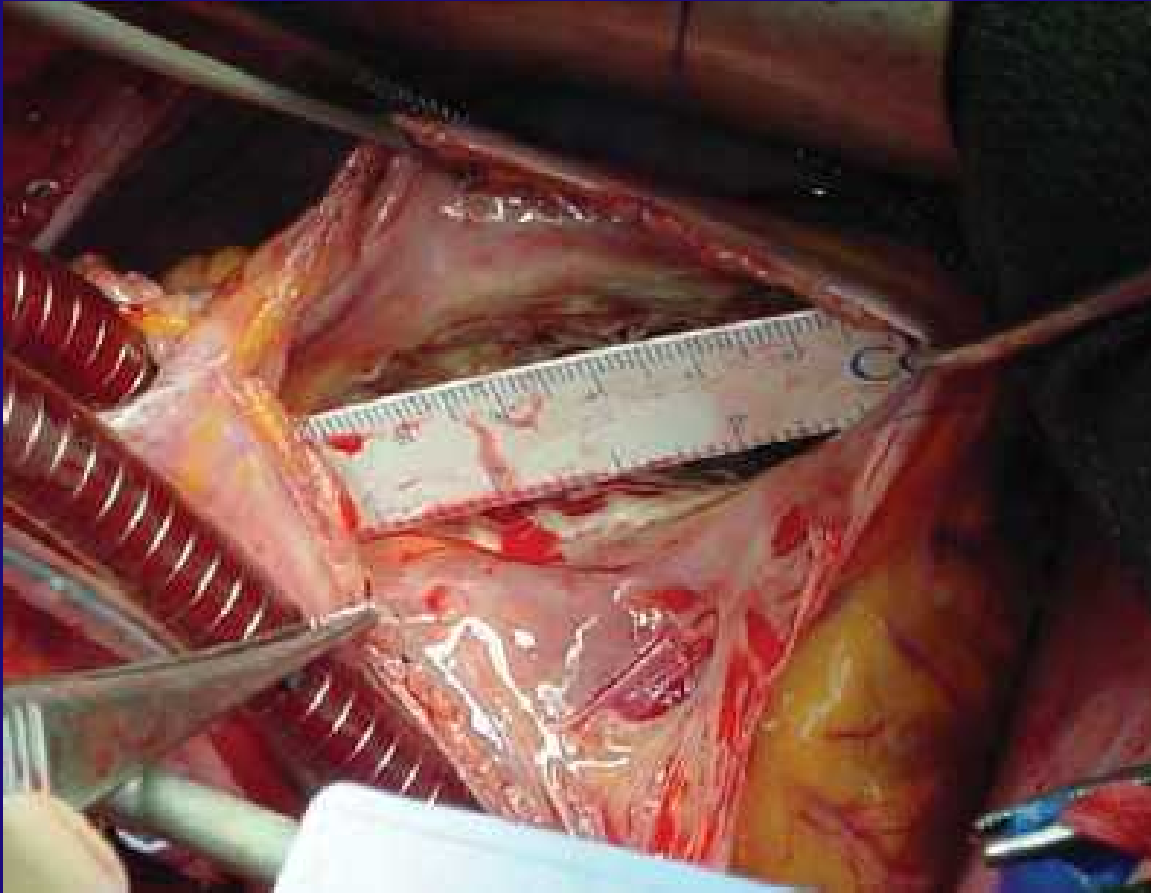


AHA/ACC Guidelines 2014





At the time of left side surgery



Pre-op echo:

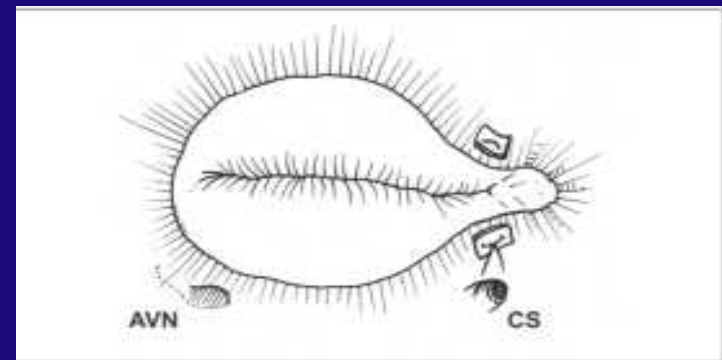
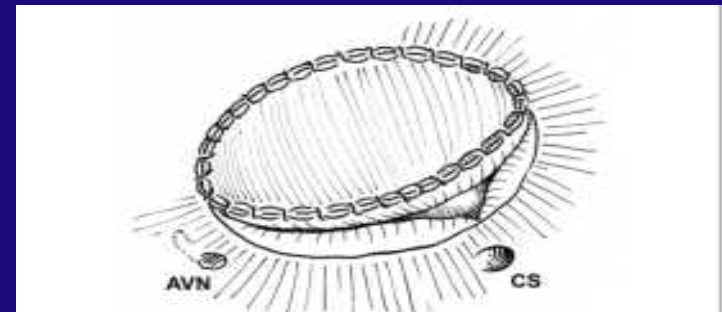
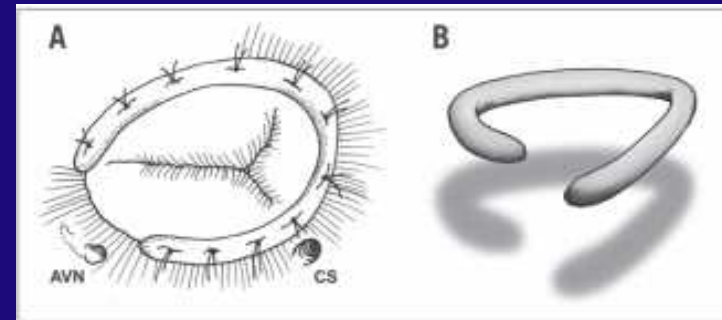
TV annulus – 4ch view
> 40mm or >21mm/m²

Dreyfus G et al. Ann Thorac Surg. 2005;79:127-32

*Benedetto U, et al.
J Thorac Cardiovasc Surg. 2012;143:632-8.*

Surgical techniques

Category	Techniques
Annuloplasty techniques	De Vega annuloplasty Prosthetic ring/band annuloplasty
Leaflet repair techniques	Clover technique Tricuspid leaflet augmentation
Other surgical repair techniques	Double orifice valve technique Posterior annular bicuspidisation
Tricuspid valve replacement	Prosthetic tricuspid valve replacement (mainly biological)





Determinants of Recurrent or Residual Functional TR after annuloplasty

TABLE 2. Echocardiographics Predictors of \geq Moderate TR Midterm After TV Annuloplasty

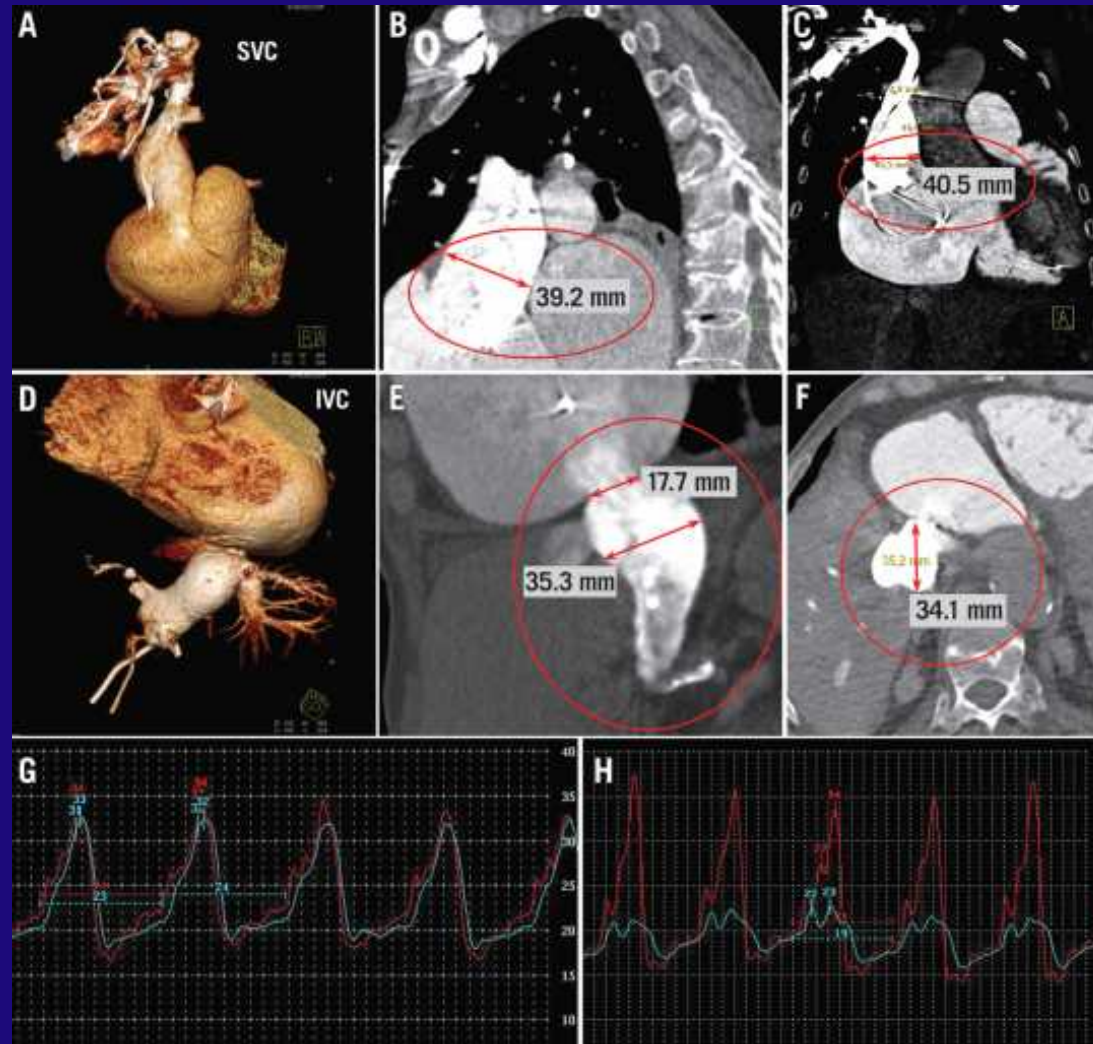
	Cut-Off Value	Sensitivity	Specificity	Area Under Curve
Precoperative TV tethering height (cm)	0.51	75%	78%	0.81
Precoperative TV tethering area (cm ²)	0.80	83%	85%	0.82
Postoperative LV ejection fraction (%)	36.6	75%	93%	0.88
Postoperative TR severity (%TR)	13.0	75%	67%	0.75

LV indicates left ventricle; TR, tricuspid regurgitation; TV, tricuspid valve.

Fukuda S et al. Circulation. 2006;114[suppl I]:I-582–I-587.



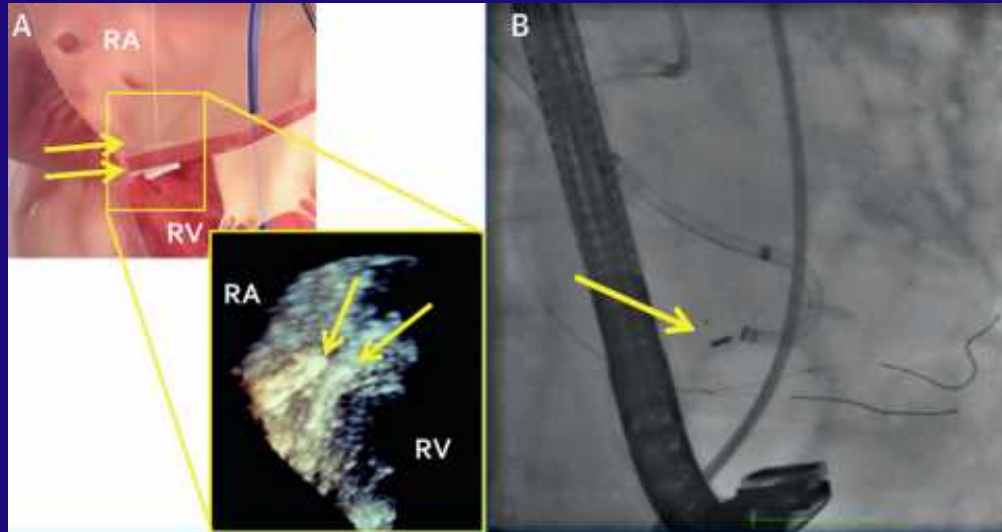
Transcatheter therapy



Lauten A et al. EuroIntervention 2015;W133-136



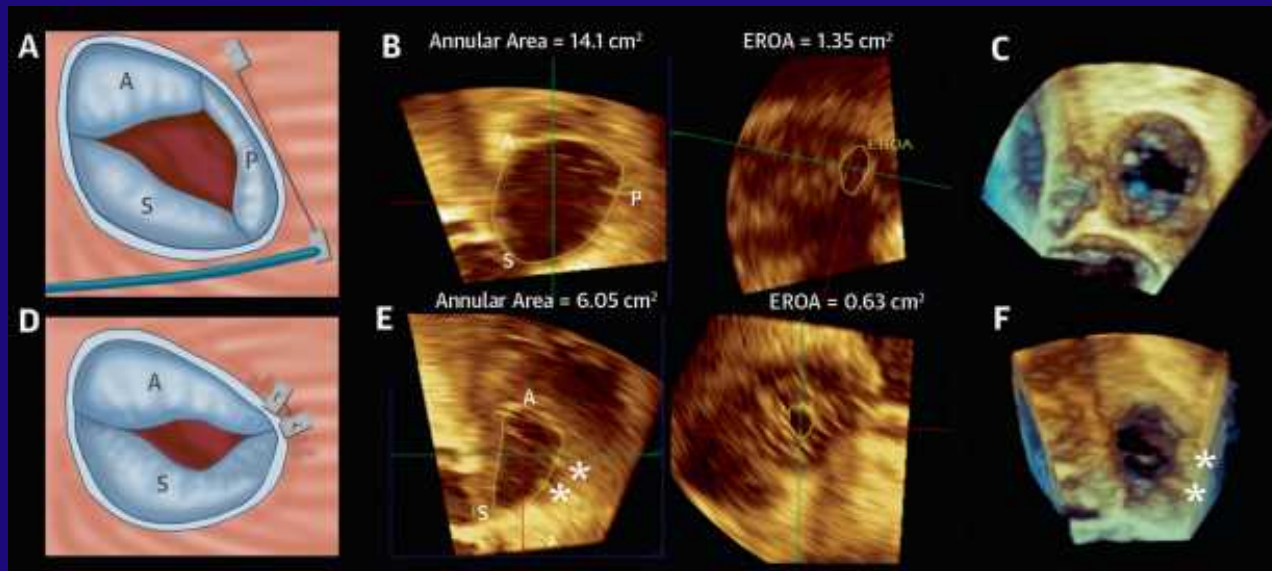
Transcatheter therapy



The Mitralign Percutaneous Annuloplasty System
(Mitralign, Tewksbury, MA, USA)

Schofer J et al. JACC. 2015;65:1190-5

Also...

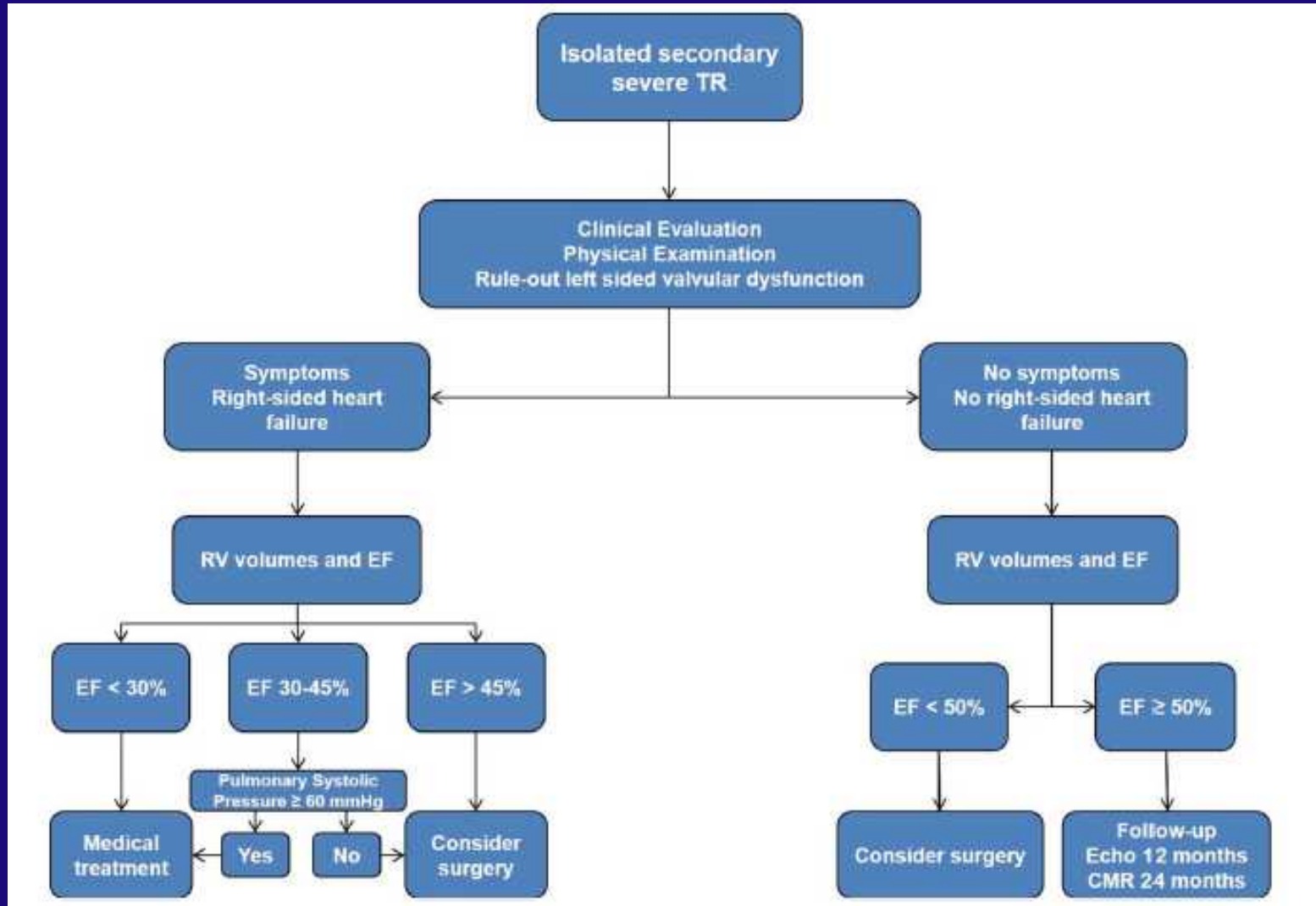


Millipede annular ring
Ann Arbor, MI, USA)

TriCinch System™ (4Tech
Cardio Ltd, Galway,
Ireland)



Summary





Key messages

- Significant (usually secondary) TR is a serious and progressive condition.
- Tricuspid repair should be considered at the time of surgery for left-valve disease in cases of more than trivial TR and dilated annulus.
- Close follow-up of the RV function is needed in patients with previous surgery or isolated severe TR in order to intervene timely.

Ευχαριστώ για την προσοχή σας!

