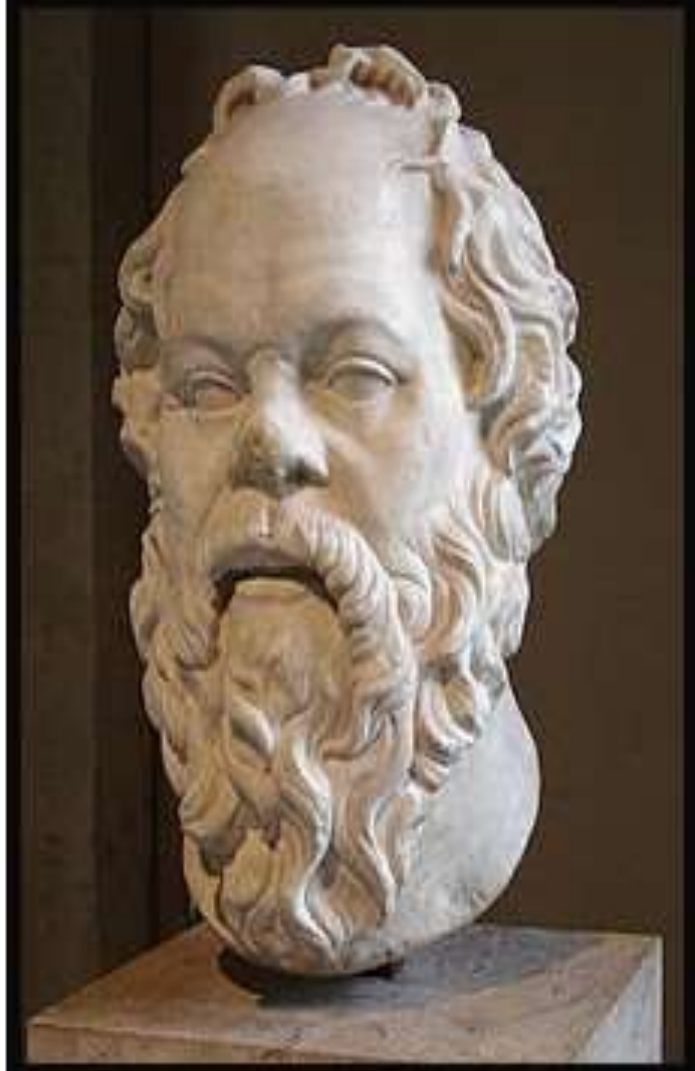
Ciddi Trikuspidal çatışmazlığında mövcud müalicə üsulları

DR. FESC. Cəmil Babayev (Baku Medikal Plaza, Liv BONA DEA)



To know, is to know that you know nothing. That is the meaning of true knowledge.

(Socrates)

Birincili Trikuspid Çatışmazlığı: Birbaşa qapaq aparatının zədələnməsinə bağlıdır (10%):

- Yatrogenikdir:

* PM/İCD/CRT

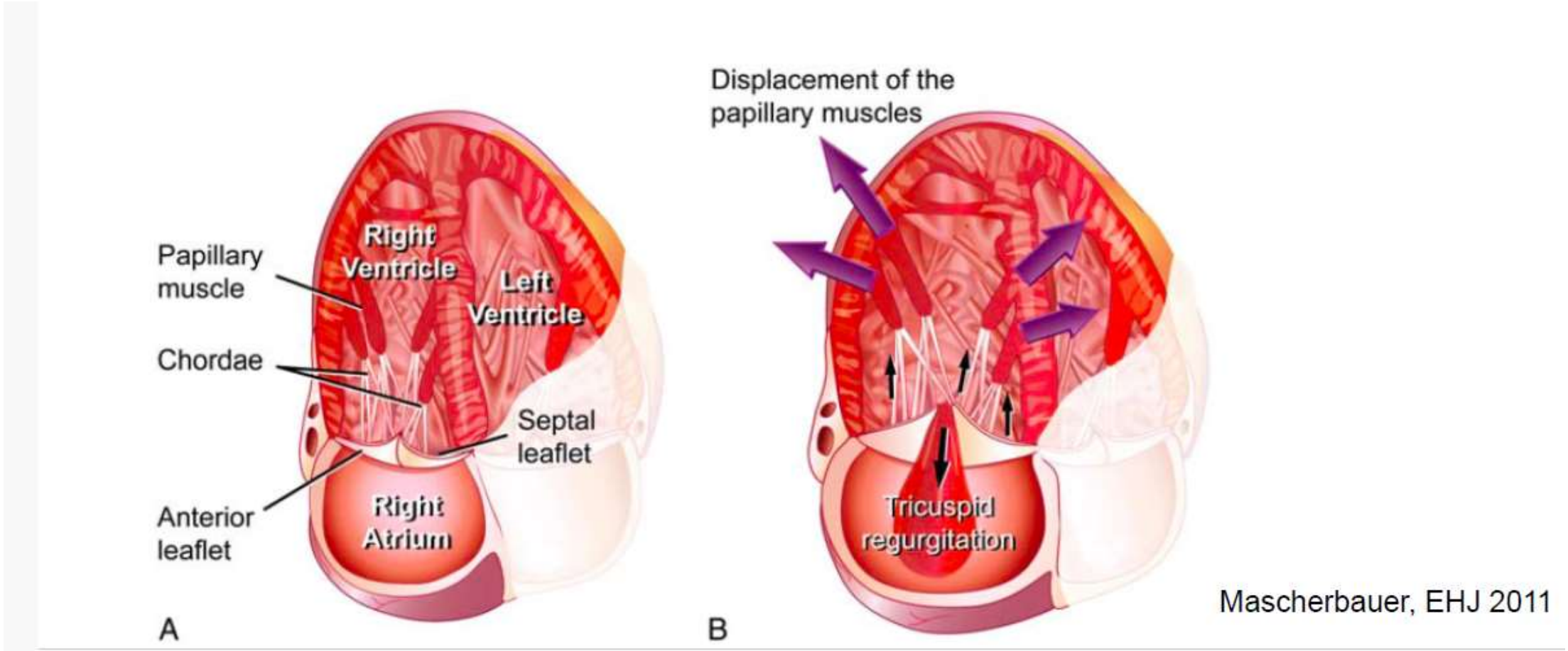
- Qapaq tayların qopması (travma)
- İnfeksiya:

* Endokardit
* Revmatik xəstəliklər

- Anadangəlmə ürək qüsuru:

* Ebstein anomaliyası
* Marfan sindromu

İkincili Trikuspid Çatışmazlıqlar tikuspid anulusun və ya qapaq dilatasiyasına bağlıdır (90%)



Trikuspid qapaq anatomiyası:

State of the Art
by EuroIntervention

EuroIntervention 2021;17:791-808

Transcatheter treatment for tricuspid valve disease

Fabien Praz[1]*, MD; Denisa Muraru[2], MD; Felix Kreidel[3], MD; Philipp Lurz[4], MD; Rebecca T. Hahn[5], MD; Victoria Delgado[6], MD; Michele Senni[7], MD; Ralph Stephan von Bardeleben[3], MD; Georg Nickenig[8], MD; Jörg Hausleiter[9], MD; Antonio Mangieri[10], MD; Jose L. Zamorano[11], MD; Bernard Prendergast[12], MD; Francesco Maisano[13], MD

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A list of collaborators can be found in the Appendix paragraph.

This paper also includes supplementary data published online at: https://eurointervention.pcronline.com/doi/10.4244/EIJ-D-21-00695

Trikuspid qapaq anatomiyası:

- Trikuspid qapaq ən böyük və ən öndə yerləşən, sadə görünsə də mürəkəb anatomiyası olan bir strukturdur.
- Adından görünür ki, 3 tayı var.
- Lakin çalışmaların nəticələrini nəzərə alaraq bu informasiya dəqiq deyil.
- 579 pasientin 4 böyük mərkəzdə (Avropa) analizi bizə fərqli nəticələri göstərdi:

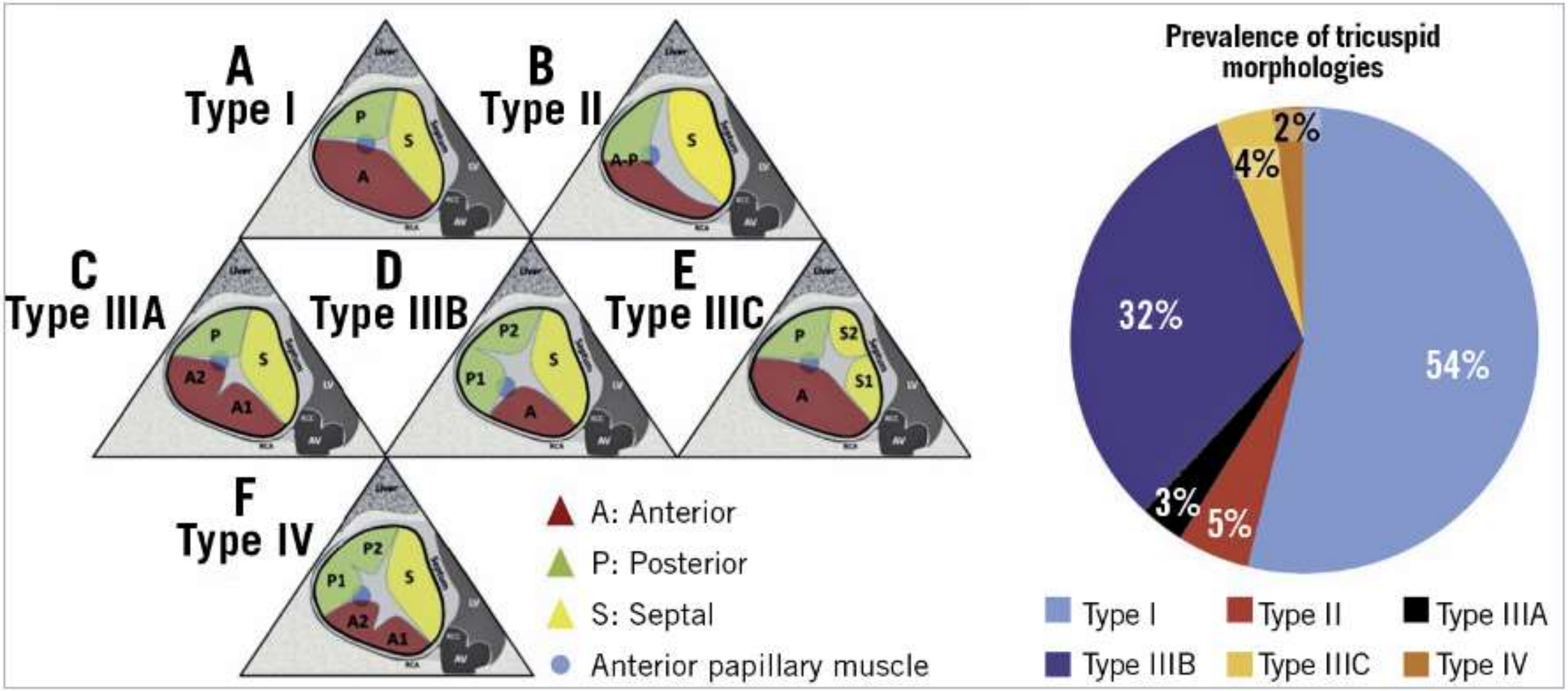


Figure 1. Proposed nomenclature for tricuspid valve classification. Left panel. Proposed nomenclature for tricuspid valve classification scheme (anterior papillary muscle [blue circle] defines separation of anterior and posterior leaflets). A) Type I: 3-leaflet configuration. B) Type II: 2-leaflet configuration. C) – E) Type III: 4-leaflet configurations. F) Type IV: 5-leaflet configuration. Right panel. Incidence of each morphology. A: anterior leaflet; AV: aortic valve; P: posterior leaflet; S: septal leaflet. Adapted from Hahn et al[9], with permission.

Non-invasive imaging assessment of RV

Non-invasive haemodynamic assessment of loading conditions

- Right atrial pressure (RAP), estimates by IVC diameter and collapse
- RV systolic pressure (RVSP), estimates using RV-RA gradient (underestimated in severe TR)
- RV diastolic pressure (RVDP), estimates using PA-RV diastolic gradient
- RV mean pressure (from RVOT-ACT or from RVSP and RVDP)

1. RV shape remodelling

2D echocardiography
- RV wall thickness
- RV short-axis length at the base and at mid-ventricular level, long-axis length, sphericity index
- RVOT dimensions,
- TV tethering parameters
- RV-LV interdependence: eccentricity index (2D echocardiography)

3D-derived volumetric measures: 3D echocardiography/CCT or CMR
- RV-EDV

2. RV functional remodelling

2D methods
- tricuspid annular plane systolic excursion (TAPSE)
- TV systolic annular velocity (S'TDI)
- RV end-systolic area, fractional area change (FAC)

3D methods
- RV-EF%, RV-ESV
- Stroke volume

Tissue deformation analysis
- RV strain measures: RV global longitudinal strain, RV free-wall longitudinal strain
- 3D strain analysis (echocardiography or CMR)

Contractile reserve
- Contractility reserve by stress echocardiography or CMR (increase of TAPSE; increase of systolic RV-RA gradient)

RV-PA coupling
- TAPSE/SPAP ratio (echocardiography)
- Invasive measurements (right heart catheterisation)

3. RV tissue remodelling

CMR
- T1 mapping
- T2 mapping
- ECV mapping
- LGE

Imaging modality	Applications
TTE	Grading of TR severity
	Assessment of TV pathology and mechanism(s) of TR
	Diagnosis/classification of PHT
	Evaluation of RV function
	Determination of pacemaker/defibrillator lead location and evaluation of TV leaflet lead impingement
TEE (3D)	Assessment of TV pathology and mechanism(s) of TR
	Exclusion of intracardiac thrombus/masses
	Determination of pacemaker/defibrillator lead location and evaluation of TV leaflet lead impingement
	Evaluation of TEE imaging quality in supine position
	Procedural guidance
ICE (3D)	Procedural guidance in patients with insufficient TEE quality or contraindications to oesophageal intubation
	Avoidance of extracardiac or left heart artefacts
	Elimination of the need for systematic general anaesthesia
CCT	Assessment of annular shape, dimensions and annular calcification
	Determination of the location of pacemaker/defibrillator leads
	Definition of optimal procedural fluoroscopic angulations
	Assessment of the relationships of the tricuspid annulus to surrounding structures (particularly the RCA)
	Evaluation of specific annular anchor points in relation to tricuspid leaflet hinge points and coronary arteries
	Evaluation of RCA status
	Evaluation of the relationship between IVC and TV annulus
Coronary angiography/ fluoroscopy	Evaluation of RCA status
	Navigation and control of patency of the RCA if a device is anchored to the tricuspid annulus
	Orientation and device placement/deployment (in particular in case of multiple implants)
CMR	Grading of TR severity when echocardiographic quantification is inconclusive
	Evaluation of RV function
	Assessment of myocardial fibrosis

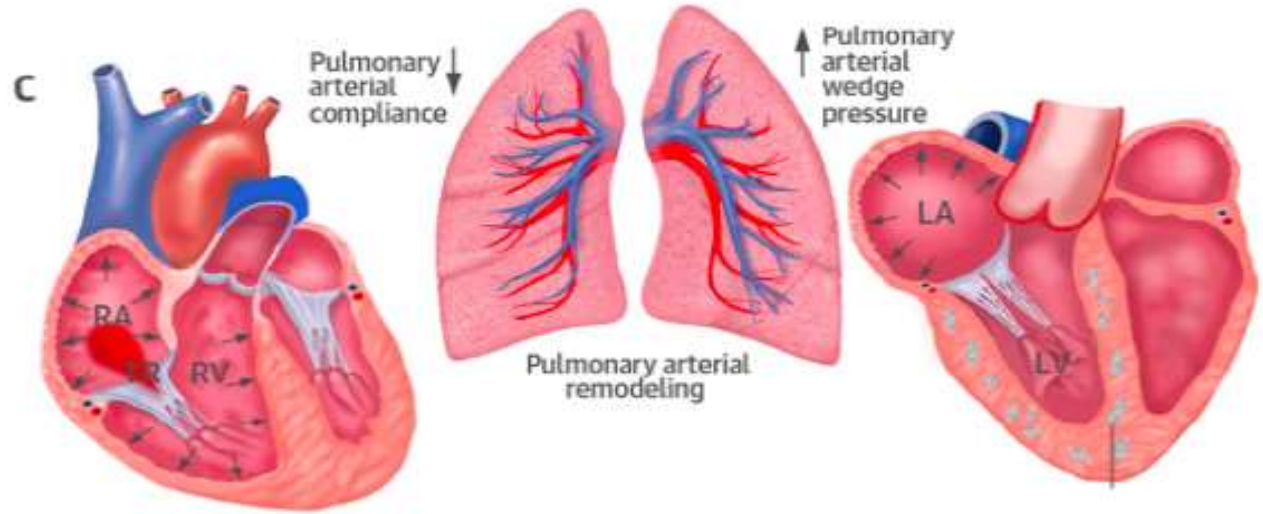
Table 1. Proposed new integrated classification of TR.

	Leaflet structure	Pathophysiology	Aetiology	Imaging
Secondary (functional)				
A. Atrial	Normal	RA enlargement and dysfunction leading to significant isolated annular dilation; RV often normal*	Carpentier I: Atrial fibrillation/flutter[101] Age[102] Heart failure with preserved ejection fraction[103,104]	Marked **TV annular dilation** is the dominant mechanism TV leaflet tethering is absent or minimal (except for late stages with secondary RV dysfunction) TV leaflet mobility is typically normal (Carpentier type I) RA is significantly dilated RV volume is typically normal (except in late stages)
B. Ventricular	Normal	RV enlargement and/or dysfunction leading to significant leaflet tethering and annular dilation	Carpentier IIIB: Left-sided ventricular or valve disease[11,12] Pulmonary hypertension[102] RV cardiomyopathy RV infarction	Marked **TV leaflet tethering** is the dominant mechanism TV leaflet mobility is typically restricted in systole (Carpentier type IIIB) TV annulus, RV and RA are dilated and/or dysfunctional
CIED-related	Normal/ abnormal	Leaflet impingement Leaflet/chordal entanglement/ chordal rupture Leaflet adherence Leaflet laceration/perforation Leaflet avulsion (following lead extraction)	Pacemaker Implantable cardiac defibrillator (ICD) Cardiac resynchronisation therapy (CRT) devices[105-108]	**TV leaflet structural abnormalities** may be present TV leaflet mobility is variable (all Carpentier types) TV annulus, RV and RA are typically dilated (except for acute TR)
Primary (organic)	Abnormal	Lack of leaflet coaptation due to intrinsic changes leading to restricted or excessive leaflet mobility or leaflet perforation	Carpentier I: Congenital Endocarditis Carpentier II: Myxomatous disease Traumatic Post biopsy Carpentier IIIA: Carcinoid[109] Rheumatic Radiotherapy Tumours	**TV leaflet structural abnormalities** characteristic of each primary aetiology are the dominant mechanisms TV leaflet mobility is variable (all Carpentier types) TV annulus, RV and RA are typically dilated (except in acute TR)

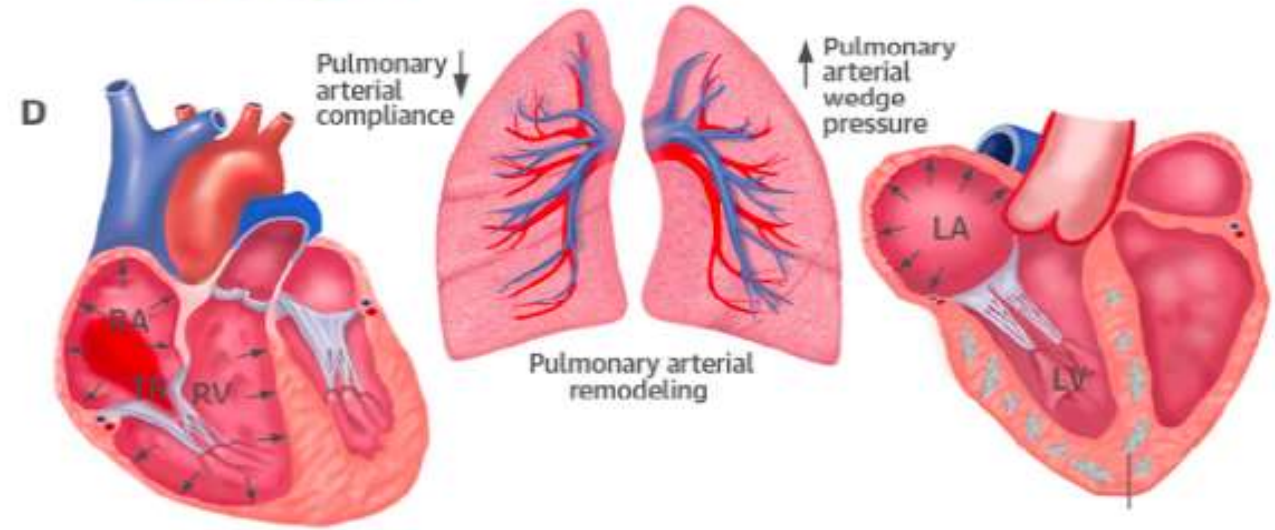
*RV basal diameter may appear abnormal due to the conical RV shape. CIED: cardiac implantable electronic device; CRT: cardiac resynchronisation therapy; ICD: implantable cardiac defibrillator; RA: right atrium; RV: right ventricle; TR: tricuspid regurgitation; TV: tricuspid valve

Interplay between left heart, pulmonary vasculature, RV and TR

RV dilatation



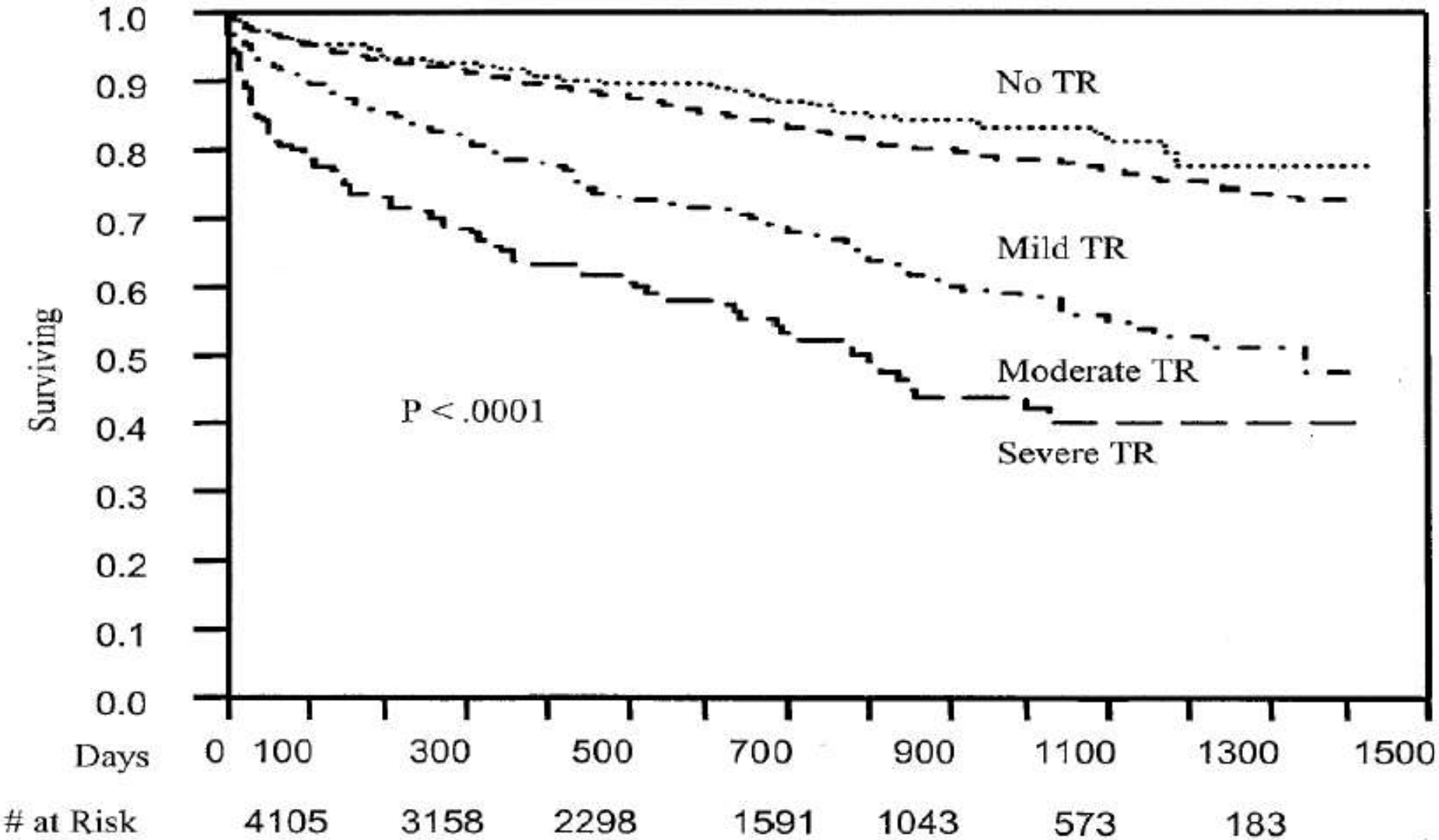
RV dilatation



Kammerlander, Mascherbauer. JACC 2014

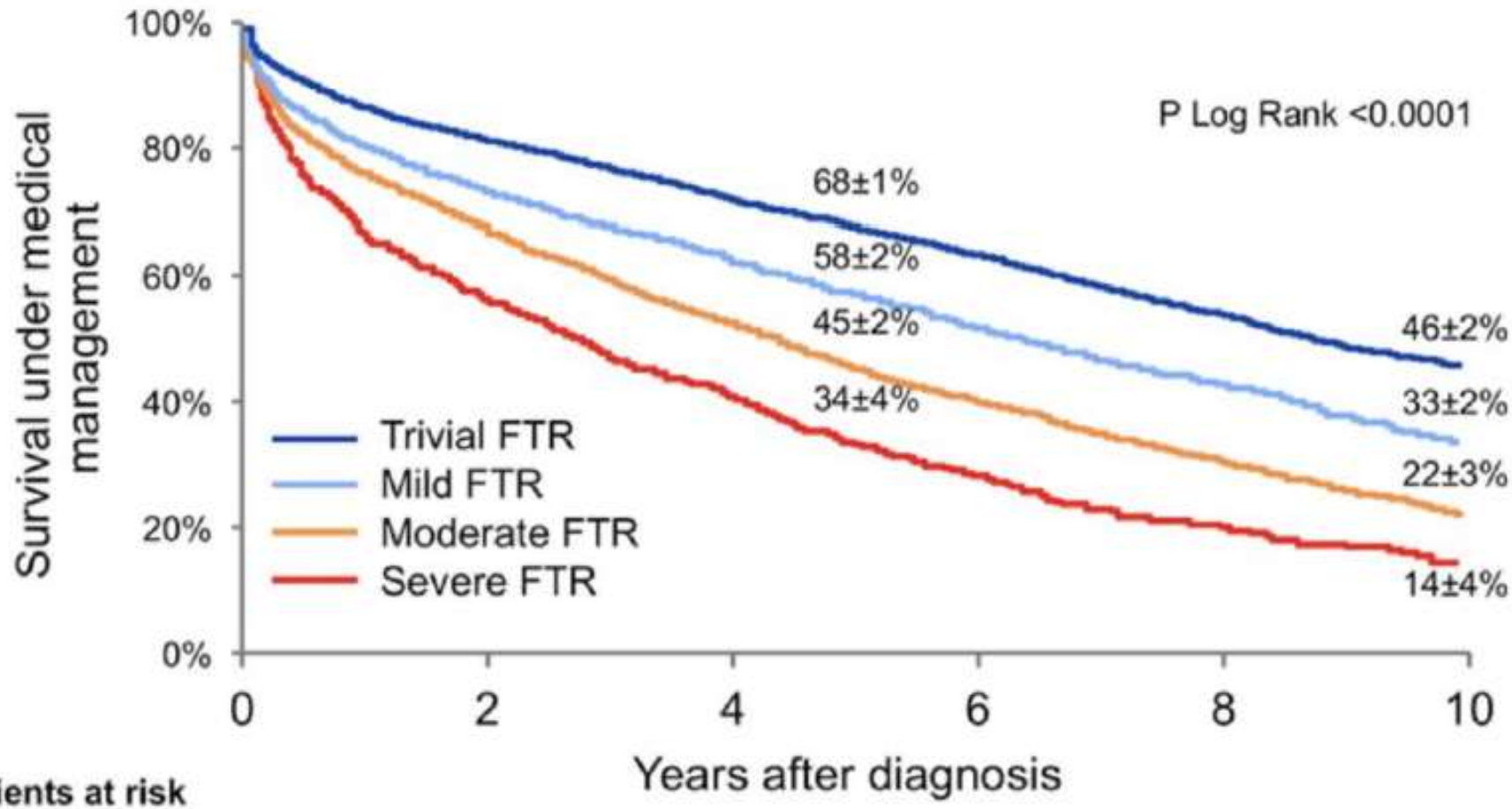
Impact of Tricuspid Regurgitation on Long-Term Survival

Jayant Nath, MD,* Elyse Foster, MD, FACC,† Paul A. Heidenreich, MD*
Palo Alto and San Francisco, California



Nath et al, JACC 2004

Mortality associated with functional TR in heart failure



>11000 HFREF patients

Patients at risk

Trivial FTR	4329	3218	3069	2384	1640	762
Mild FTR	4178	2789	2119	1384	809	359
Moderate FTR	2255	1336	935	555	307	119
Severe FTR	745	352	230	135	65	23

Benfari et al., Circulation 2019

ESC European Society of Cardiology

European Heart Journal (2019) **40**, 476–484
doi:10.1093/eurheartj/ehy641

META-ANALYSIS

Tricuspid regurgitation is associated with increased mortality independent of pulmonary pressures and right heart failure: a systematic review and meta-analysis

Nelson Wang[1], Jordan Fulcher[2,3], Nishan Abeysuriya[4], Michele McGrady[2], Ian Wilcox[1,2], David Celermajer[1,2], and Sean Lal[1,2]*

[1]Sydney Medical School, University of Sydney, Sydney, New South Wales, Australia; [2]Department of Cardiology, Royal Prince Alfred Hospital, Sydney, New South Wales, Australia; [3]NHMRC Clinical Trials Centre, University of Sydney, Sydney, New South Wales, Australia; and [4]University of Queensland, Brisbane, Queensland, Australia

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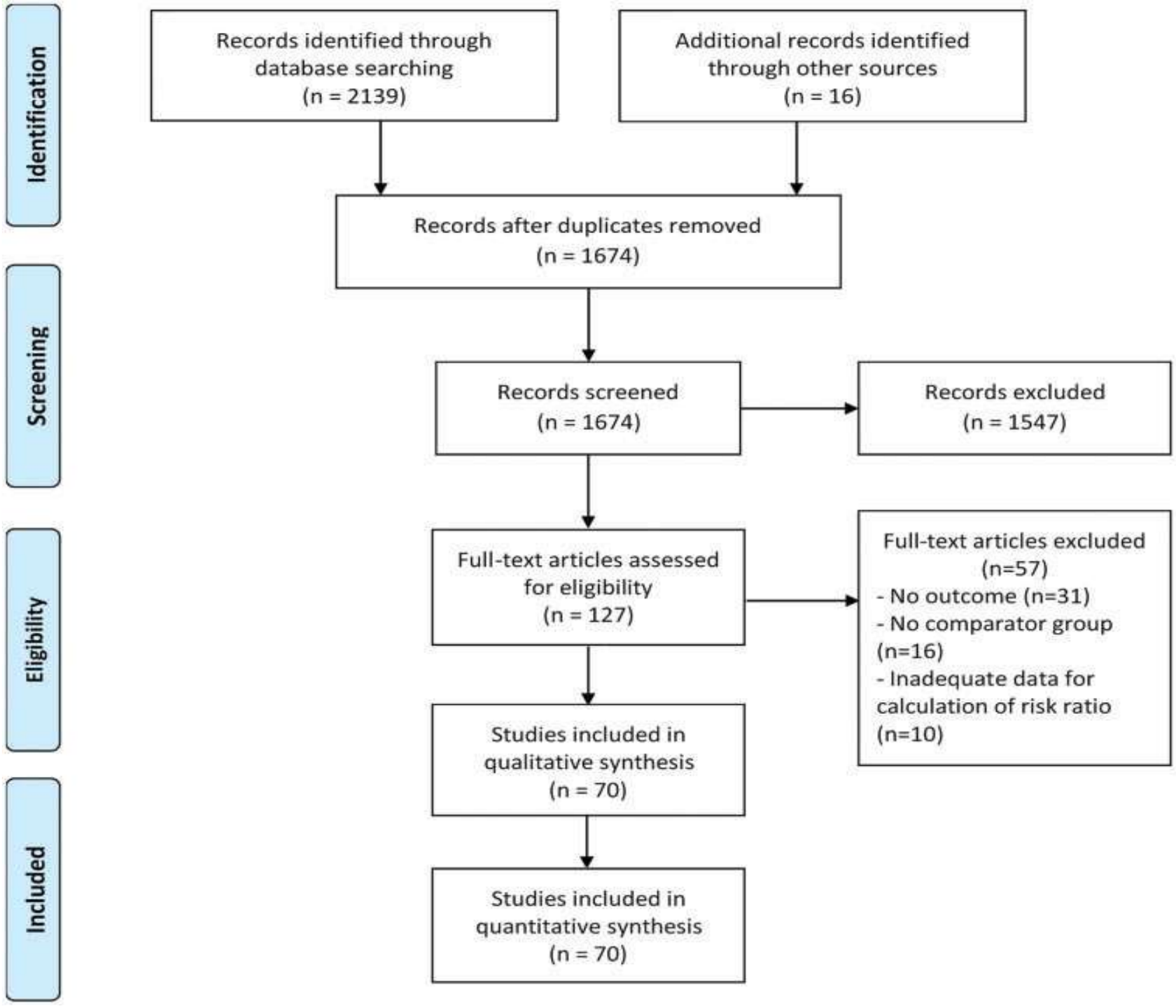
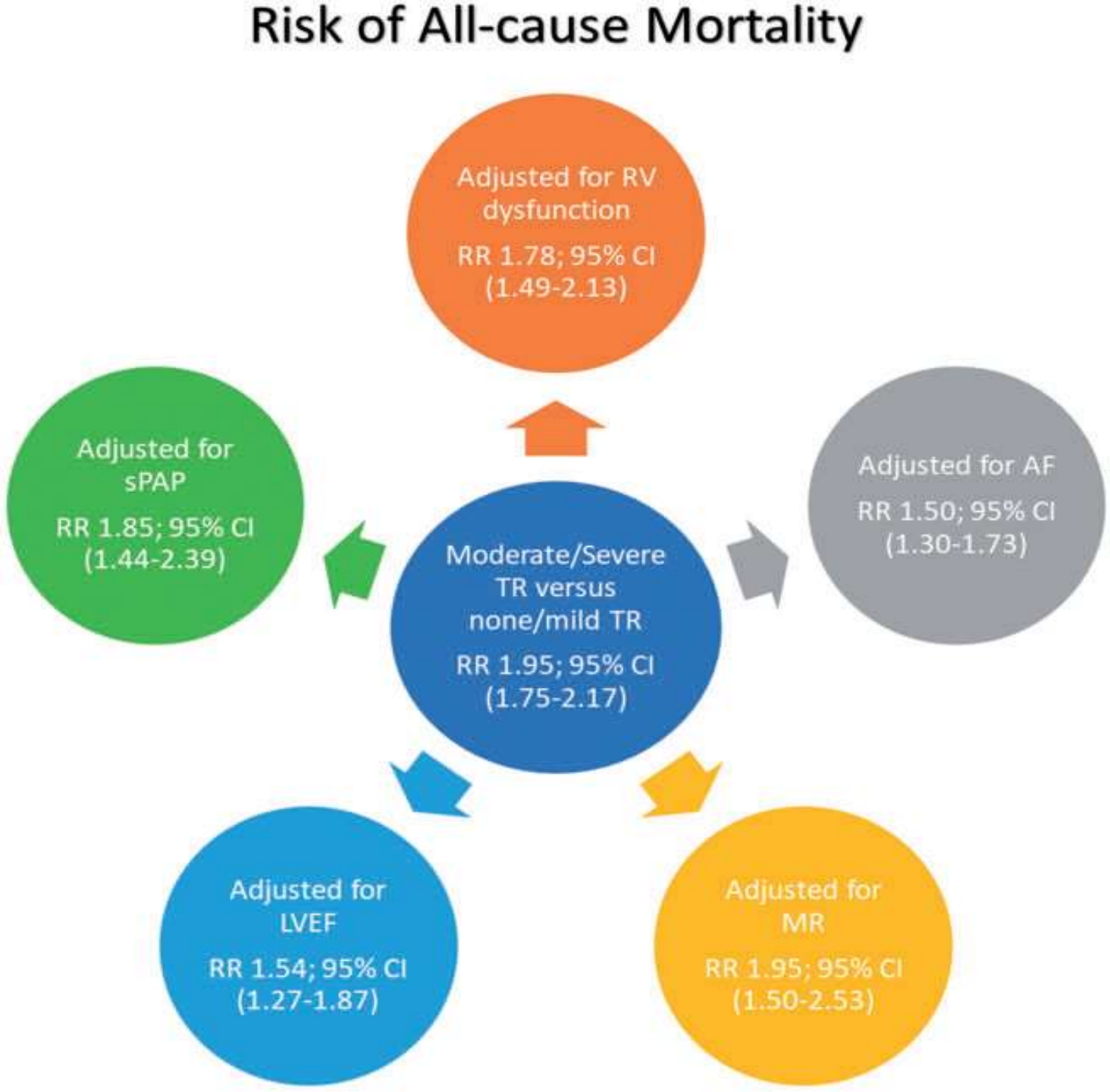
See page 485 for the editorial comment on this article (doi: 10.1093/eurheartj/ehy722)


Identification
Screening
Eligibility
Included
Records identified through database searching (n = 2139)
Additional records identified through other sources (n = 16)
Records after duplicates removed (n = 1674)
Records screened (n = 1674)
Records excluded (n = 1547)
Full-text articles assessed for eligibility (n = 127)
Full-text articles excluded (n=57)
- No outcome (n=31)
- No comparator group (n=16)
- Inadequate data for calculation of risk ratio (n=10)
Studies included in qualitative synthesis (n = 70)
Studies included in quantitative synthesis (n = 70)



İkincili trikuspidal çatışmazlıq ölüm riskini bu parametrlərə baxmayaraq artırır:

***SĞMAF**

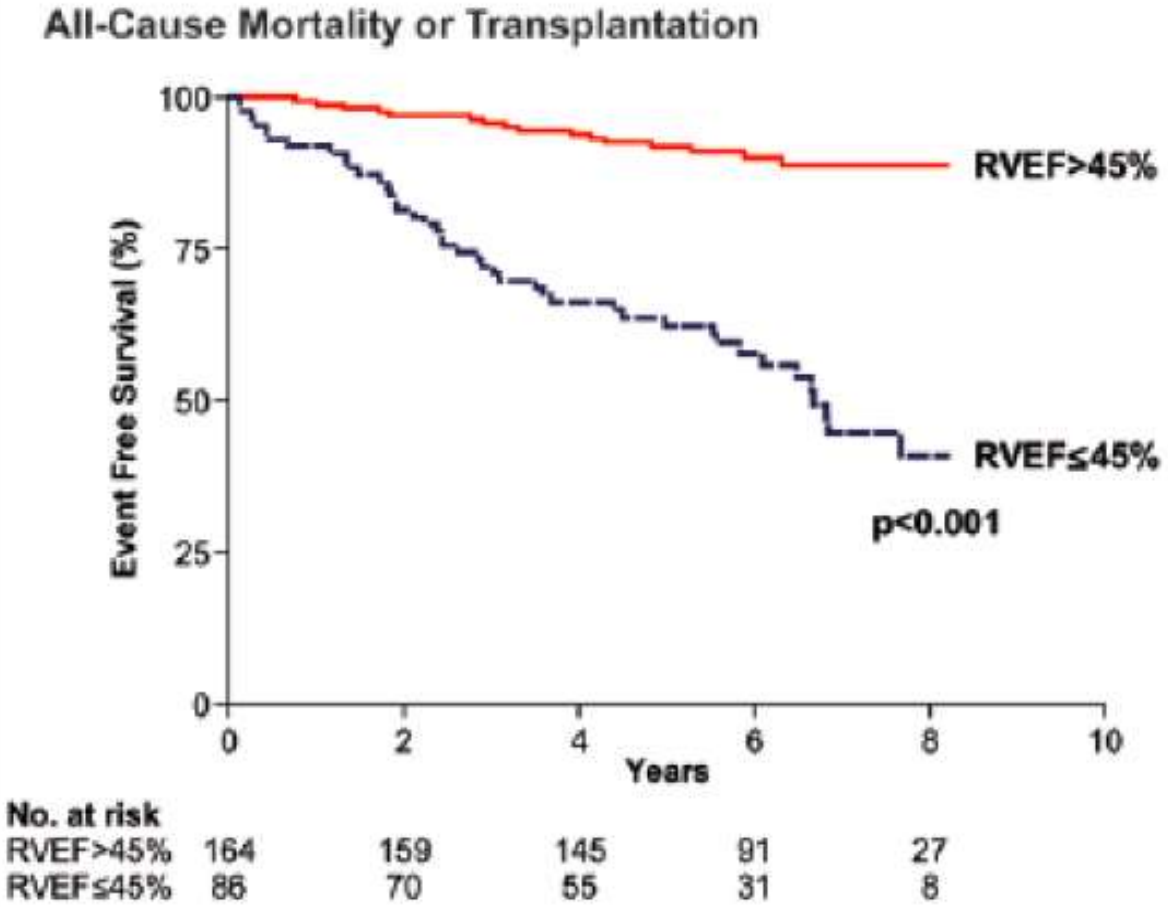
***SLMAF**

***sPAP Exo**

***MÇ**

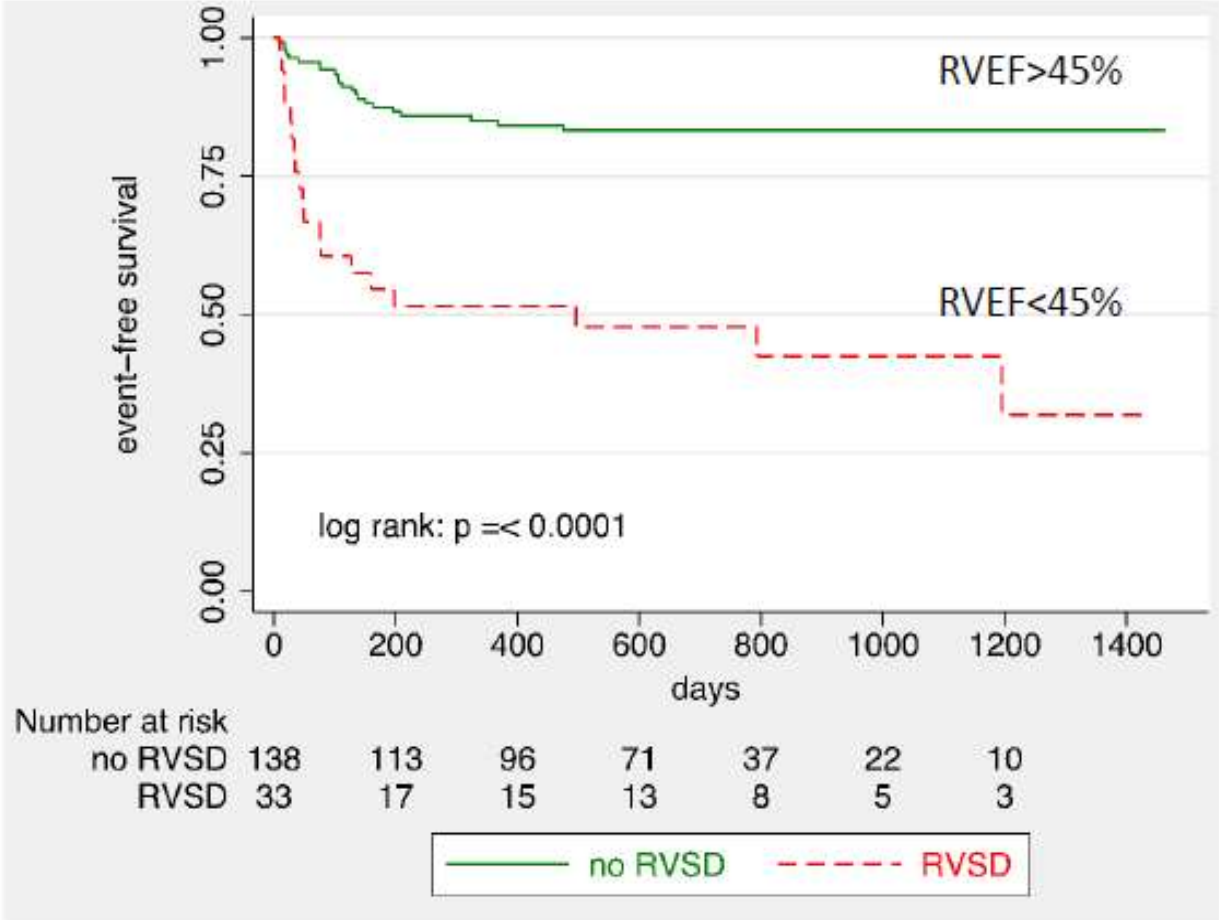
Prognostic significance of RV dysfunction in heart failure

HFREF



Gulati, Circulation 2013

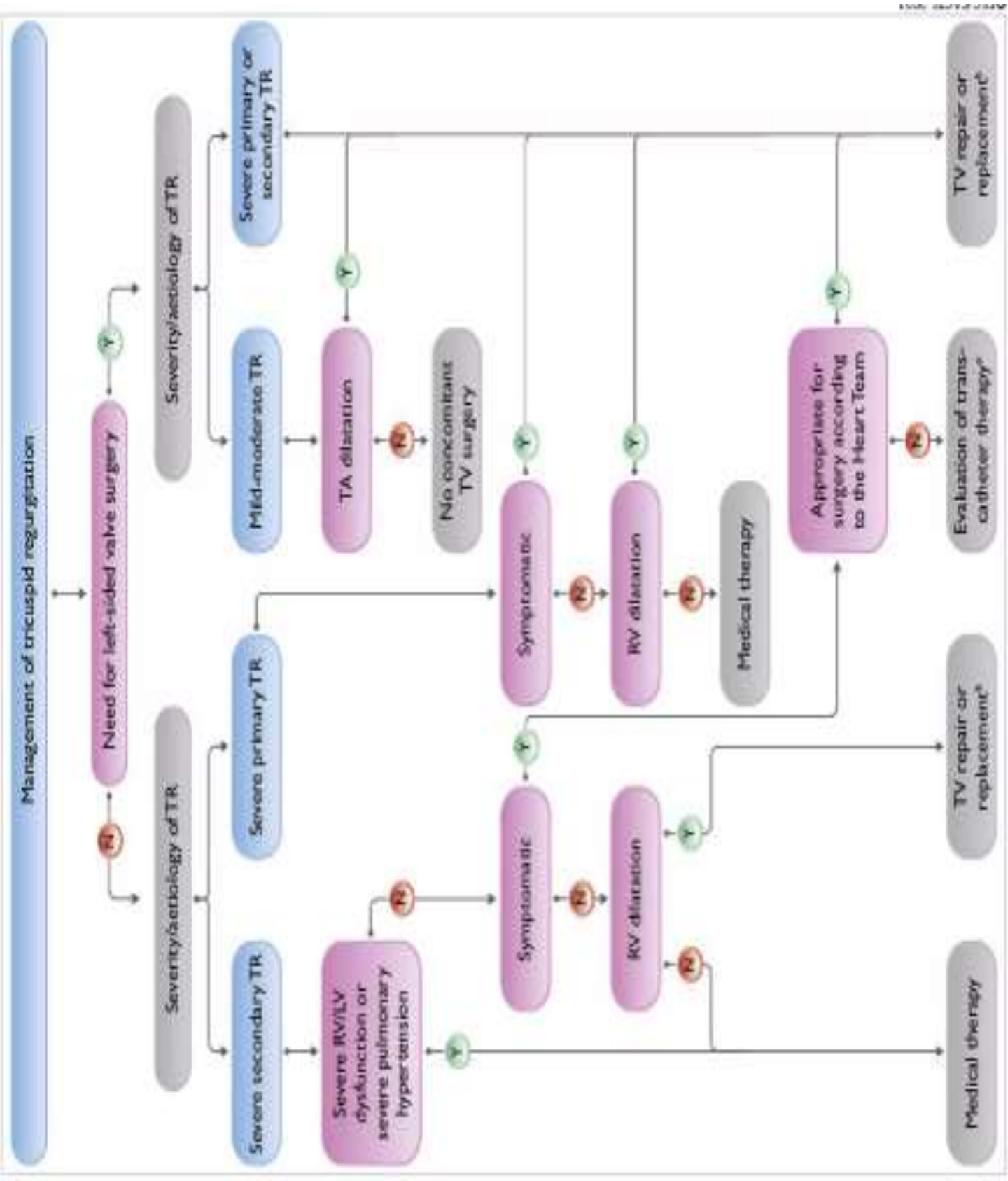
HFPEF



Aschauer, Eur J Hear Fail 2015

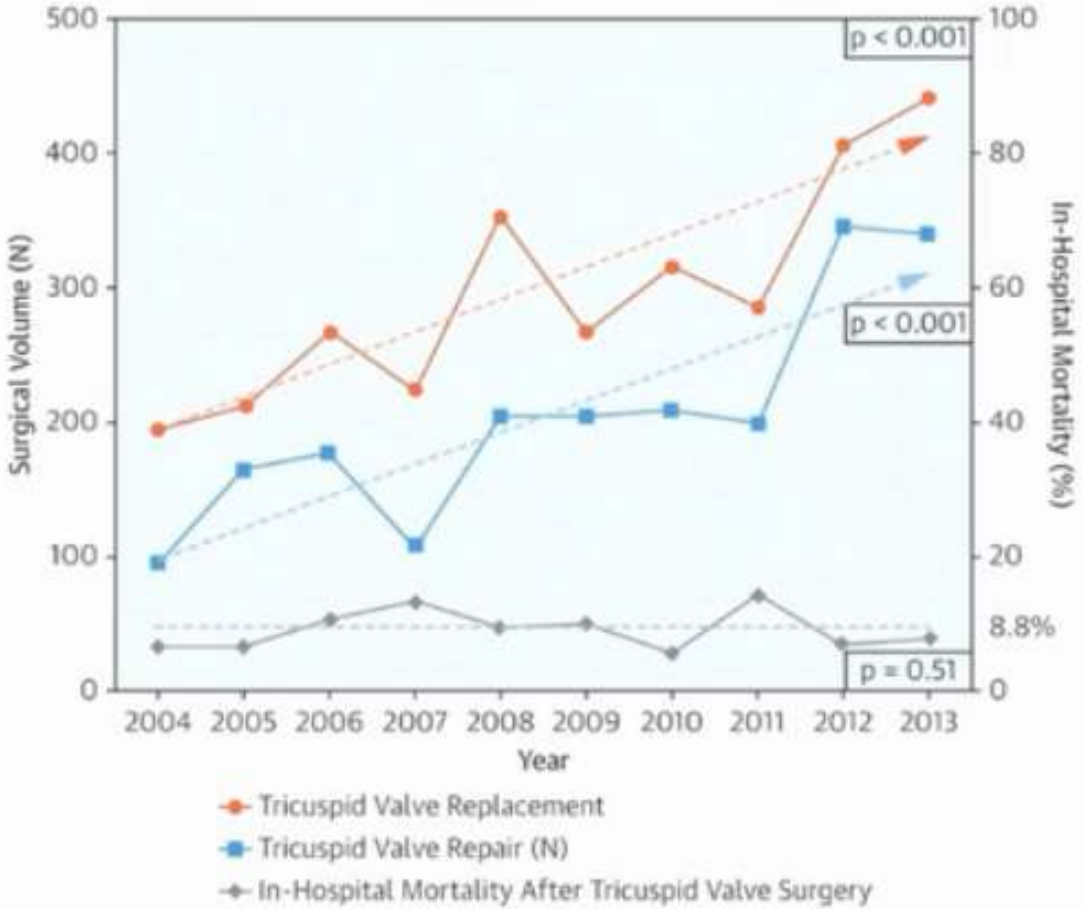
2021 ESC/EACTS Guidelines for the management of valvular heart disease

Developed by the Task Force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)



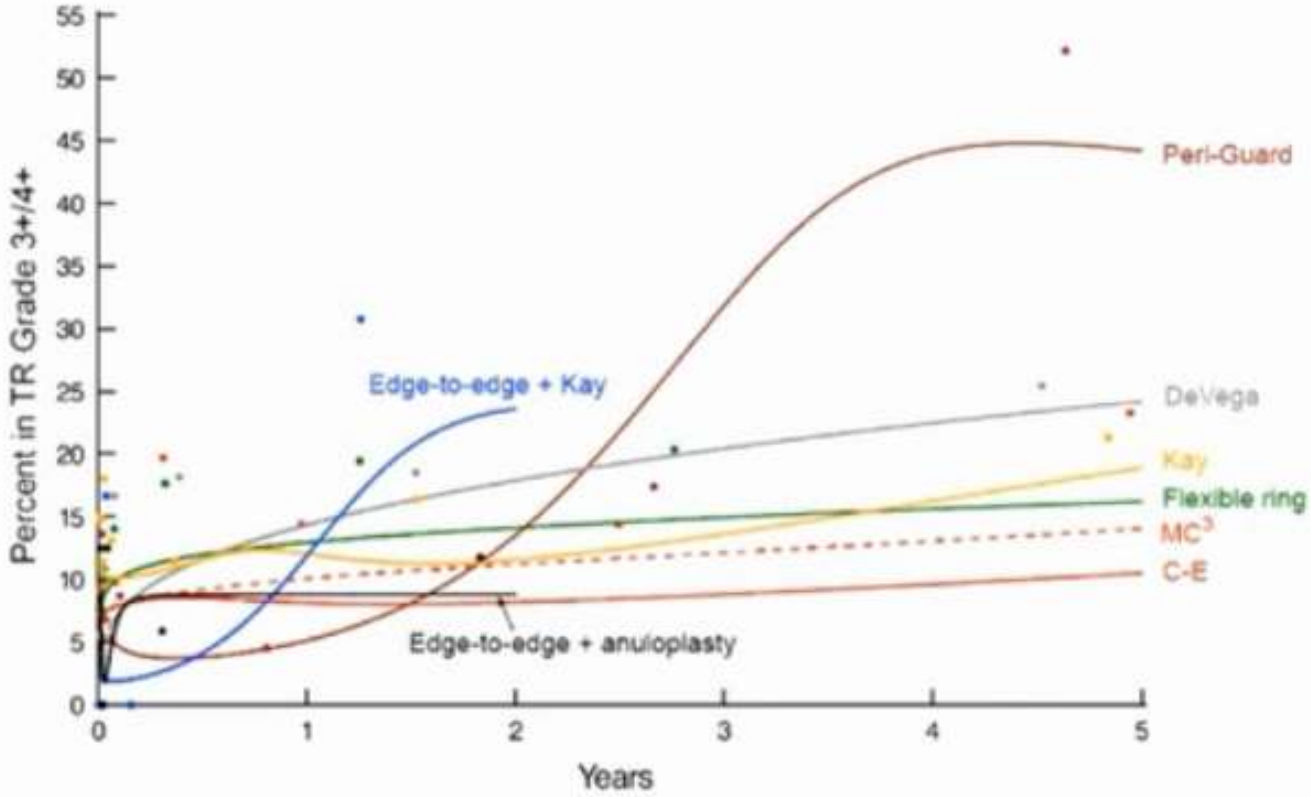
Surgical interventions – some limitations

Perioperative mortality



Zack et al, J Am Coll Cardiol. 2017 Dec 19;70(24):2953-2960

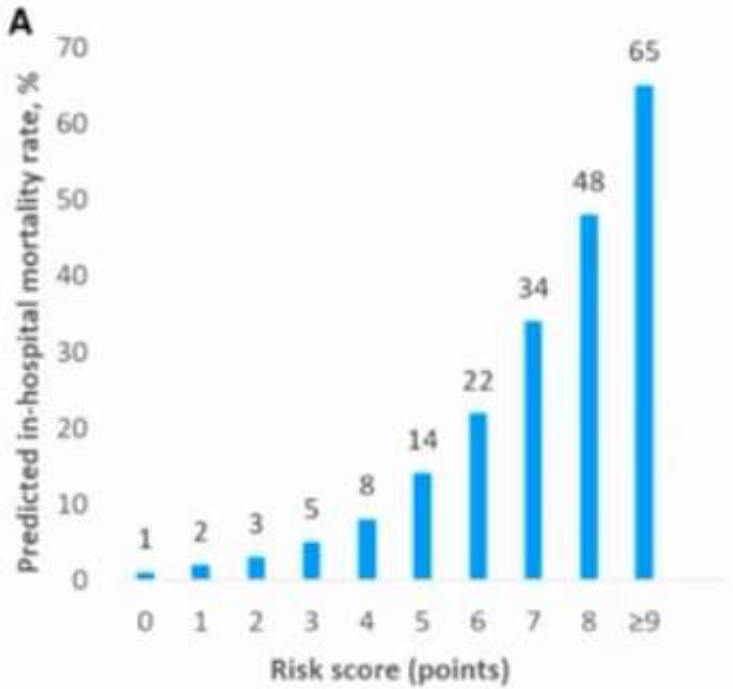
Risk of recurrence

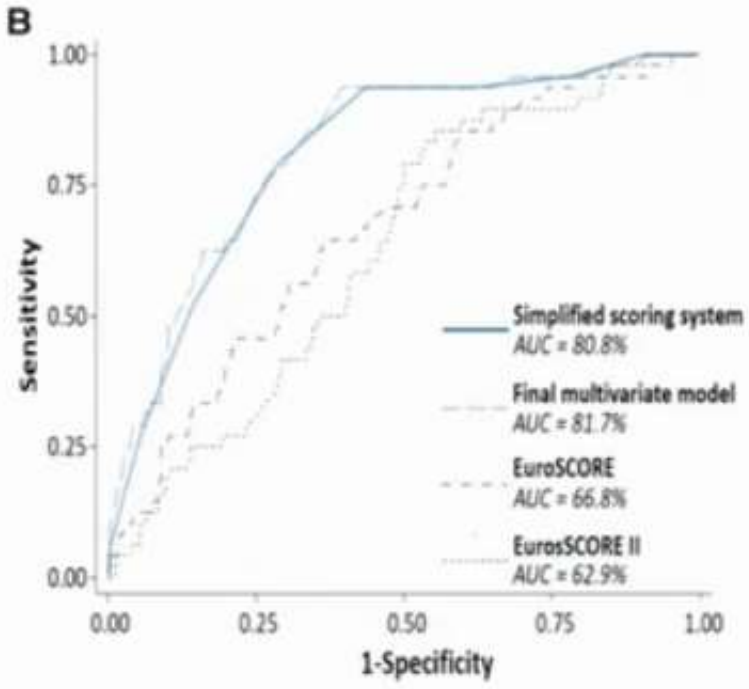


Navia et al, JTCVS 2015

TRI-SCORE: a new surgical risk score

Risk factors (final model from multivariate analysis)	Scoring
Age ≥ 70 years	1
NYHA functional class III-IV	1
Right-sided heart failure signs	2
Daily dose of furosemide ≥ 125mg	2
Glomerular filtration rate < 30 ml/min	2
Elevated total bilirubin	2
Left ventricular ejection fraction < 60%	1
Moderate/severe right ventricular dysfunction*	1
Total	12



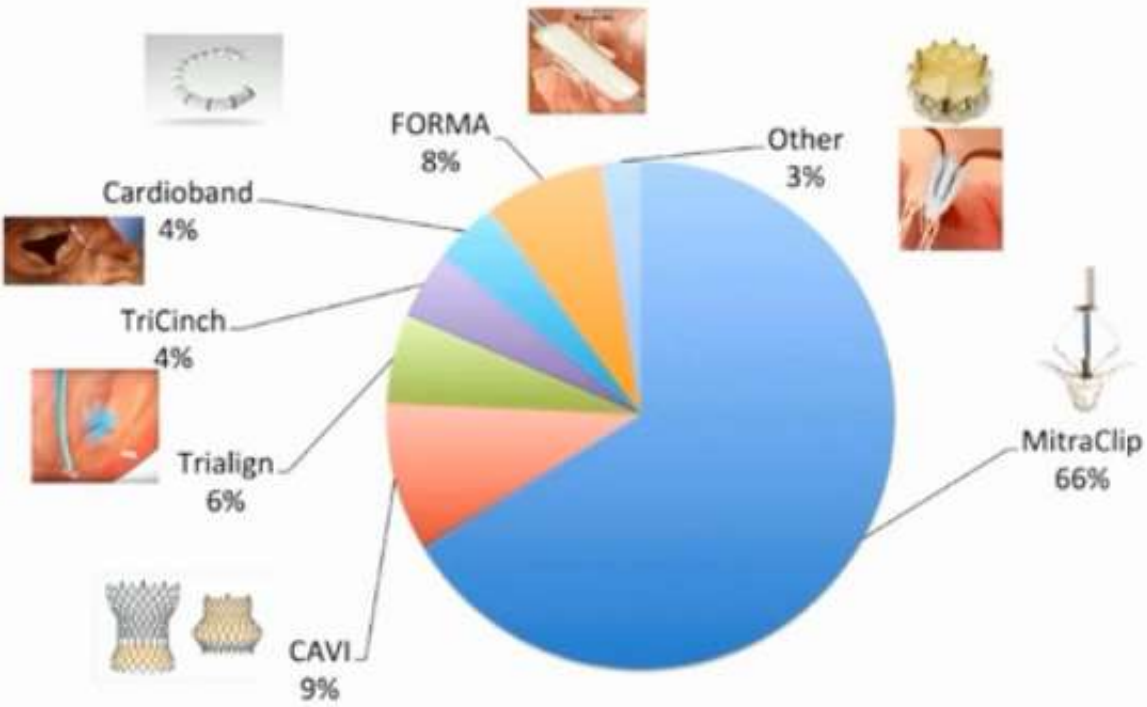


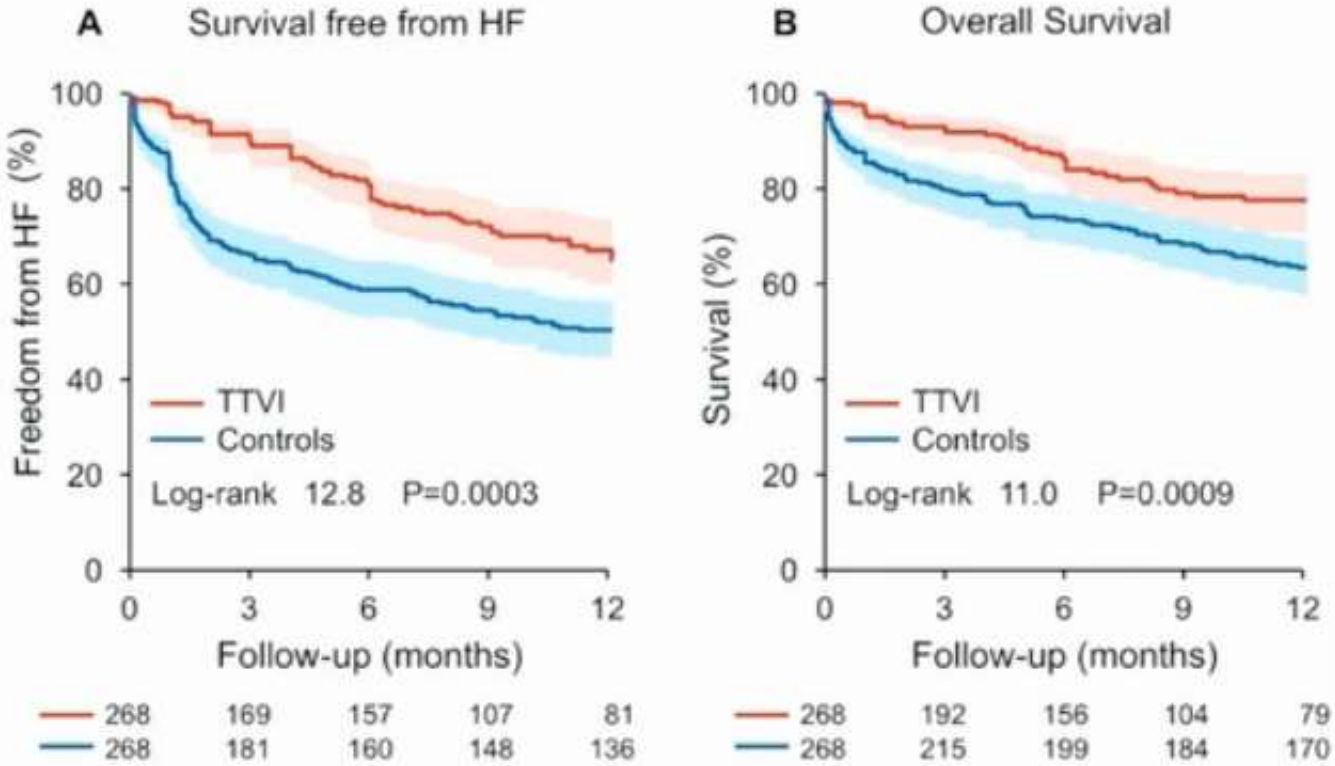
* Moderate/severe RV dysfunction was defined by a tricuspid annular plane systolic excursion (TAPSE) <17mm and/or a DTI<9.5cm/s and/or markedly reduced FAC based on visual assessment

J. Dreyfus et al., EHJ 2022

Transcatheter TR treatment – the evidence

Transcatheter treatment of symptomatic secondary severe tricuspid regurgitation may be considered in inoperable patients at a Heart Valve Centre with expertise in the treatment of tricuspid valve disease.	IIb	C





Taramasso M. et al, JACC Cardiovasc Interv. 2019 Jan 28;12(2):155-165

Taramasso M. et al, JACC 2019 Sep 24

Trikuspid qapaq çatışmazlığın dərman müalicəsi

- Diuretiklər sağ ürək çatışmazlıqda daha effektivdir. Bu tip xəstələrdə renin-anqiotenzin-aldesteron sisteminin pozulması ilə qaraciyər yüklənmə əlamətləri də qeyd olunur, aldesteron antoqonistlərin təyini mümkündür. Xüsusi hallarda pulmonar hipertenziyanın müalicəsi üçün spesifik yanaşma ola bilər. Məhdud məlumətlara görə ritmin kontrol altına alınması, AF-li xəstələrdə, anulyar dilatasiya səbəbi ilə trikuspid çatışmazlığı olanlarda müsbət rol oynayır.
- Ciddi sağ mədəciyin disfunksiyası və ciddi dərəcəli pulmonar hipertenziyası olan xəstələr müalicəyə cavab vermədiyi hallarda cərrahi və ya invaziv müdaxilə üçün yönləndirilməlidir.

Alqoritm

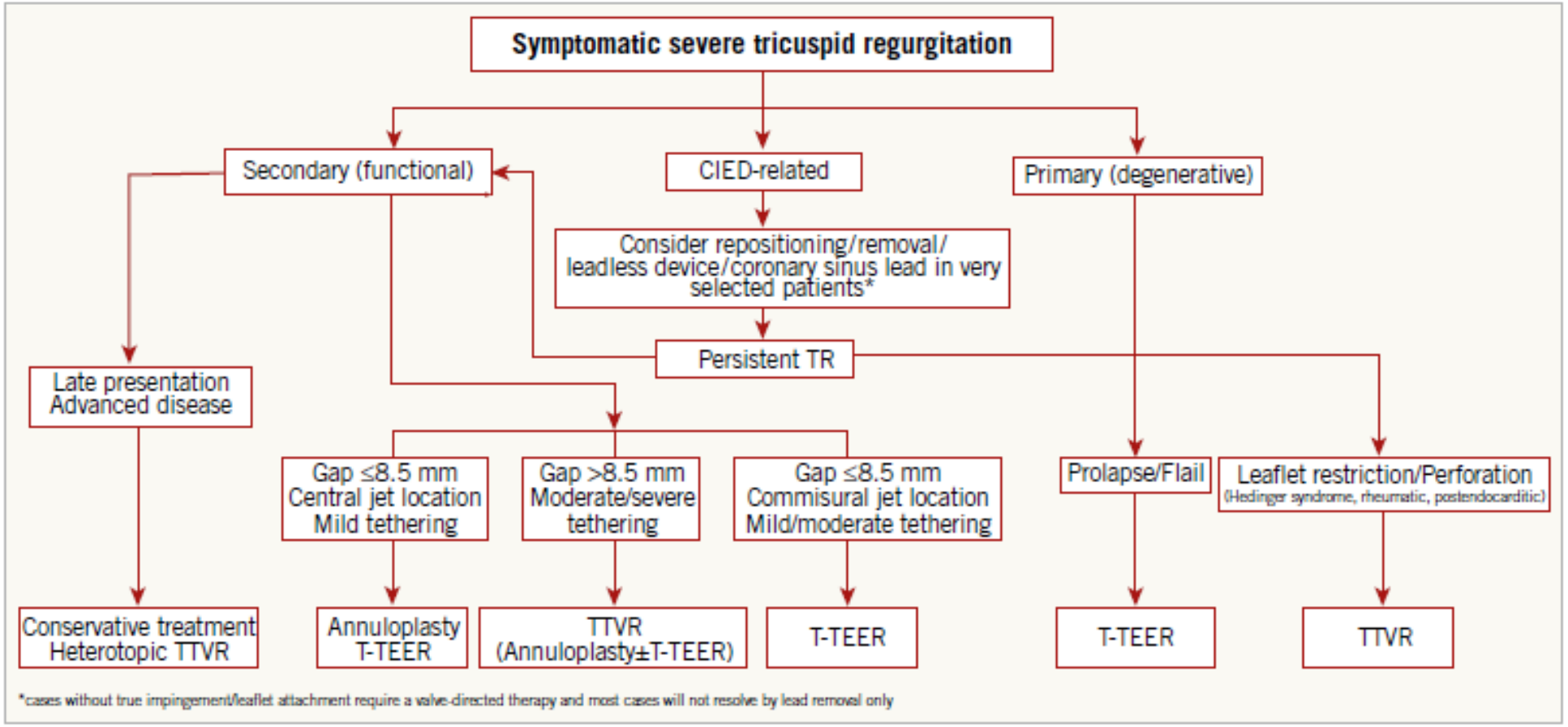


Figure 6. *Proposed algorithm for the selection of TTVI systems. CIED: cardiac implantable electronic device; T-TEER: tricuspid transcatheter edge-to-edge repair; TTVR: transcatheter tricuspid valve replacement*

Valve replacement


LuX-Valve

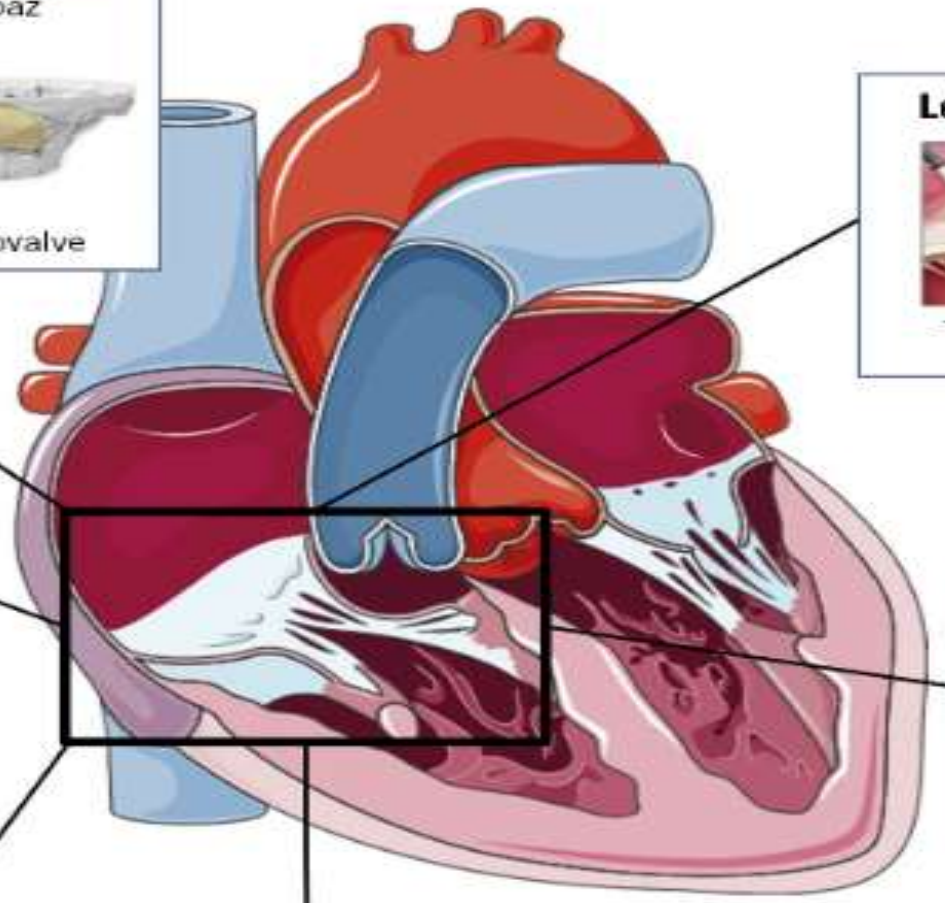

Intrepid


Topaz


Evoque


GATE


Cardiovalve

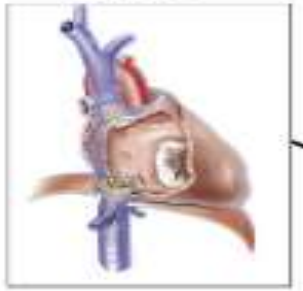


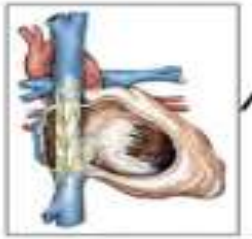
Leaflet approximation

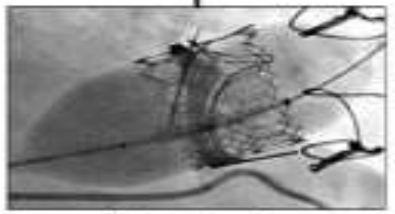

TriClip*


PASCAL/
PASCAL Ace*

TricValve*




Tricento


Valve-in-valve

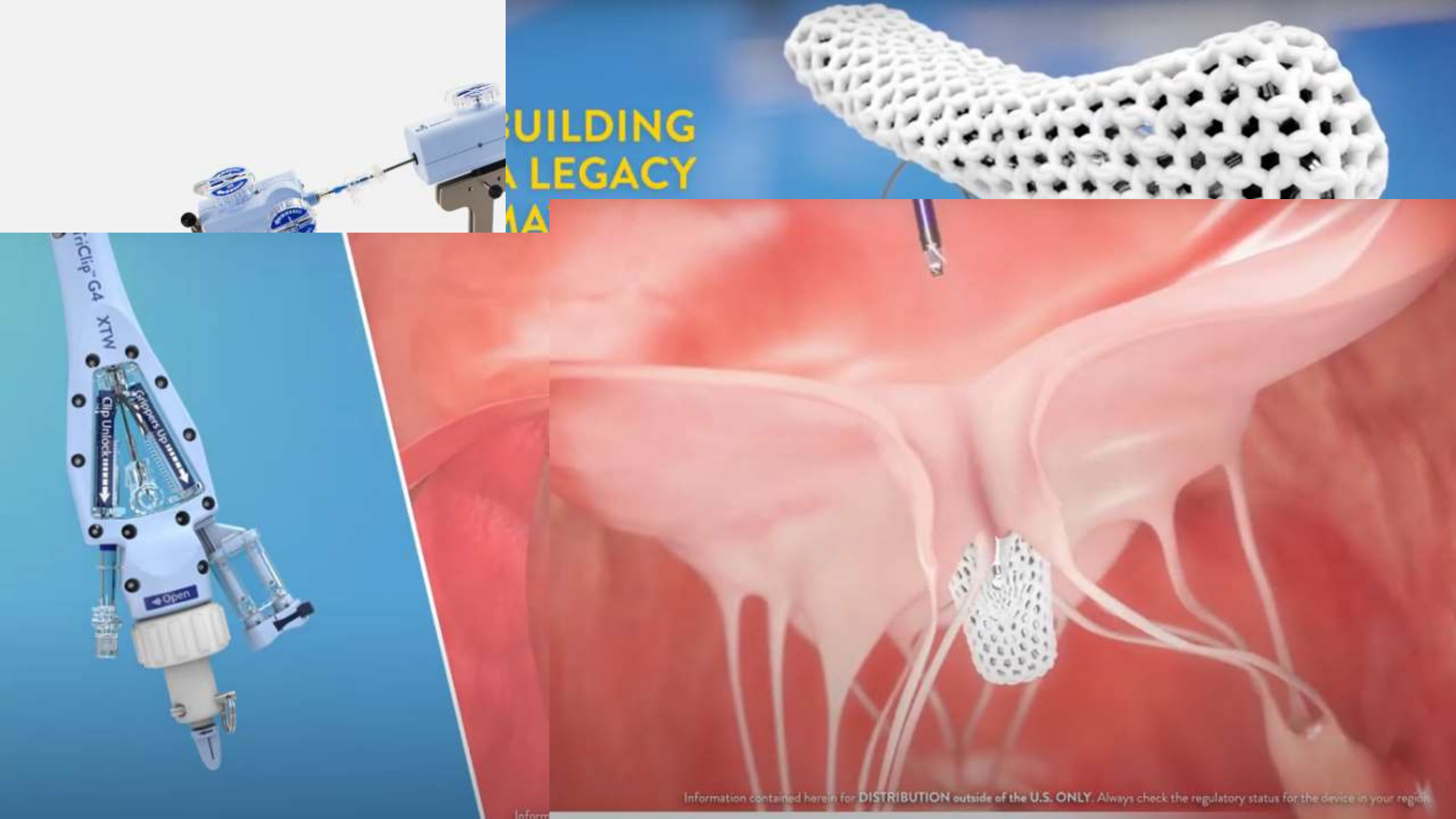
Annuloplasty


Cardioband*


Millipede


MIA-T


Cardiac Implants LLC


UILDING
LEGACY
MA
riClip™ G4 XTW
Clip Unlock
Grippers Up
Open
Information contained herein for DISTRIBUTION outside of the U.S. ONLY. Always check the regulatory status for the device in your regio

Take Home Message:

- Trikuspid qapaq çatışmazlığı daha çox ikincili rast gəlinir (90%)
- Trikuspid qapaq anatomiyası göründüyü qədər sadə deyil
- Trikuspid qapaq çatışmazlığı (ciddi) ayrıca mənfi proqnostik kriteriyadır
- Zamanında olmuş müdaxilə xəstələrin sağ qalma faktoruna mübət təsir edir.
- Trikuspid qapaq çatışmazlığın müalicəsində istifadə olunan yeni invaziv metodların geniş istifadəsi zəruridir

Diqqətinizə görə Təşəkkürlər!!!