

Il trattamento chirurgico della valvola tricuspide

Dott. Federico Ranocchi



Tricuspid Regurgitation is a frequent disease but rarely treated

1.6M

TR prevalence



<10,000

*Surgical procedures
annually*

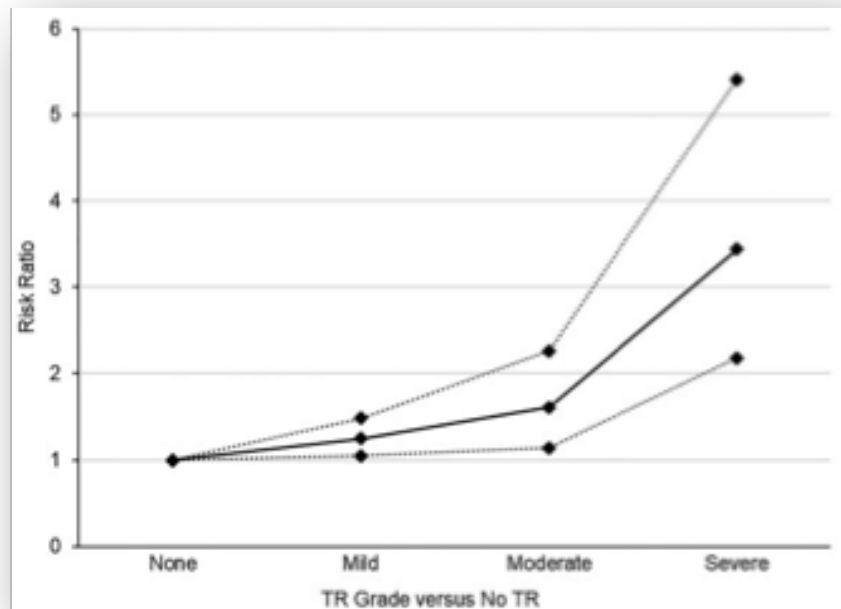


1. Singh JP, et.al. Prevalence and Clinical determinants of mitral, tricuspid, and aortic regurgitation, Am J Cardiol. 1999;83:897-902
2. McCarthy P.M, Sales V.L , Evolving Indications for Tricuspid Valve Surgery. Curr Treat Options Cardiovasc Med. 2010 Dec; 12(6): 587–597.



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

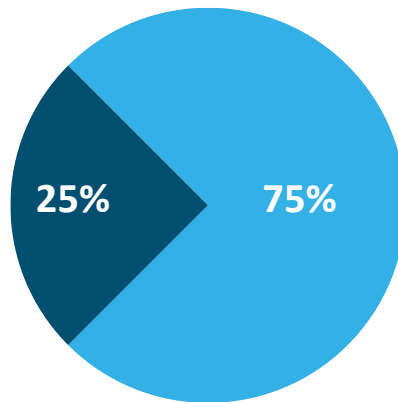
- 32 601 patients were included in the analysis, with a mean ($\pm$ SD) follow-up of 3.2 ± 2.1 year;
- Moderate/severe TR was associated with a two-fold increased mortality risk compared to no/mild TR
- Moderate/severe TR remained associated with higher all-cause mortality when adjusted for systolic pulmonary arterial pressures (RR 1.85, 95% CI 1.44–2.39), and right ventricular (RV) dysfunction (RR 1.78, 95% CI 1.49–2.13).



ETIOLOGY

ORGANIC

- Rheumatic
- Myxomatous
- Ebstein anomaly
- Endomyocardial fibrosis
- Endocarditis
- Carcinoid disease
- Traumatic (blunt chest injury, laceration)
- Iatrogenic (pacemaker/ defibrillator)

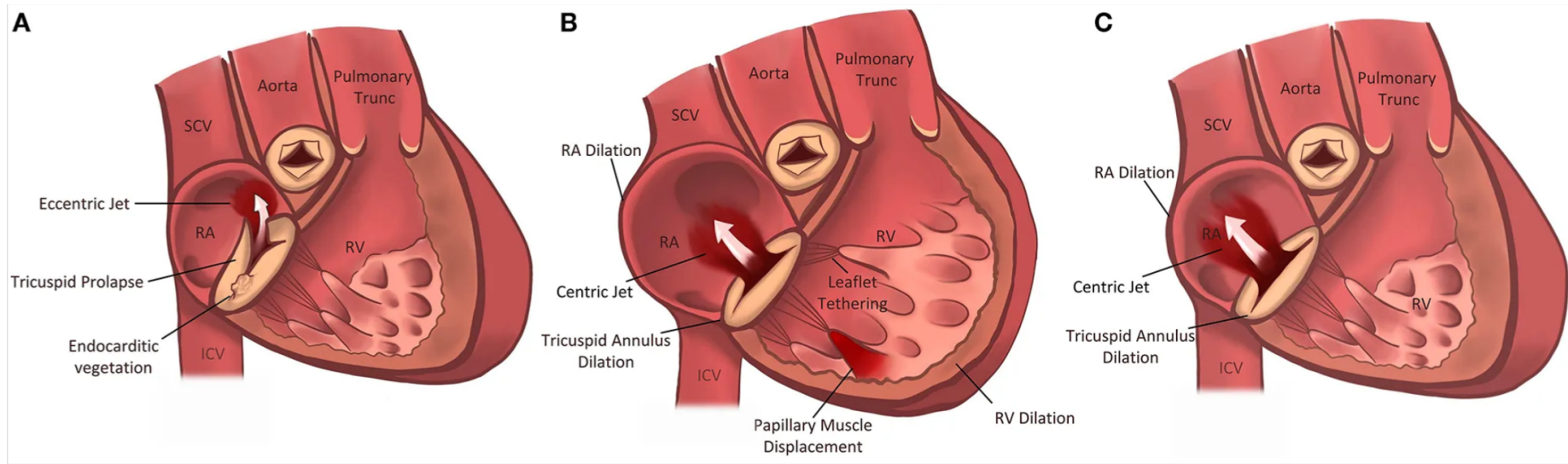


FUNCTIONAL

- Left heart disease resulting in pulmonary hypertension
- Any cause of pulmonary hypertension (chronic lung disease, pulmonary thromboembolism, left to right shunt)
- Any cause of right ventricle (RV) dysfunction (myocardial disease, RV ischemia/infarction)



ETIOLOGY



Organica

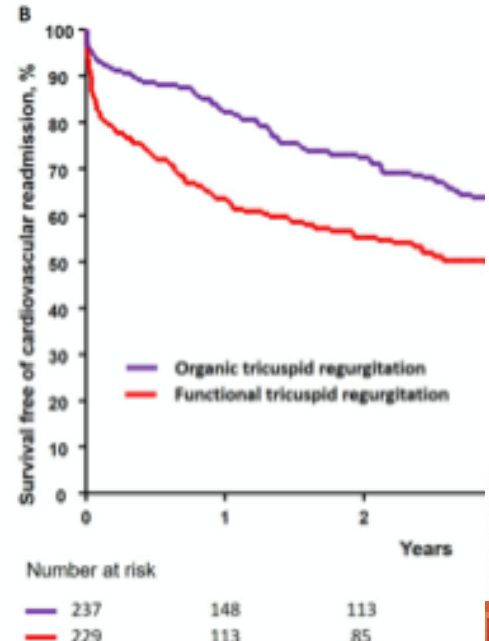
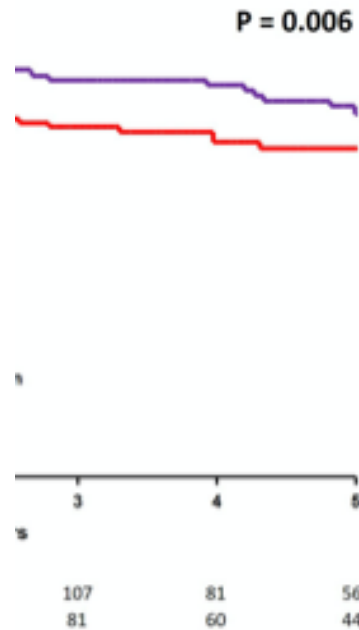
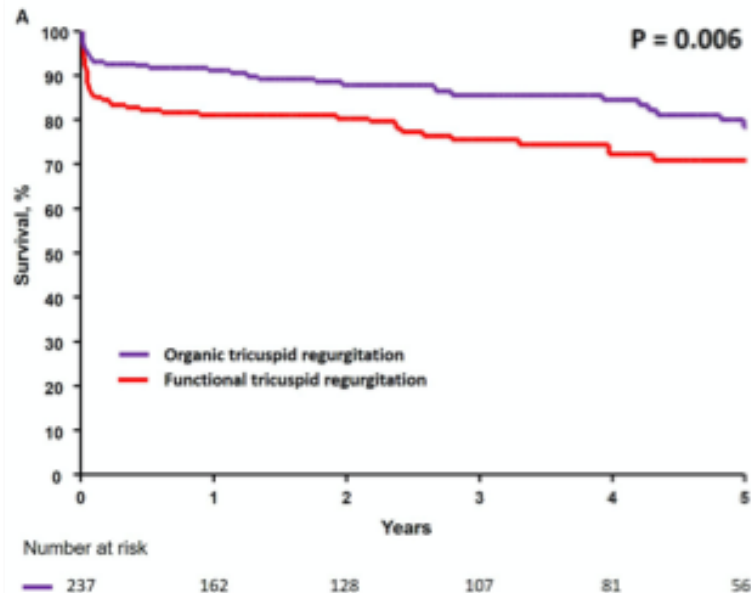
Funzionale ventricolare

Funzionale atriale

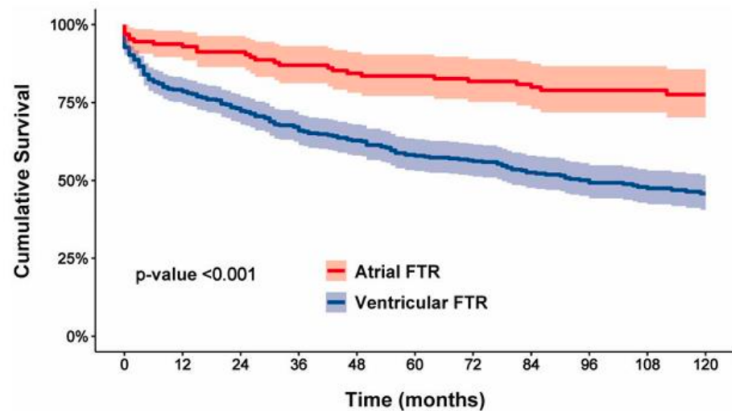


Isolated tricuspid valve surgery: impact of aetiology and clinical presentation on outcomes

Julien Dreyfus ^{1*}, Michele Flagiello², Baptiste Bazire ³, Florian Eggenspieler⁴, Florence Viau ⁵, Elisabeth Riant⁶, Yannick Mbaki⁷, Yohann Bohbot^{8,9}.

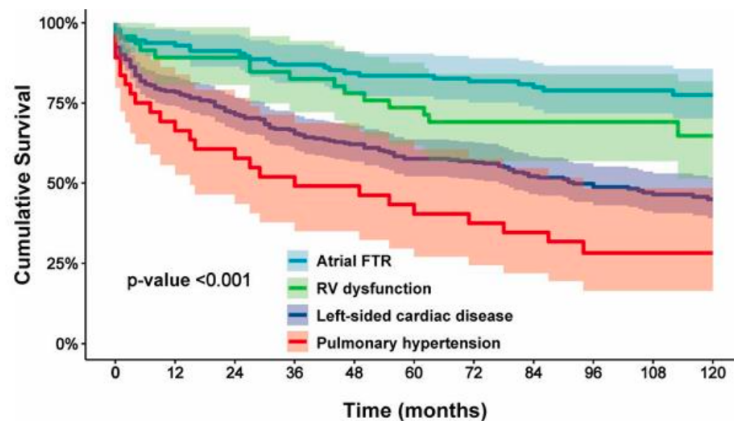


Tricuspid Valve – Etiology and Prognosis



Patients at risk

129	113	107	102	98	96	94	84	69	62	53
425	283	256	234	218	202	195	163	126	101	77



Patients at risk

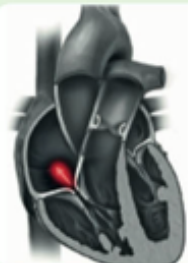
129	113	107	102	98	96	94	84	69	62	53
48	40	40	37	35	33	30	28	21	19	14
340	219	195	179	166	154	152	123	97	76	58
37	24	21	18	17	15	13	12	8	6	5





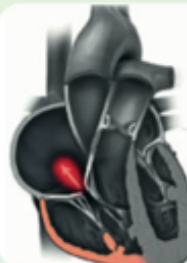
Stage 1

- No symptoms
- TR < 2+
- Normal RV function, no remodelling
- No treatment



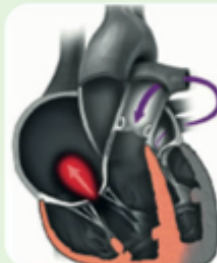
Stage 2

- No symptoms
- TR ≥ 3+
- Normal RV function, mild remodelling
- None/low-dose diuretics



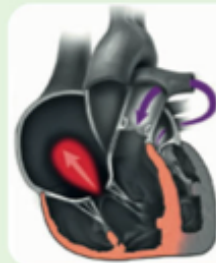
Stage 3

- Vague symptoms
- Severe TR
- Mild RV dysfunction/remodelling
- Diuretics



Stage 4

- Previous RHF episodes
- Severe TR
- > moderate RV dysfunction/remodelling
- moderate-high dose diuretics



Stage 5

- Overt RHF and/or organ damage
- Torrential TR
- Severe RV dysfunction
- high-dose diuretics/IV diuretics



Mid-term outcomes of isolated tricuspid valve surgery according to preoperative clinical and functional staging

Alessandra Sala ^{a,*}, Roberto Lorusso ^{b,c}, Edoardo Zancanaro ^a, Davide Carino ^a, Marta Bargagna ^a,

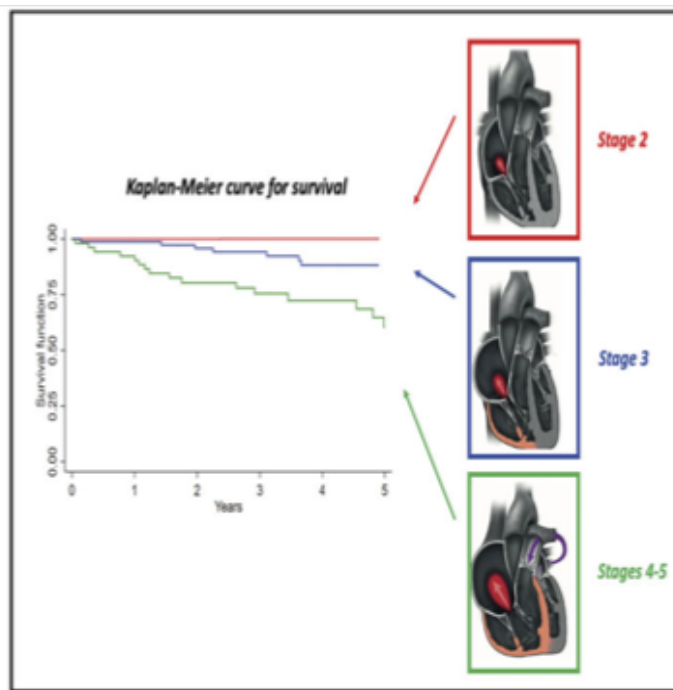
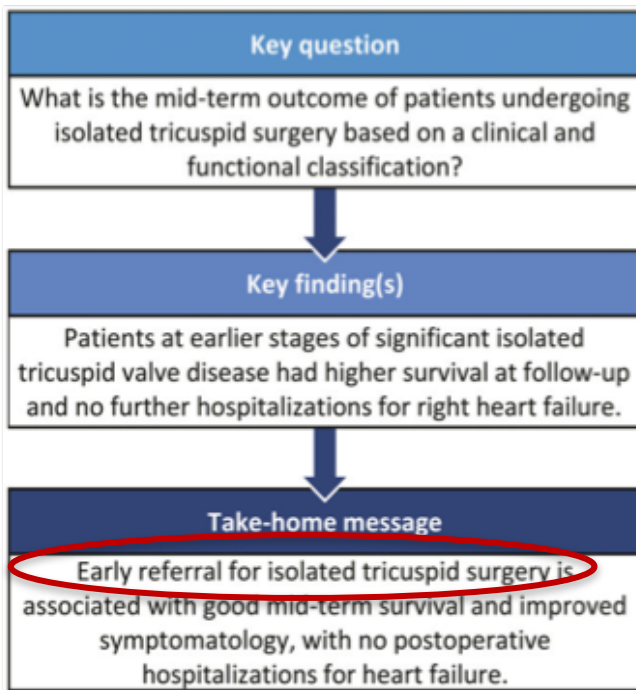


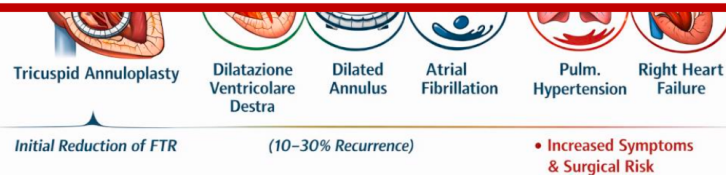
TABLE 5 Risk Factors Associated With Tricuspid Regurgitation Recurrence After Tricuspid Annuloplasty

Risk Factors for Recurrence of Significant TR After Repair	Impact on Early TR Recurrence	Impact Late TR Recurrence
Echocardiographic predictors		
Pre-operative TR severity	++	+
Larger a		
Advance		
Presence		
Reduced		
Clinical predictors		
Female		
Chronic		
Presence		
Presence		
Kidney dysfunction	+	+++
Concomitant chronic obstructive pulmonary disease	+	+
Surgical/procedural predictors		
Repair technique (suture vs. ring annuloplasty, flexible vs. rigid or semirigid ring)	+	+++
Concomitant mitral valve replacement rather than repair	+	+

In the table + and – represent the strength of evidence supporting the specific data (43,80–82).
Abbreviations as in Tables 3 and 4.

Progression of FTR after Annuloplasty

TR does not resolve following left valve surgery and is a progressive disease!



Taramasso M et al. J Am Coll Cardiol Img 2019;12:605–21



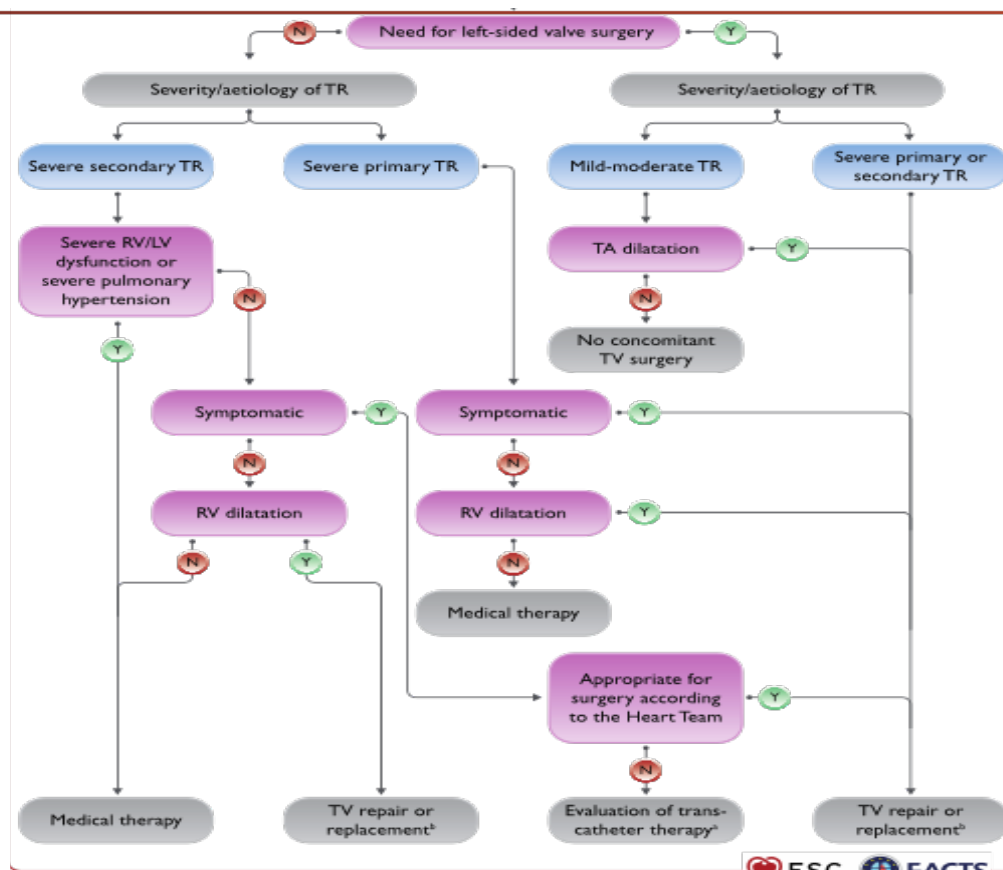
TRI-SCORE: a new risk score for in-hospital mortality prediction after isolated tricuspid valve surgery

< 3 basso
4-5 intermedio
> 6 alto

Table 2 Risk factors for in-hospital mortality: final model from multivariate analysis and scoring system

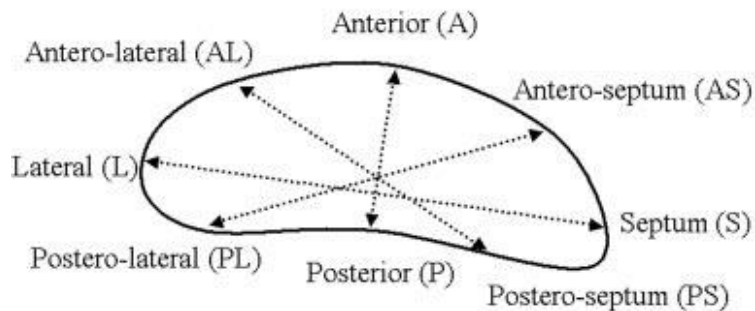
Risk factors	Odds ratio	95% CI	Regression coefficient	Final scoring
Age ≥ 70 years	1.65	0.84–3.21	0.50	1
NYHA functional Class III–IV	1.76	0.88–3.55	0.57	1
Right-sided heart failure signs	2.62	1.08–6.35	0.96	2
Daily dose of furosemide ≥ 125 mg	2.25	1.08–4.68	0.81	2
Glomerular filtration rate < 30 mL/min	2.47	0.92–6.62	0.90	2
Elevated total bilirubin	2.89	1.48–5.63	1.06	2
Left ventricular ejection fraction $< 60\%$	1.97	0.91–4.28	0.68	1
Moderate/severe right ventricular dysfunction	1.93	0.93–4.01	0.66	1
Total				12

CI, confidence interval; NYHA, New York Heart Association.

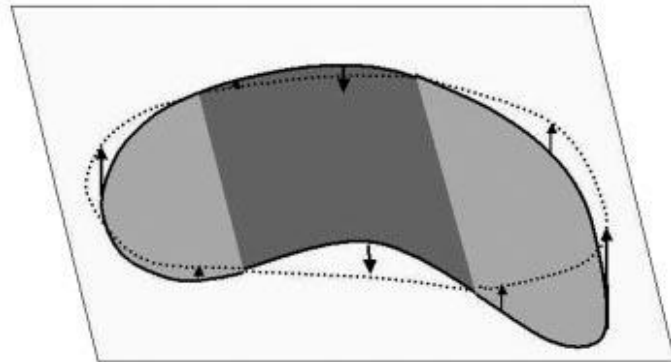


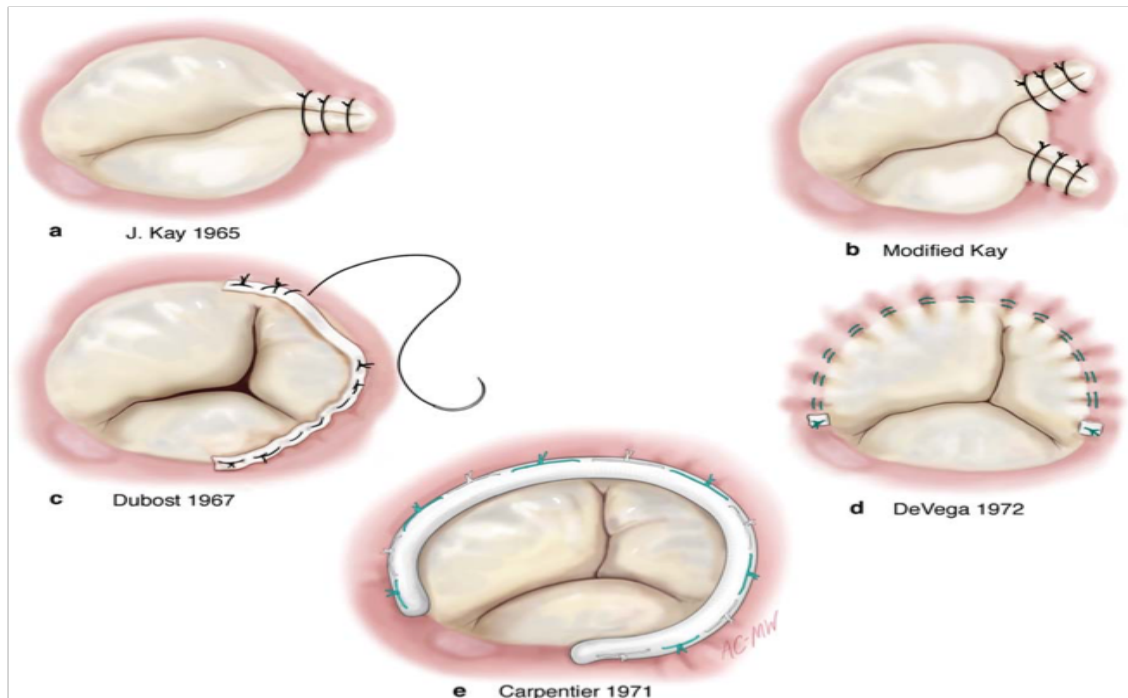
Annulus tricuspidalico

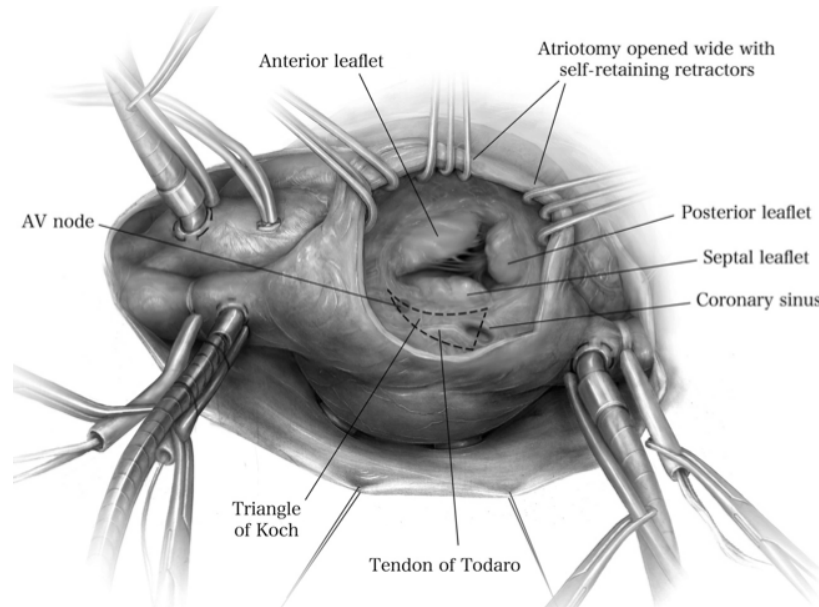
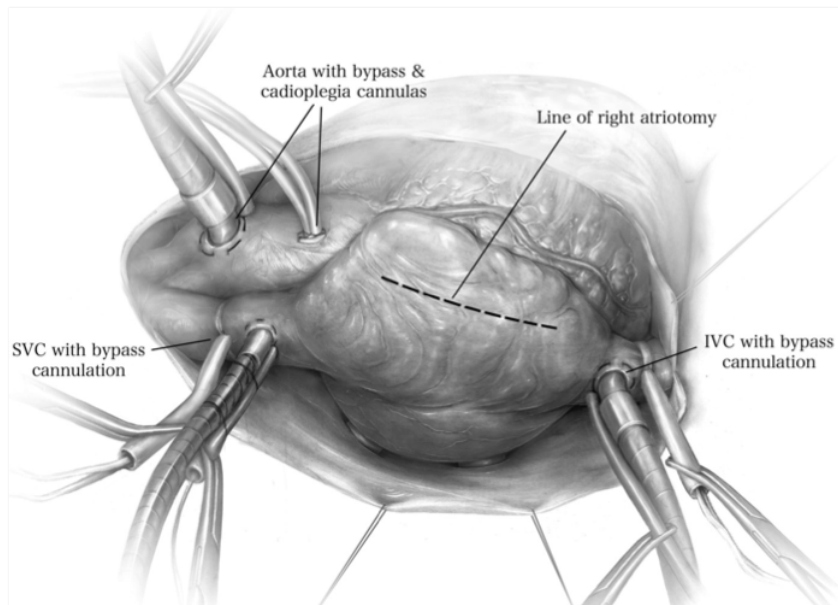
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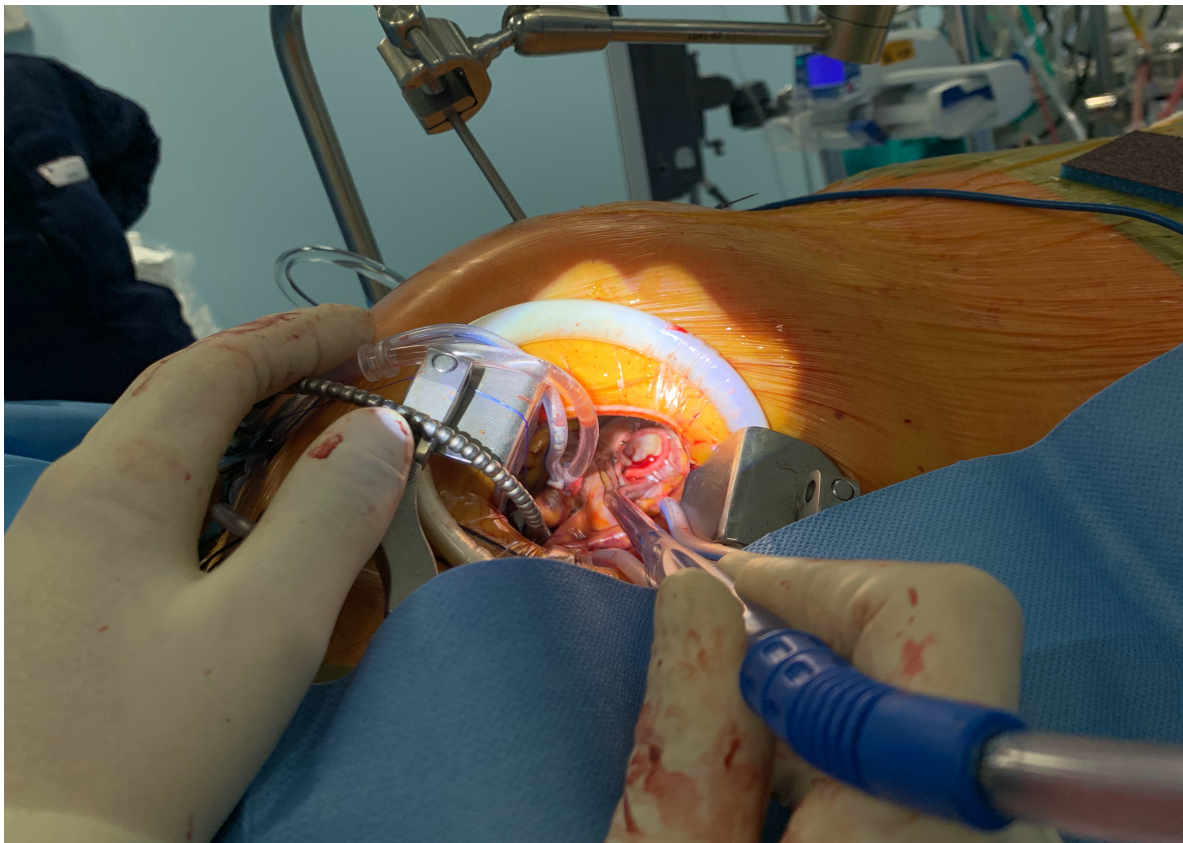


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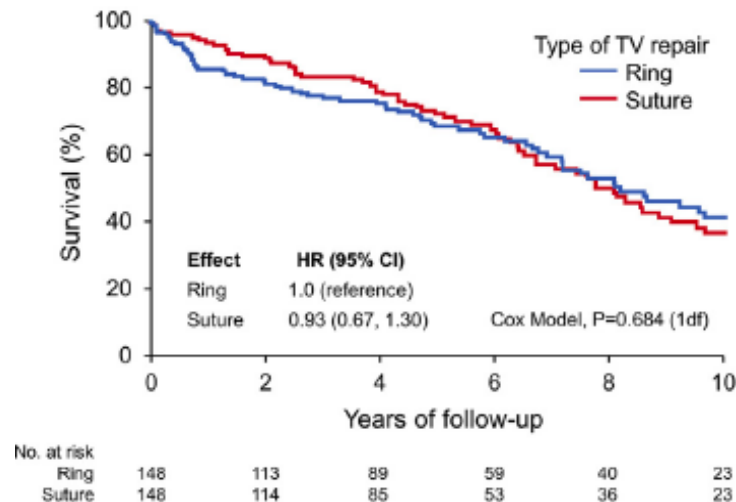
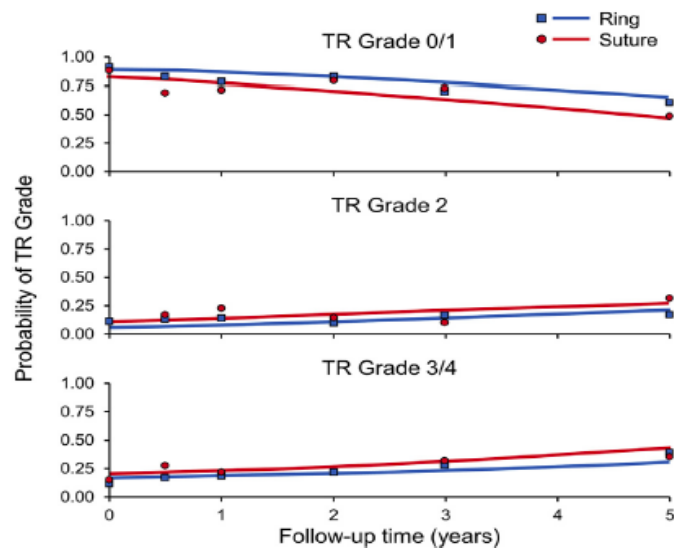








Outcomes of ring versus suture annuloplasty for tricuspid valve repair in patients undergoing mitral valve surgery



J Thorac Cardiovasc Surg 2016;152:406-15



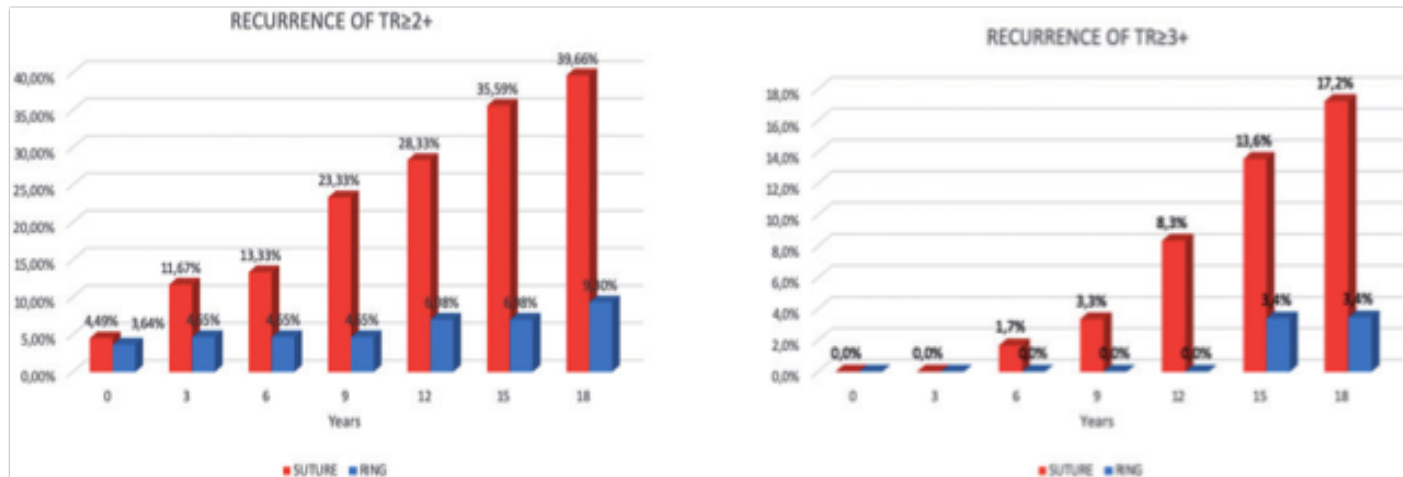


Figure 3. Percent of TR $\geq 2+$ recurrence in the panel (A) and TR $\geq 3+$ recurrence in the panel (B) according to the study group. The number of patients for each year was: 137 patients at 3 years, 136 patients at 6 years, 135 at 9 years, 135 at 12 years, 123 at 15 years and finally 49 at 18 years. TR: tricuspid regurgitation.

Ring Annuloplasty associated with a reduced risk of recurrence of TR

➤ *Asian Cardiovasc Thorac Ann.* 2022 Mar;30(3):285-292. doi: 10.1177/02184923211019533.

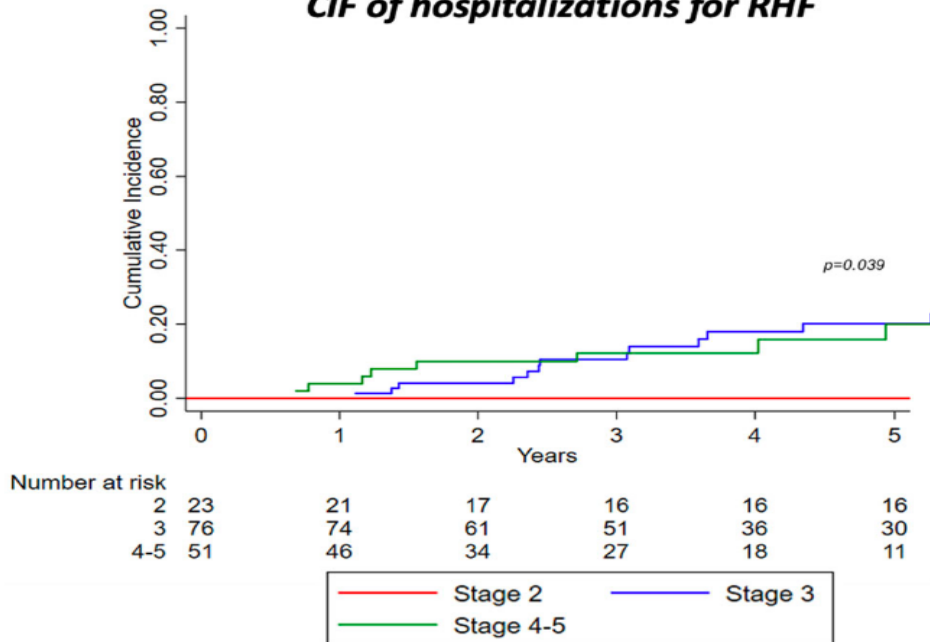
Epub 2021 May 20.



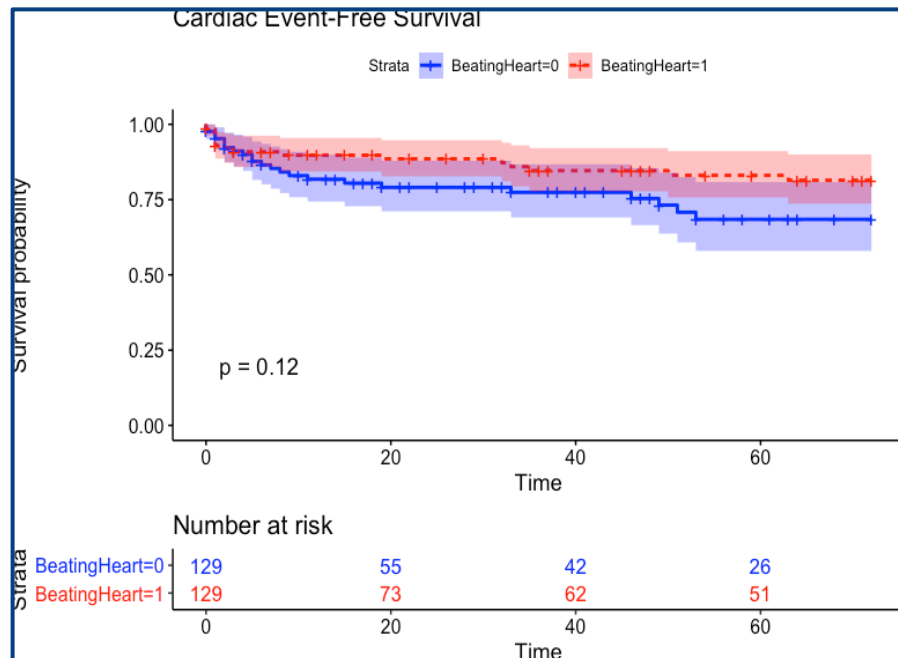
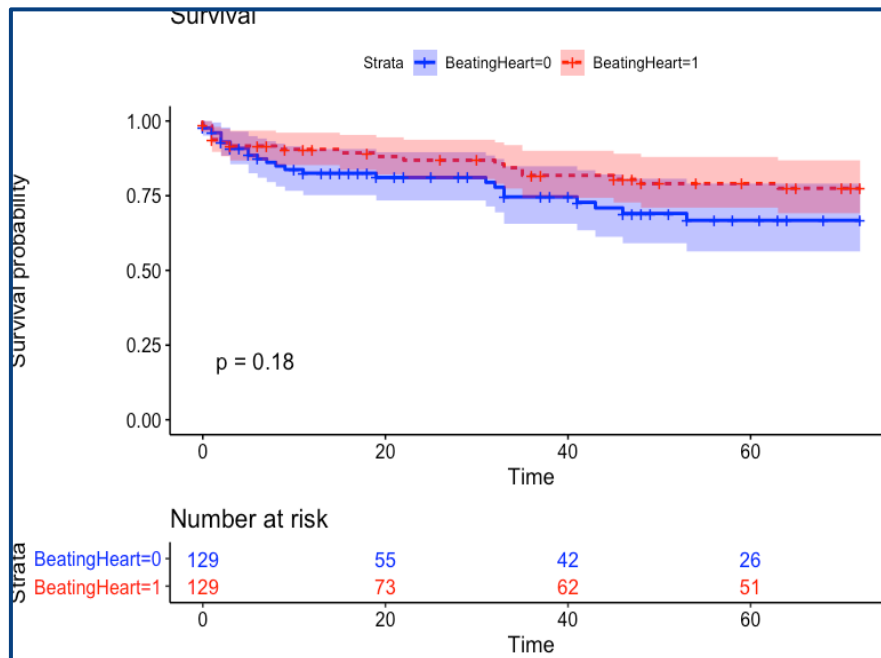
Mid-term outcomes of isolated tricuspid valve surgery according to preoperative clinical and functional staging

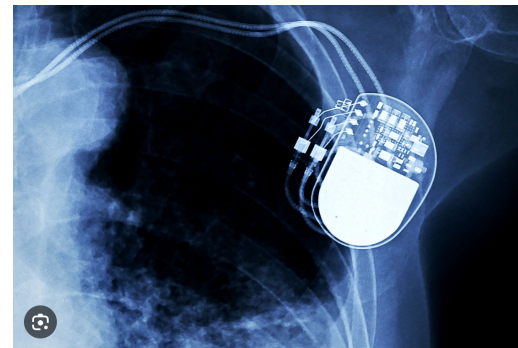
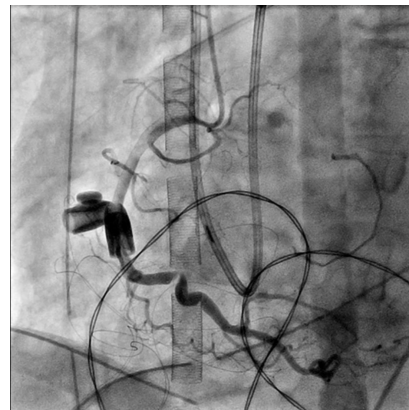
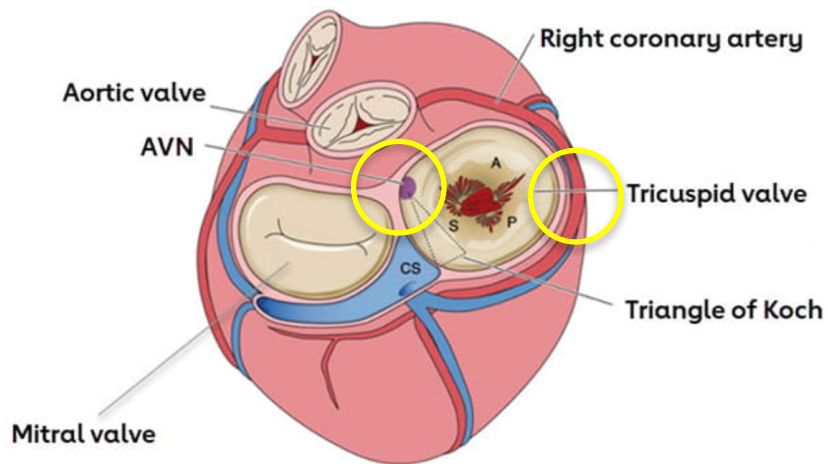
Alessandra Sala ^{a,*}, Roberto Lorusso ^{b,c}, Edoardo Zancanaro ^a, Davide Carino ^a, Marta Bargagna^a,

CIF of hospitalizations for RHF

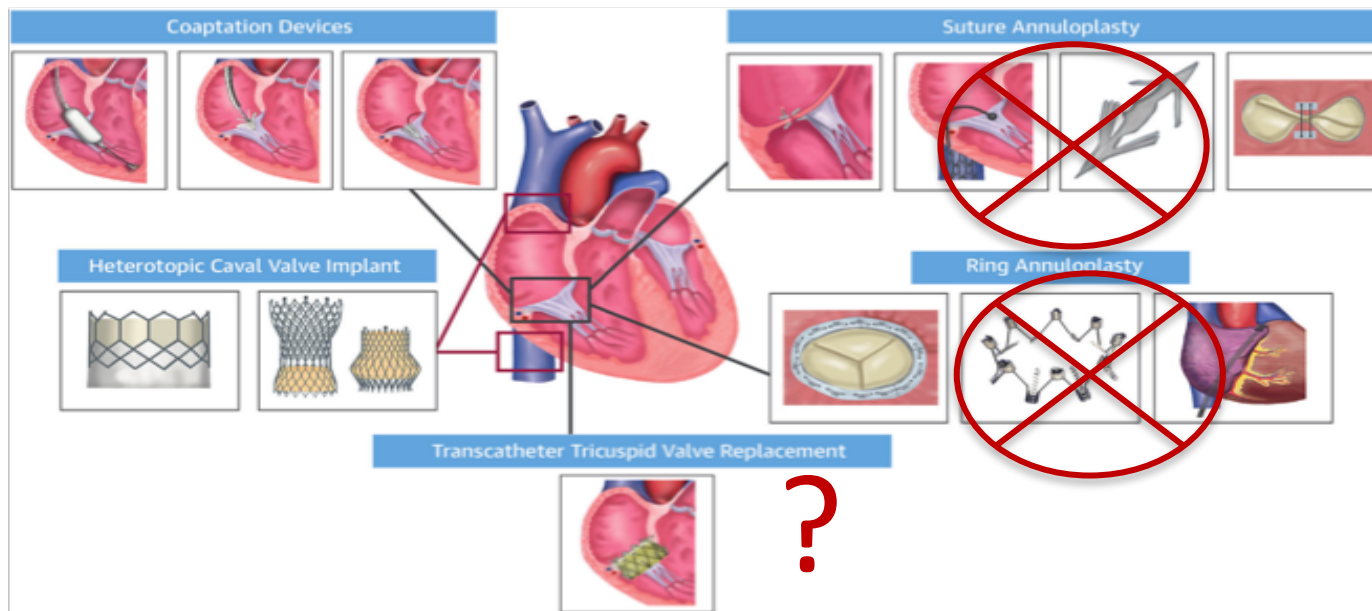


Beating Versus Arrested Heart Isolated Tricuspid Valve Surgery: Long-term Outcomes





CENTRAL ILLUSTRATION Transcatheter Tricuspid Landscape



Asmarats, L. et al. *J Am Coll Cardiol.* 2018;71(25):2935-56.

Coaptation devices (Forma, MitraClip, Pascal), suture annuloplasty (Trialign, TriCinch, minimally invasive annuloplasty technology, pledget-assisted suture annuloplasty), ring annuloplasty (Cardioband, Millipede, transatrial intrapericardial tricuspid annuloplasty), heterotopic caval valve implantation (SAPIEN, TricValve), and transcatheter tricuspid valve replacement (NaviGate).



- Screening cardiologico precoce e referral tempestivo al cardiocirurgo
- Trattamento chirurgico precoce in pazienti ben selezionati (stadio 2)
- Approccio minitoracotomico (cuore battente)

