

Incidence et impact pronostic des fuites tricuspides : quand la corriger ?

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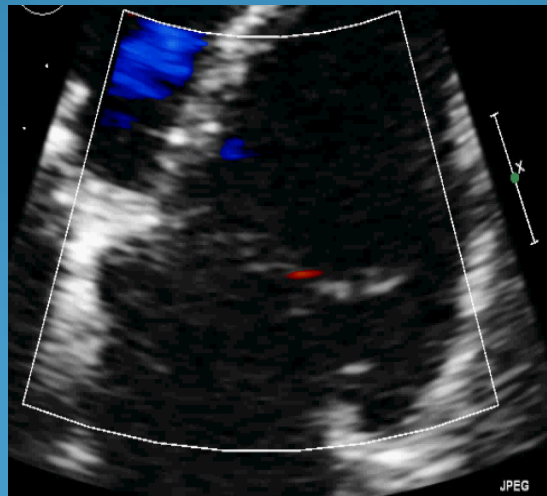
Disclosures Dr David Attias

- Exposés scientifiques rémunérés : BMS, Boeringher-Ingelheim, Servier, MSD, Abbott
- Board scientifique : Novartis, BMS
- Proctoring: Abbott
- Consulting: Highlife

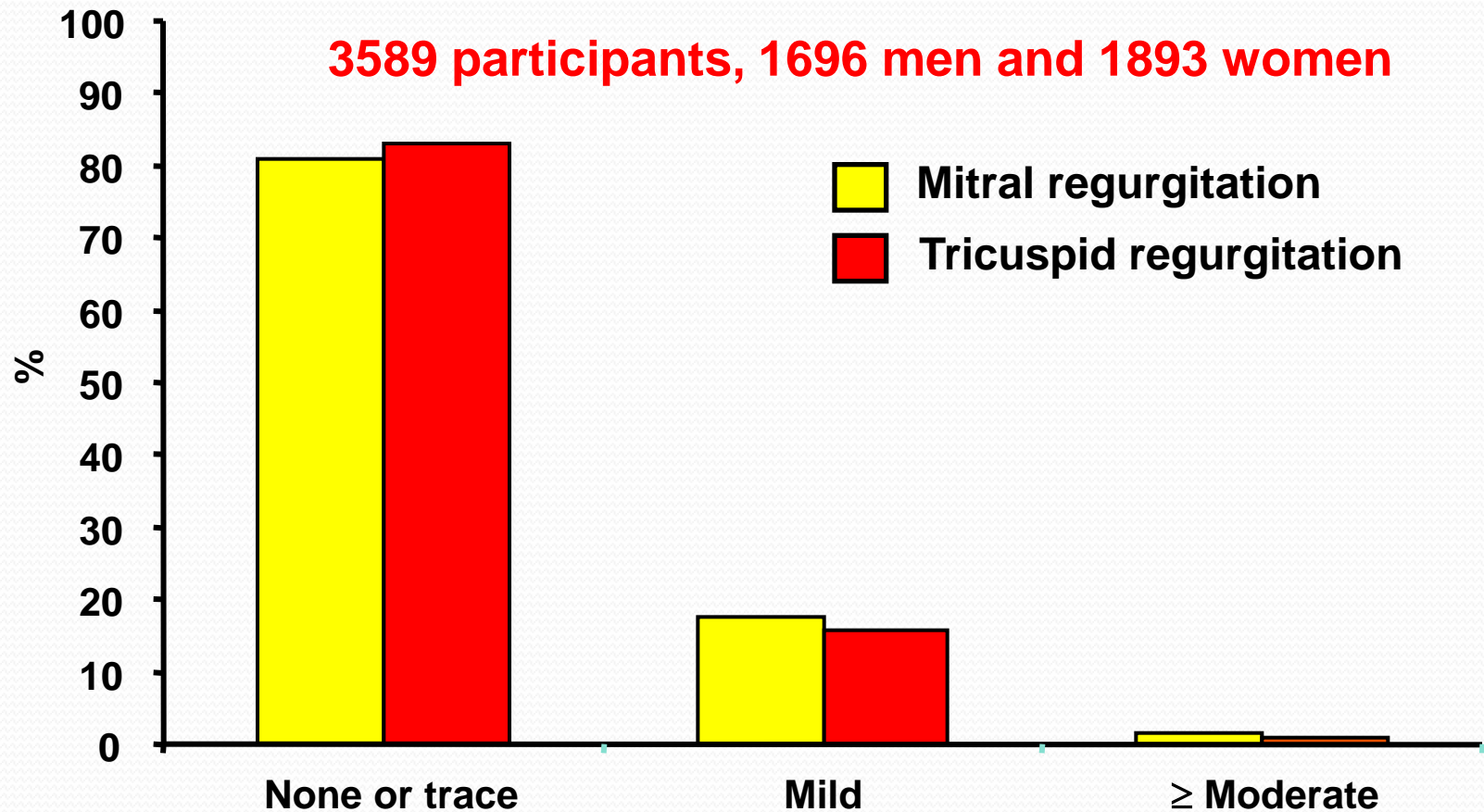
Valve Tricuspidale (VT): « la valve oubliée »

- Peu étudiée pendant des décennies (\neq valves aortique ou mitrale)
- Atteinte évaluée sur le degré d'Insuffisance Tricuspidale (IT) ++ = pathologie la + fréquente affectant la VT
- Regain d'intérêt:
 - ✓ Prévalence de l'IT (>1.5 millions de personnes aux USA)
 - ✓ Gravité potentielle
 - ✓ Nécessité d'une prise en charge adaptée / spécifique
 - ✓ Développement des traitements percutanés

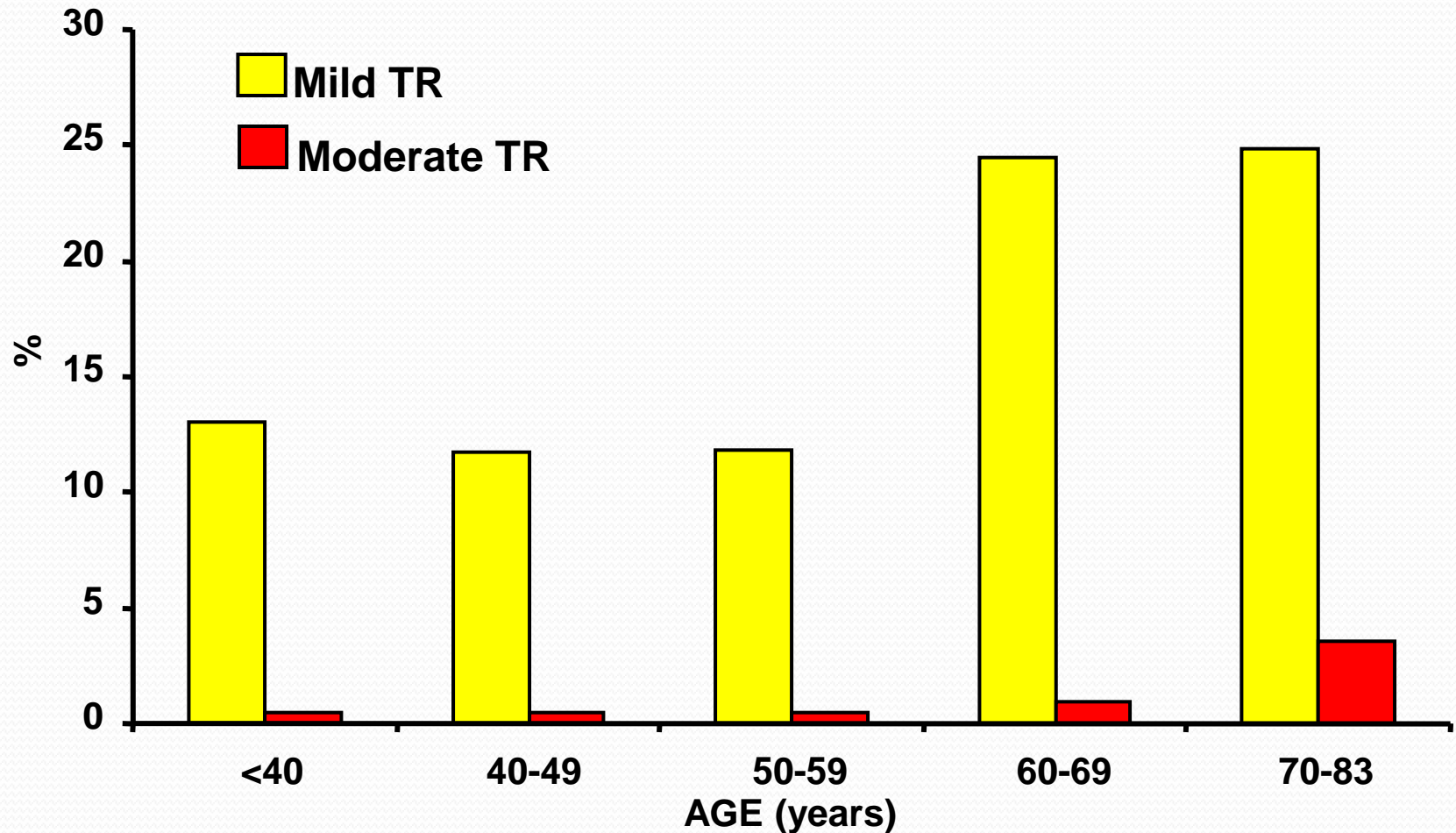
**Prevalence of TR :
Tricuspid regurgitation is
a common finding**



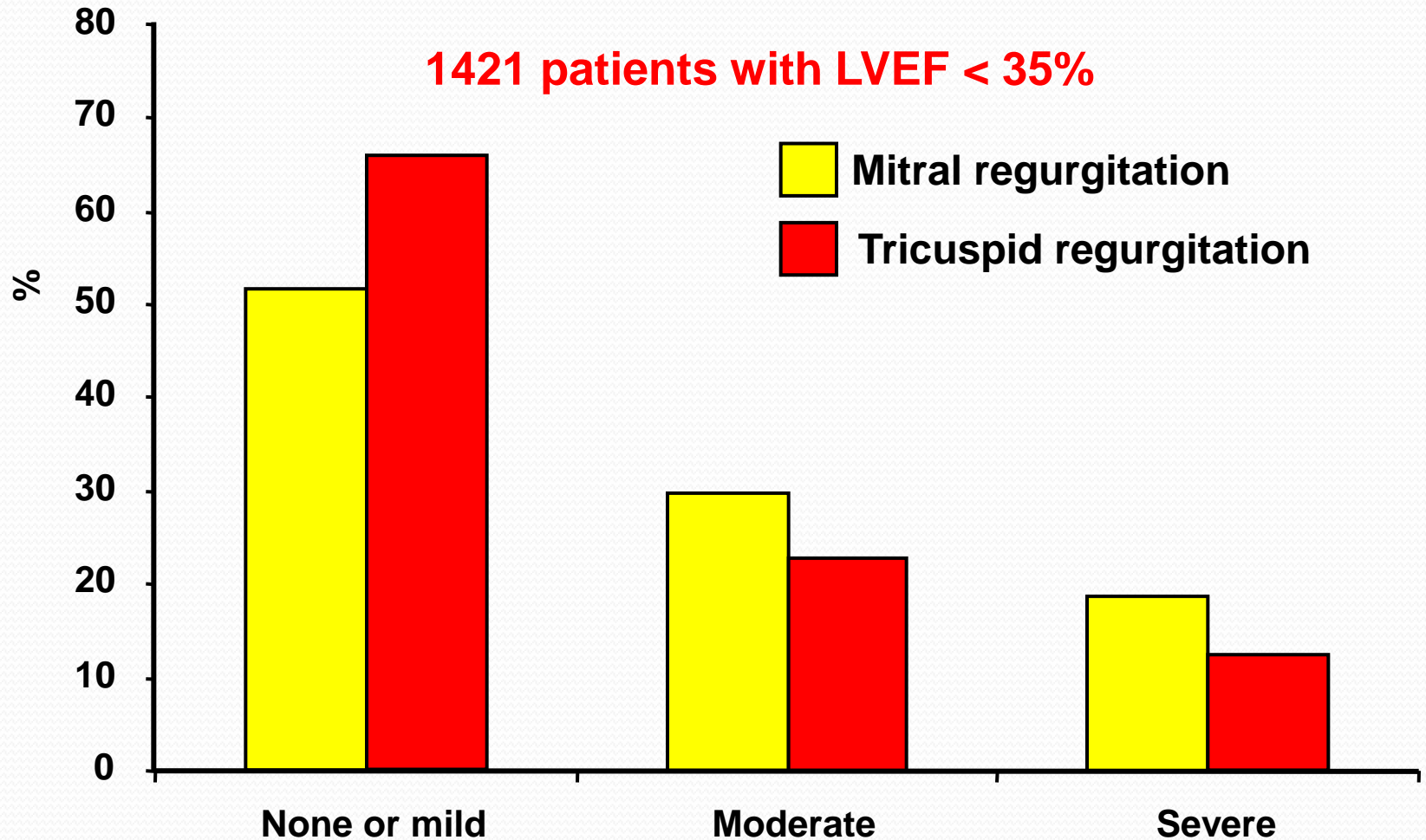
Prevalence of TR in the General Population (The Framingham Heart Study)



Prevalence and severity increase with age

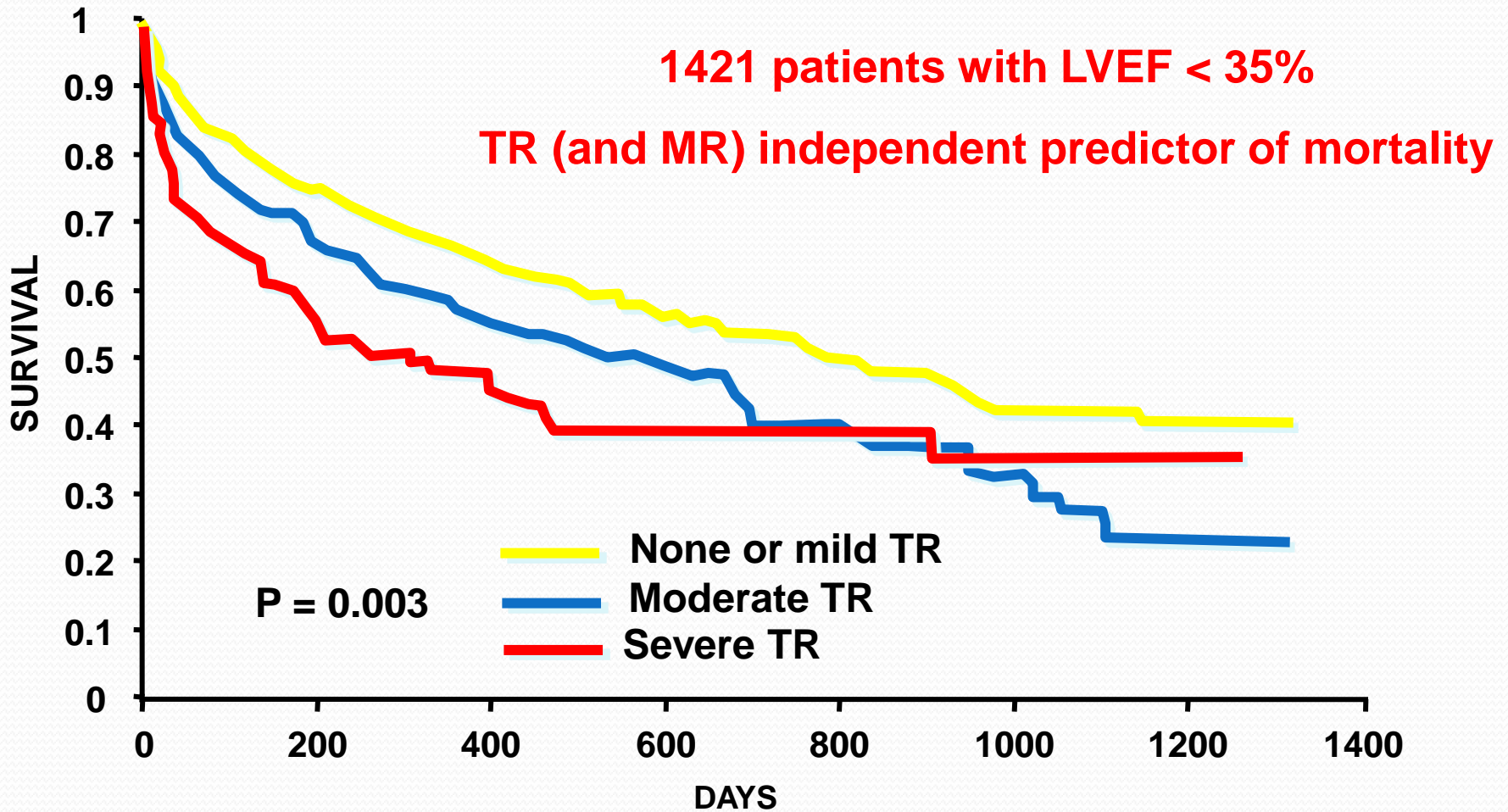


Prevalence of TR in patients with LV dysfunction



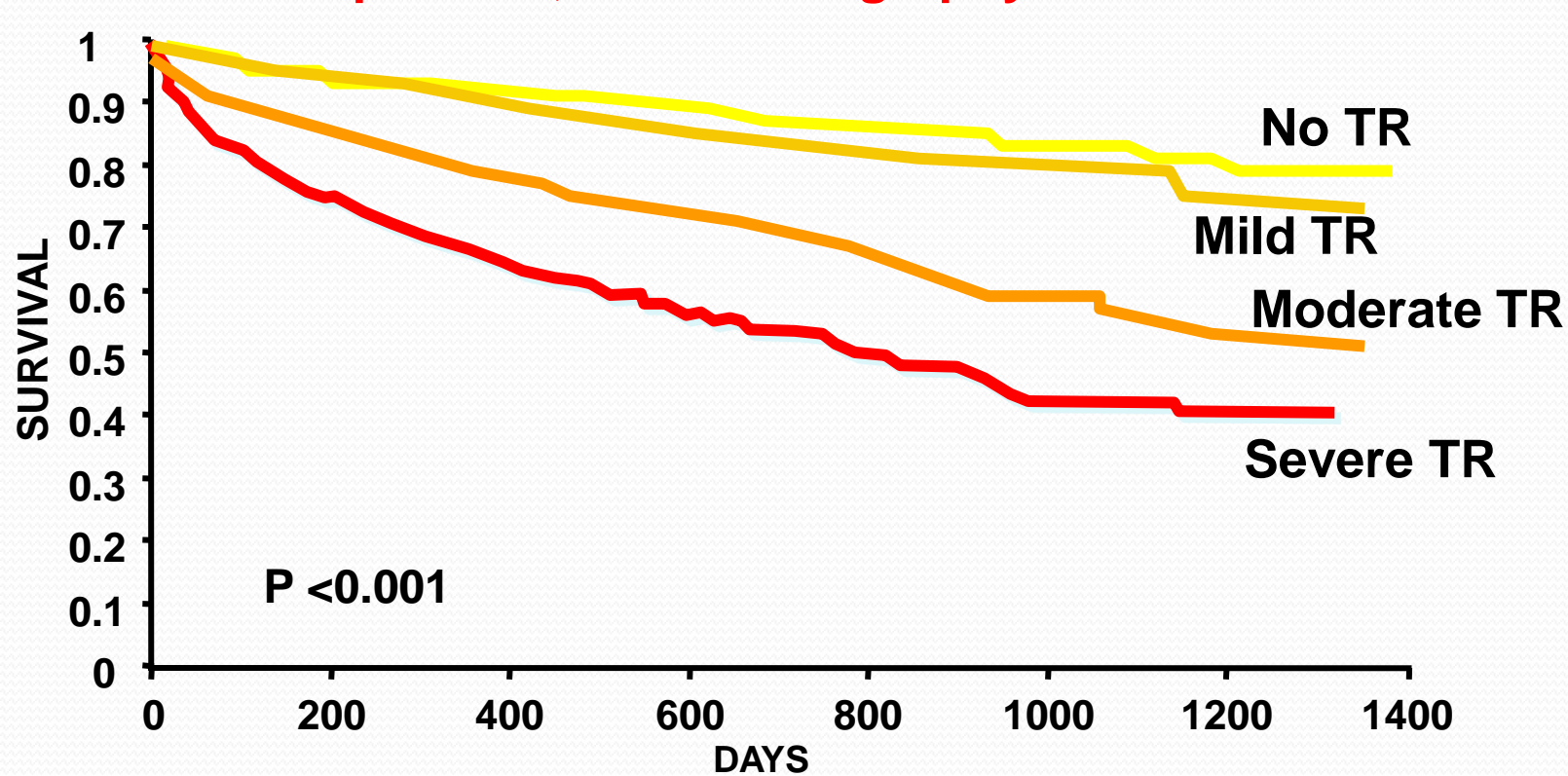
Is Tricuspid Regurgitation Bad ?

TR Grade and Survival in Patients with LV dysfunction



TR Grade and Survival

5507 patients, echocardiography at Veterans Centers



Severe TR is associated with a poor prognosis, independent of age, biventricular systolic function, RV size, and dilation of the inferior vena cava.

L'IT est associée à une morbi-mortalité importante

➤ ↗° des symptômes

Asthénie, anorexie, ascite, foie cardiaque, OMI

➤ ↘° des capacités fonctionnelles

Durée de l'effort ↘, consommation d'oxygène ↗

Groves PH et al. Br Heart J 1991

➤ FDR indépendant d'insuffisance cardiaque

Ruel M et al. J Thorac Cardiovasc Surg 2004

➤ FDR indépendant de décès

Henein MY et al. J Heart Valve Dis 2003

**Is TR
Cause or Marker of
impaired Prognosis?**

Clinical Situations

A. Severe isolated TR

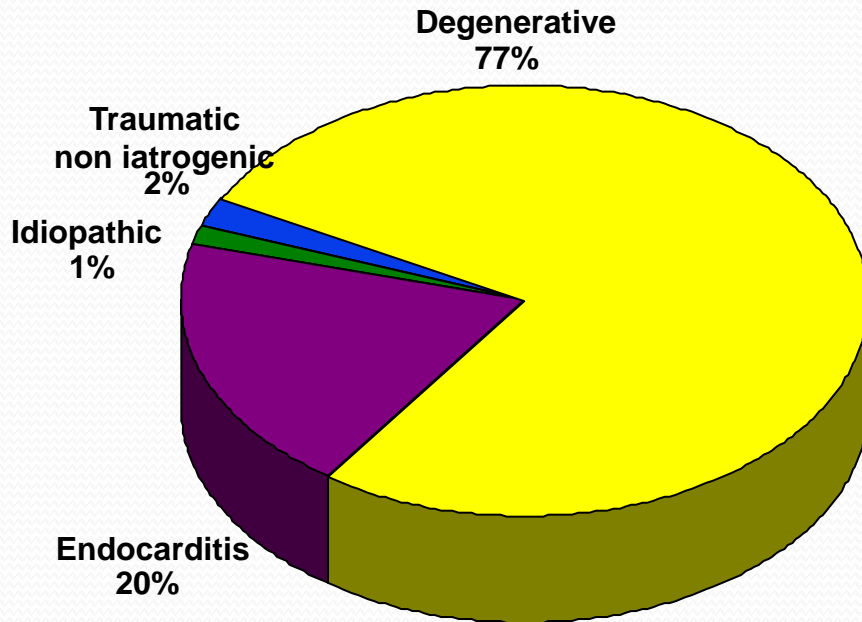
1. Without previous left-sided surgery
2. After previous surgery

B. Left-sided surgery

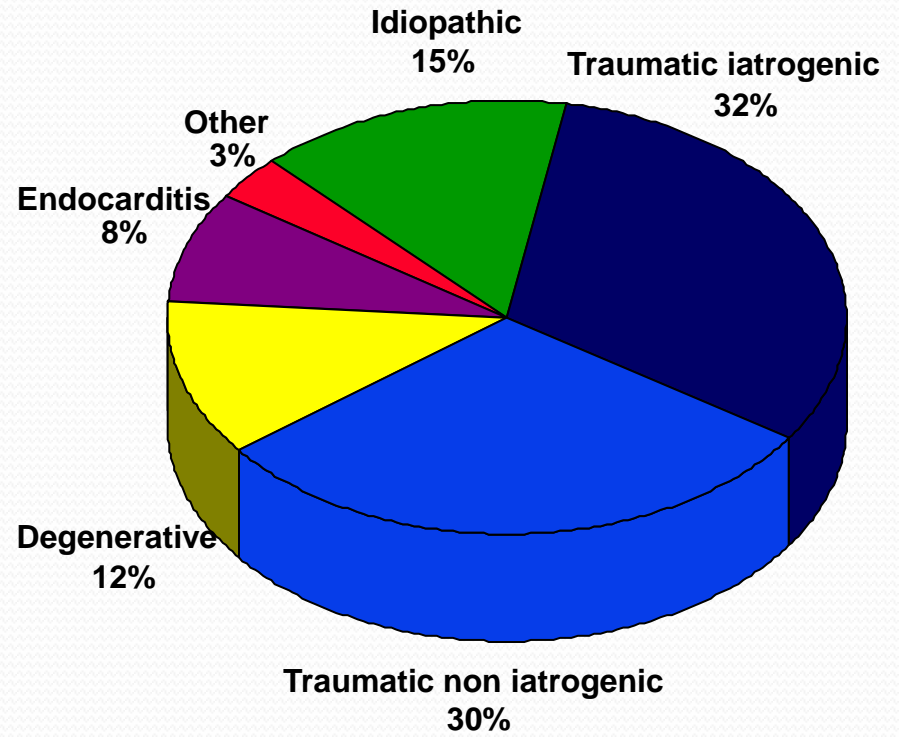
1. Severe TR
2. Moderate TR
3. No or mild TR

Tricuspid Flail – A Model of Isolated Severe Organic TR

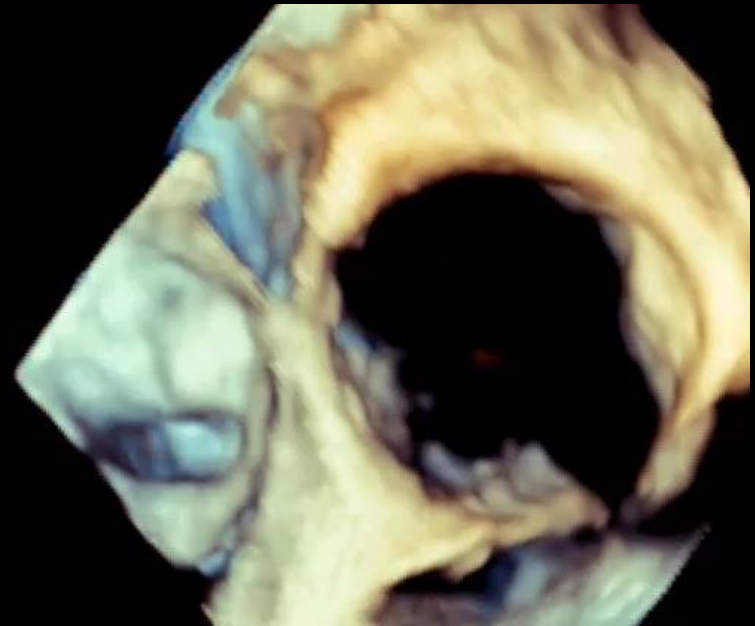
MITRAL FLAILS



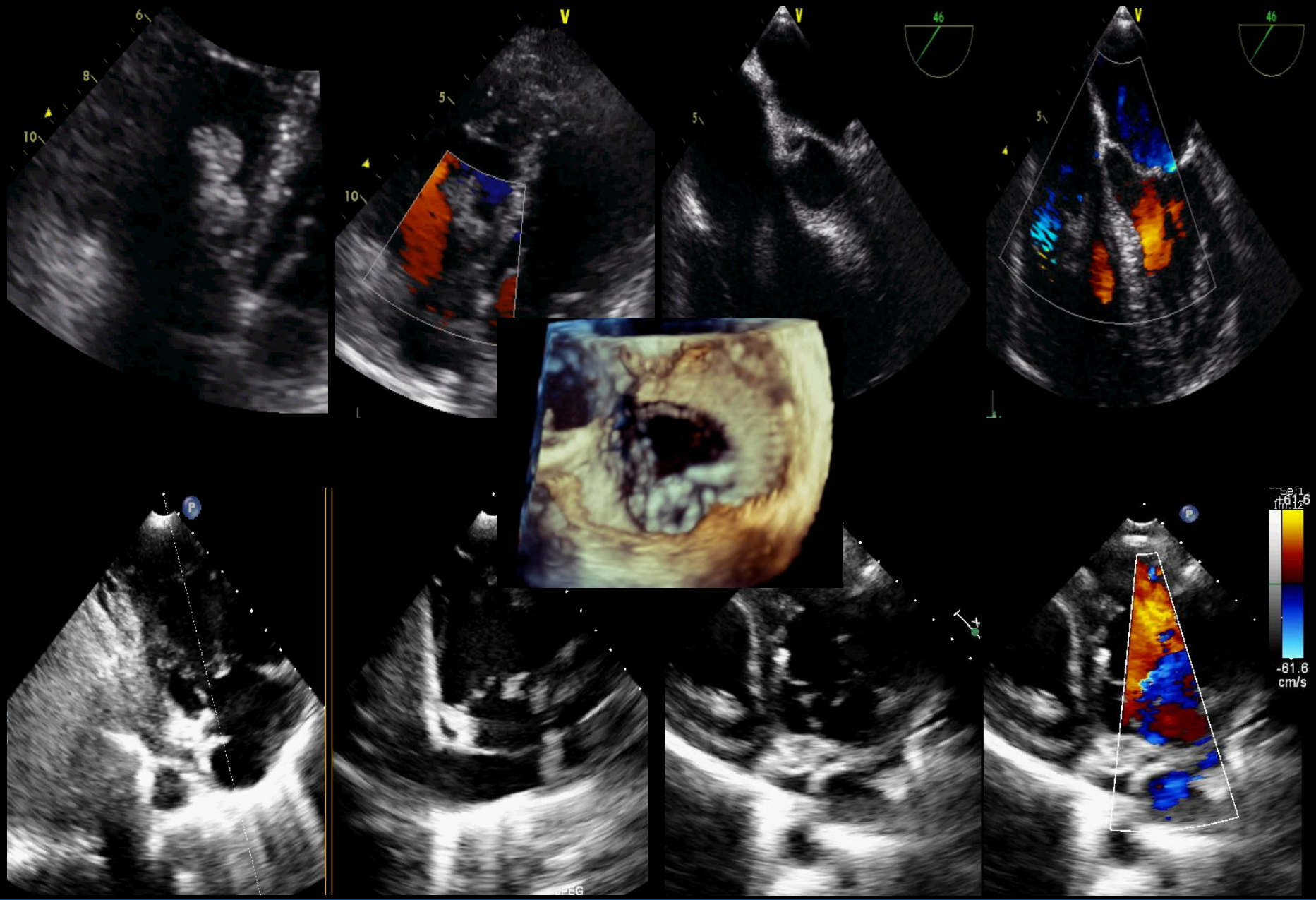
TRICUSPID FLAILS



IT traumatique



IT sur endocardite



Medical and surgical outcome of tricuspid regurgitation caused by flail leaflets

Population

- 60 patients
- Mean age: 51 ± 26 years
- Men: 62%
- Right ventricular enlargement: 35 (58%)
- Asymptomatic: 26 (43%)
- Atrial fibrillation
 - History: 40%
 - At presentation: 25%

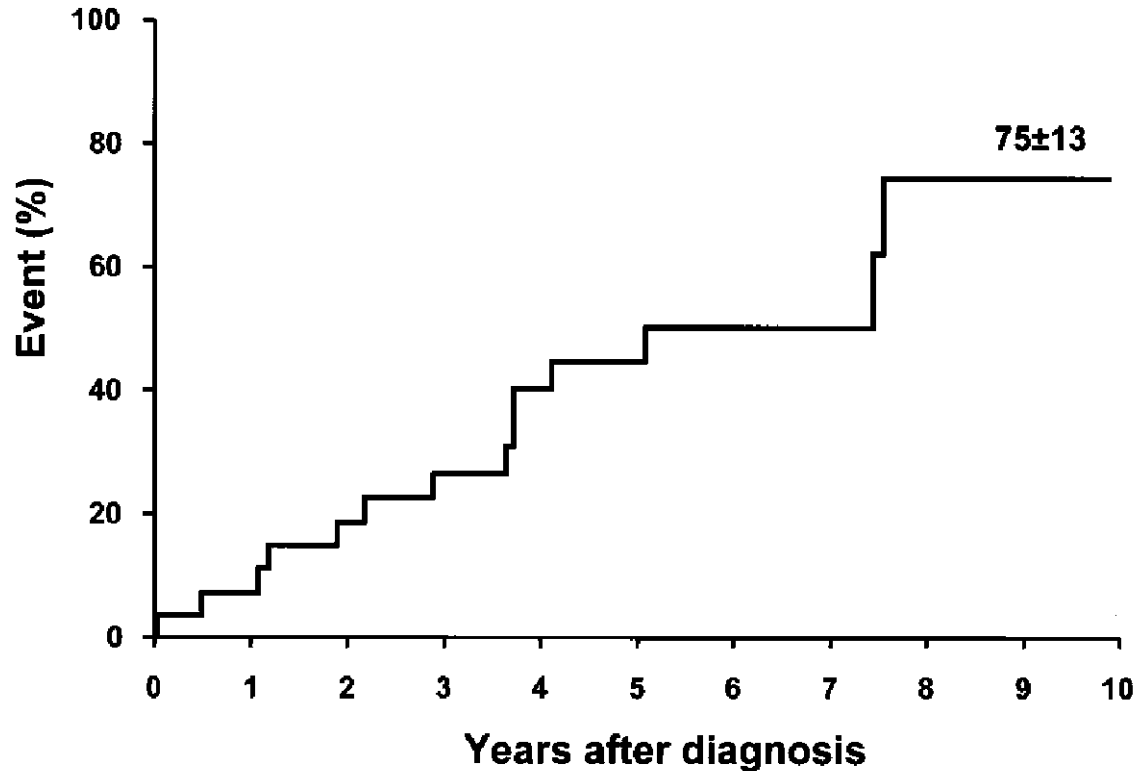
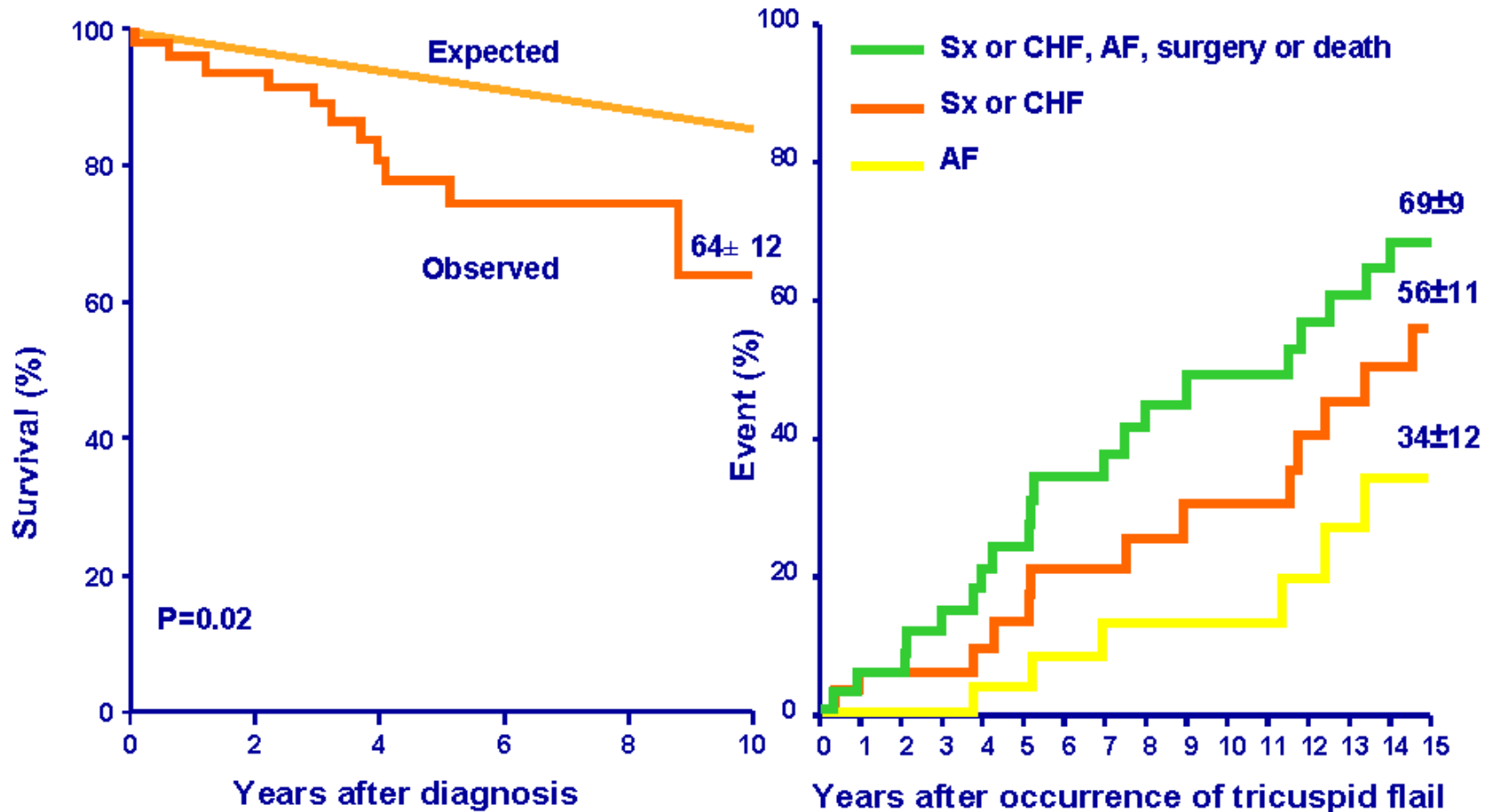
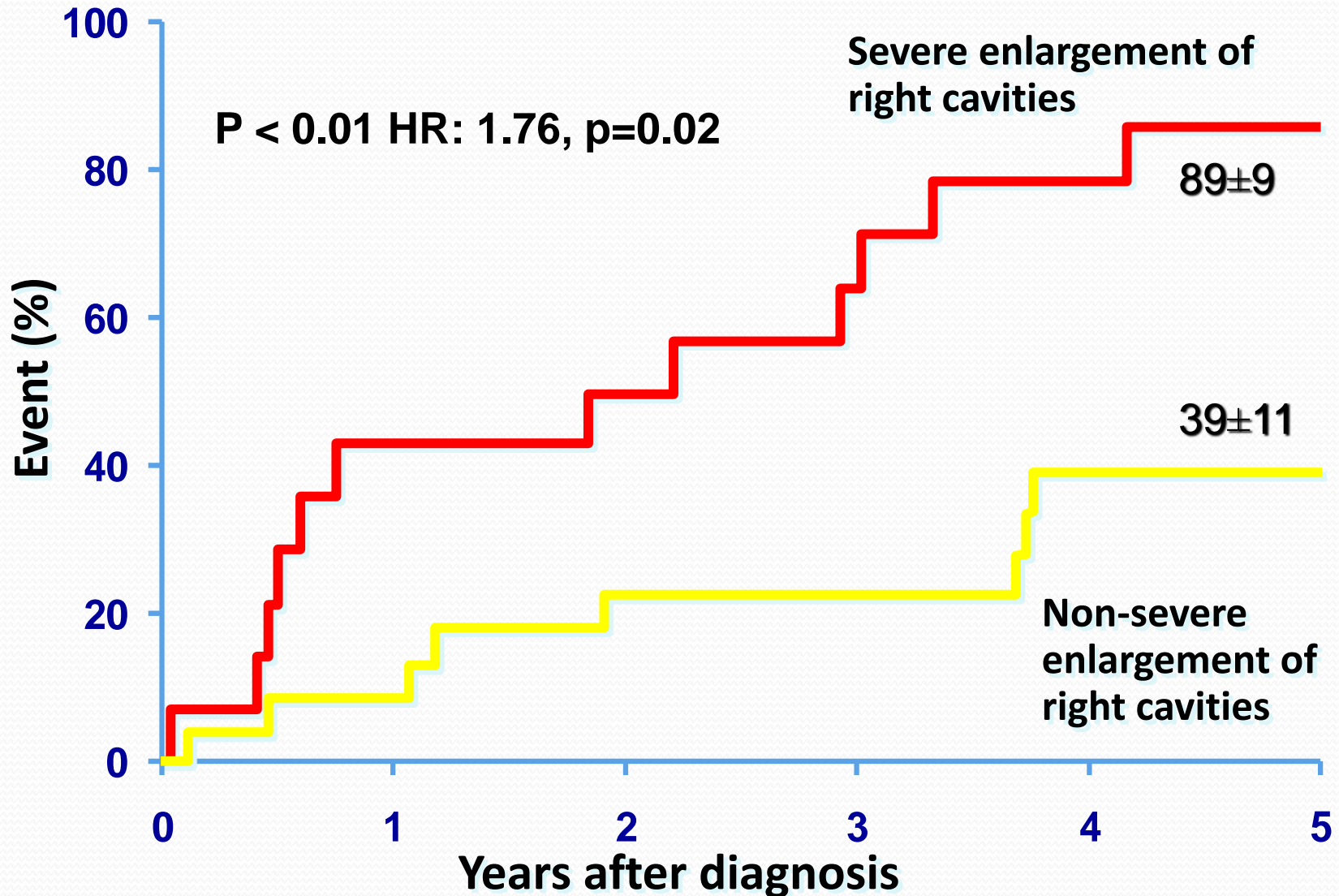


Figure 2 Clinical outcome after diagnosis of TR caused by flail leaflets of asymptomatic patients. The Kaplan-Meier curve depicts the incidence of the combined end point of symptoms or heart failure, new AF, cardiac surgery, or death.

Impact of TR on Outcome



Effect on outcomes of right-sided chambers enlargement



Clinical Situations

A. Severe isolated TR

1. Without previous left-sided surgery
2. After previous surgery

B. Left-sided surgery

1. Severe TR
2. Moderate TR
3. No or mild TR

Determinants of Surgical Outcome in Patients With Isolated Tricuspid Regurgitation

Yong-Jin Kim, MD; Dong-A Kwon, MD; Hyung-Kwan Kim, MD; Jin-Shik Park, MD; Seokyoung Hahn, PhD; Kyung-Hwan Kim, MD; Ki-Bong Kim, MD; Dae-Won Sohn, MD; Hyuk Ahn, MD; Byung-Hee Oh, MD; Young-Bae Park, MD

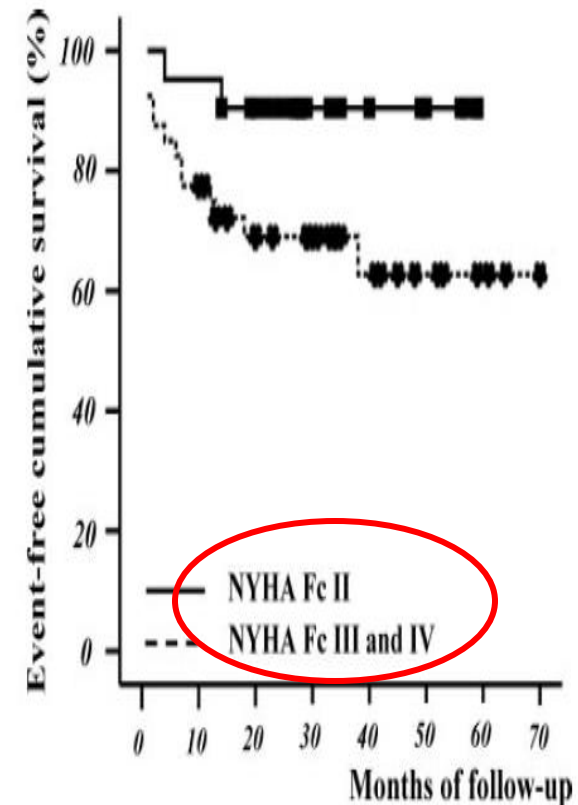
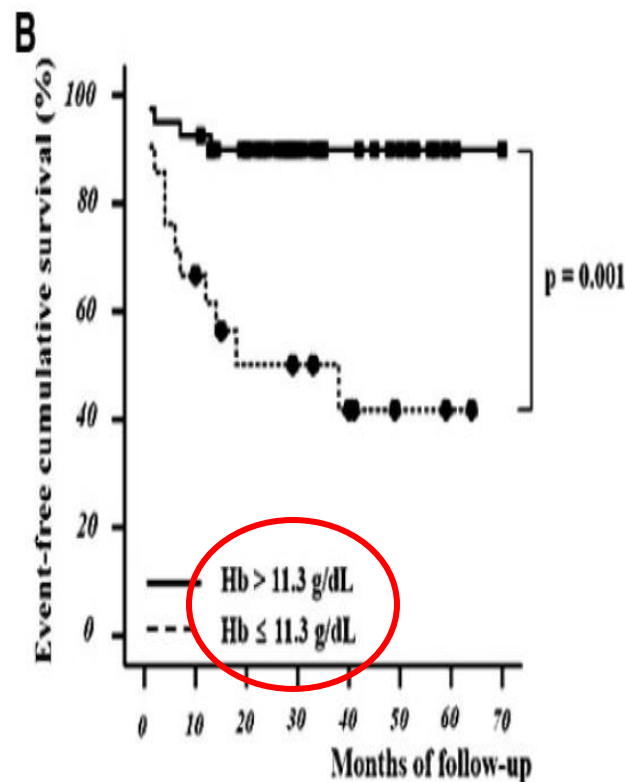
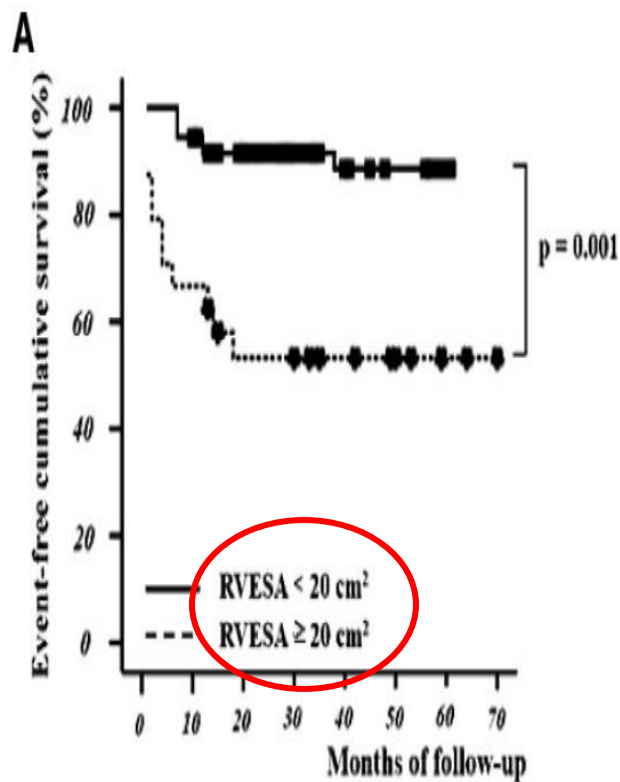
Background—We sought to identify preoperative predictors of clinical outcomes after surgery in patients with severe tricuspid regurgitation.

Methods and Results—We prospectively enrolled 61 consecutive patients (54 women, aged 57 ± 9 years) with isolated severe tricuspid regurgitation undergoing corrective surgery. Twenty-one patients (34%) were in New York Heart Association functional class II, 35 (57%) in class III, and 5 (9%) in class IV. Fifty-seven patients (93%) had previous history of left-sided valve surgery. Preoperative echocardiography revealed pulmonary artery systolic pressure of 41.5 ± 8.7 mm Hg, right ventricular (RV) end-diastolic area of 35.1 ± 9.0 cm², and RV fractional area change of $41.3 \pm 8.4\%$. The median follow-up duration after surgery was 32 months (range, 12 to 70). Six of the 61 patients died before discharge; thus, operative mortality was 10%. Three of the 55 patients who survived surgery died during follow-up, and 6 patients required readmission because of cardiovascular problems. Thus, 46 patients (75%) remained event free at the end of follow-up. In the 54 patients who underwent 6-month clinical and echocardiographic follow-up, RV end-diastolic area decreased by 29%, with a corresponding 26% reduction in RV fractional area change. Thirty-three patients (61%) showed improved functional capacity after surgery. On multivariable Cox regression analysis, preoperative hemoglobin level ($P < 0.001$) and RV end-systolic area ($P < 0.001$) emerged as independent determinants of clinical outcomes. On receiver operating characteristic curve analysis, we found that RV end-systolic area < 20 cm² predicted event-free survival with a sensitivity of 73% and a specificity of 67%, and a hemoglobin level > 11.3 g/dL predicted event-free survival with a sensitivity of 73% and a specificity of 83%.

Conclusions—Timely correction of severe tricuspid regurgitation carries an acceptable risk and improves functional capacity. Surgery should be considered before the development of advanced RV systolic dysfunction and before the development of anemia. (*Circulation*. 2009;120:1672-1678.)

Determinants of Surgical Outcome in Patients With Isolated Tricuspid Regurgitation

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RVESA < 20 cm ²	37	35	34	34	33	33	33	33
RVESA ≥ 20 cm ²	24	16	13	13	13	13	13	13

Hb > 11.3 g/dL	40	37	36	36	36	36	36	36
Hb ≤ 11.3 g/dL	21	14	11	11	10	10	10	10

HA Fc II	21	20	19	19	19	19	19	19
HA Fc III and IV	40	31	28	28	27	27	27	27

development of anemia. (*Circulation*. 2009;120:1672-1678.)

Preoperative Factors Associated With Adverse Outcome After Tricuspid Valve Replacement

Yan Topilsky, MD; Amber D. Khanna, MD; Jae K. Oh, MD; Rick A. Nishimura, MD; Maurice Enriquez-Sarano, MD; Yang B. Jeon, MD; Thoralf M. Sundt, MD; Hartzell V. Schaff, MD; Soon J. Park, MD

(46%) had previous left-sided valve surgery

Background—Preoperative factors associated with increased mortality and worse outcome after tricuspid valve replacement in patients with severe tricuspid regurgitation are poorly understood.

Methods and Results—We retrospectively analyzed 189 patients (37% men; age, 67.5 ± 11.3 years) who underwent tricuspid valve replacement for severe tricuspid regurgitation. Operative mortality rate was 10%, and was associated with intra-aortic balloon pump (odds ratio, 3.2; 95% confidence interval, 1.9 to 5.6; $P < 0.0001$) or the presence of severe symptoms (New York Heart Association class IV relative to classes II and/or III) at the time of surgery (1.7; 95%

Operative mortality 10%

Predictive factors of post-op outcome

-Age / Charlson

-NYHA class III-IV

- Right ventricular function

1, 6 (3%)
were free
lographic
formance
18; 95%
nference
interval,
ort right
increased

acceptable
ortality is

associated with a high preoperative Charlson index, short right index of myocardial performance ratio, and advanced New York Heart Association class. (*Circulation*. 2011;123:1929-1939.)

Clinical and echocardiographic outcomes after surgery for severe isolated tricuspid regurgitation

Joon Bum Kim, MD, Sung-Ho Jung, MD, Suk Jung Choo, MD, PhD, Cheol Hyun Chung, MD, PhD, and Jae Won Lee, MD, PhD

Objective: Few studies have investigated the outcomes after surgical correction of severe isolated tricuspid regurgitation.

Methods: The medical records of 51 consecutive patients (aged 55.8 ± 12.9 years, 25 male) who underwent tricuspid valve surgery at the Asan Medical Center between September 1996 and July 2010 were evaluated retrospectively. The primary end point was event-free survival. Secondary end points were mortality, morbidity, and reoperation for tricuspid disease.

Predictive factors of post-op outcome

Results: Hemoglobin, renal function, liver function, and right ventricle size were predictive factors of post-operative outcome. Residual TR was also a significant predictor of poor event-free survival, even after adjustment for preoperative risk factors ($P = .036$). Replacement of the tricuspid valve with a mechanical valve was associated with a higher mortality rate compared with replacement with a biological valve. The median event-free survival was 5.2 years (interquartile range, 1.1-11.1 years). Severe tricuspid regurgitation after tricuspid valve repair or bioprosthetic valve replacement was a significant predictor of poor event-free survival, even after adjustment for preoperative risk factors ($P = .036$).

Conclusions: In the present cohort, preoperative anemia, renal/hepatic dysfunction, right ventricular dilatation, and significant postoperative tricuspid regurgitation were associated with poor outcomes. Timely surgery is advisable in patients with severe isolated tricuspid regurgitation before the development of anemia, organ dysfunction, or right ventricular dilatation. (J Thorac Cardiovasc Surg 2012; ■:1-7)

Surgical Risk and Outcome of Repair Versus Replacement for Late Tricuspid Regurgitation in Redo Operation

Shao-Wei C
Yin-Kai Cha
Pyng-Jing L

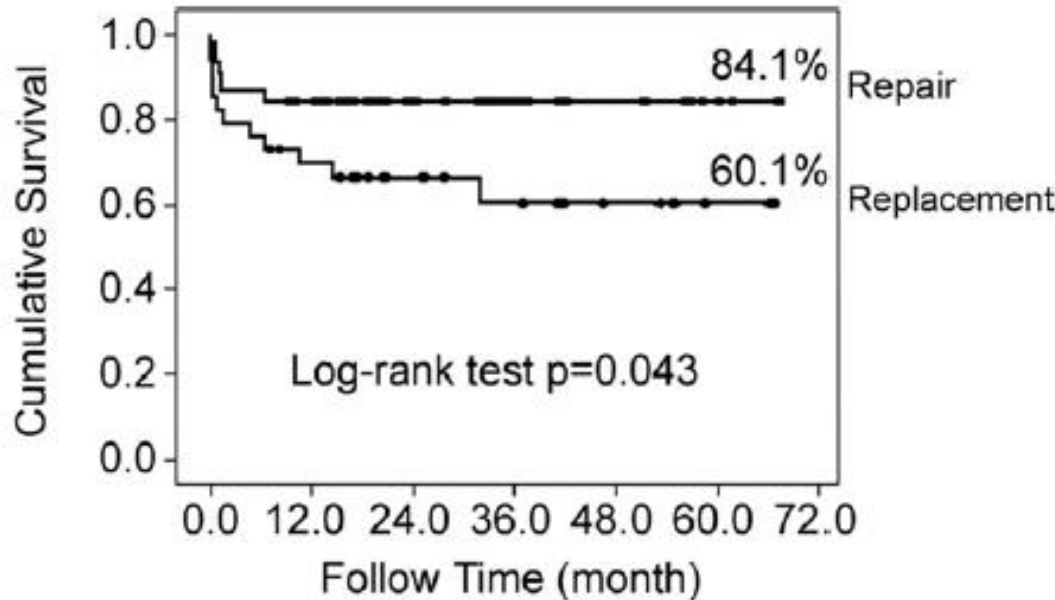
Department of Ca
Chang Gung Uni

Background. I
cardiac operatio
to repair and wl
experiences and
morbidity.

Methods. Fro
consecutive pa
open heart op
procedure. Thei
83 years). TV r
replacement in

received mechanical prostheses.

Results. Fourteen (18%) patients died after the operation. Risk factors of hospital death by multivariate analysis were age (>65 years), preoperative renal insufficiency (creatinine >2 mg/dL), and preoperative severe liver cirrhosis (Child classification C). Compared with the group that underwent TV repair, those who under-



Repair	38	35	22	12	8	4	0
Replacement	25	21	14	10	6	2	0

and

g Memorial Hospital and

ed to have had previous TV
(.001) and preoperative Child
vs 2%; $p = 0.018$). Although
significant (24% vs 14%; $p =$
ilities of tracheotomy, gastro-
e death were higher in the

had previous TV operations
r cirrhosis were more likely
t in tricuspid reoperations.

in the repair group, patients
in the replacement group had higher morbidities and
low late survival. Earlier intervention, before decompensated heart failure occurs, is warranted to improve the outcome.

(Ann Thorac Surg 2012;93:770–5)

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Timing of Referral of Patients With Severe Isolated Tricuspid Valve Regurgitation to Surgeons (from a French Nationwide Database)

Julien Dreyfus, MD^{a,b}, Nicolas Ghalem, MD^a, Eric Garbarz, MD^a, Claire Cimadevilla, MD^c,
Patrick Nataf, MD^c, Alec Vahanian, MD^a, Gilbert Caranhac, MS^d, and
David Messika-Zeitoun, MD, PhD^{a,e,f,*}

Pronostic de la chirurgie tricuspide isolée

- Toutes les chirurgies tricuspides isolées en France entre 2013 et 2014:
- **241** patients:
 - 84 annuloplasties et 157 RVT
 - 20% d'endocardite et 20% d'antécédent de chirurgie valvulaire du coeur gauche
- Mortalité hospitalière: **10%**
- Complications majeures post-opératoire (décès, dialyse, ECMO): **19%**
- Déterminant de la mortalité hospitalière: Insuffisance cardiaque pré-op
- Déterminants des complications majeures post-opératoire :
Présentation clinique et stade avancé de la maladie
(Insuffisance cardiaque, atteinte hépatique, insuffisance rénale)
- **70%** de survie à 1an, **62%** de survie à 5ans
- ➔ Patients adressés trop tard au chirurgien

Clinical Situations

A. Severe isolated TR

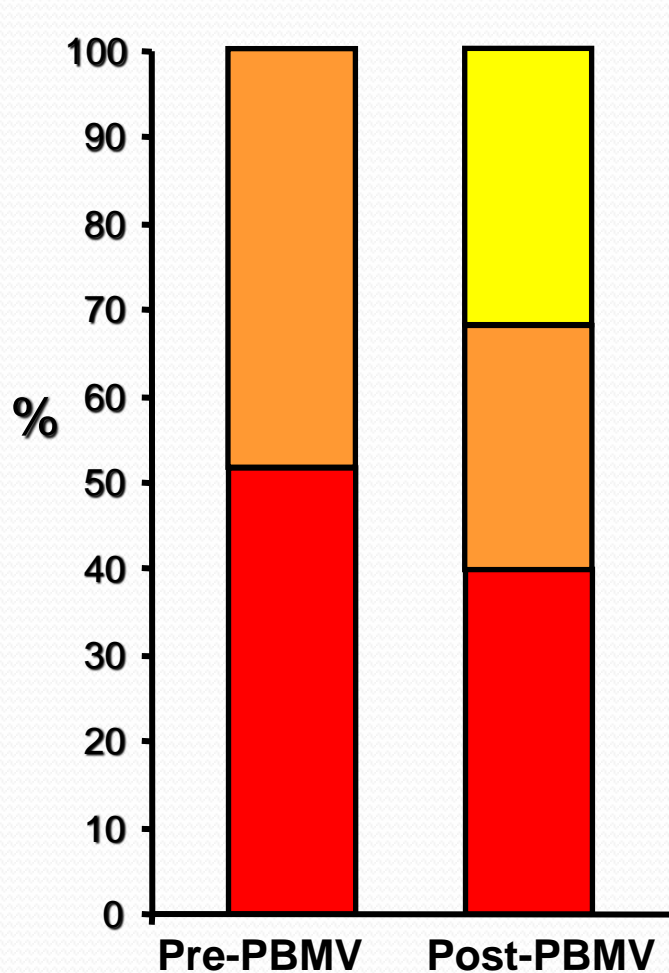
1. Without previous left-sided surgery
2. After previous surgery

B. Left-sided surgery

1. Severe TR
2. Moderate TR
3. No or mild TR

**Does the treatment of
left-sided disease
cure the TR?**

TR Resolution post Mitral Valve Commissurotomy

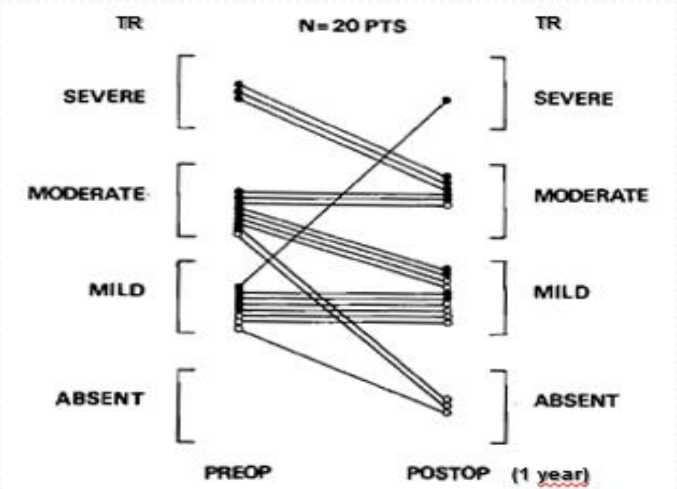


- Resolution in 32%
- Independent predictors:
 - TR jet area before PBMV
 - Decrement of peak mitral gradient after PBMV (=success of the procedure)

Corriger la valvulopathie du cœur gauche ne résout pas l'atteinte valvulaire du cœur droit

L'IT ne diminue pas après correction de la valvulopathie mitrale

➤ chirurgie valvulaire mitrale isolée



Simon R et al. Circulation 1980

**Take home message :
The sole treatment of
left-sided disease
only partially cure TR**

Clinical Situations

A. Severe isolated TR

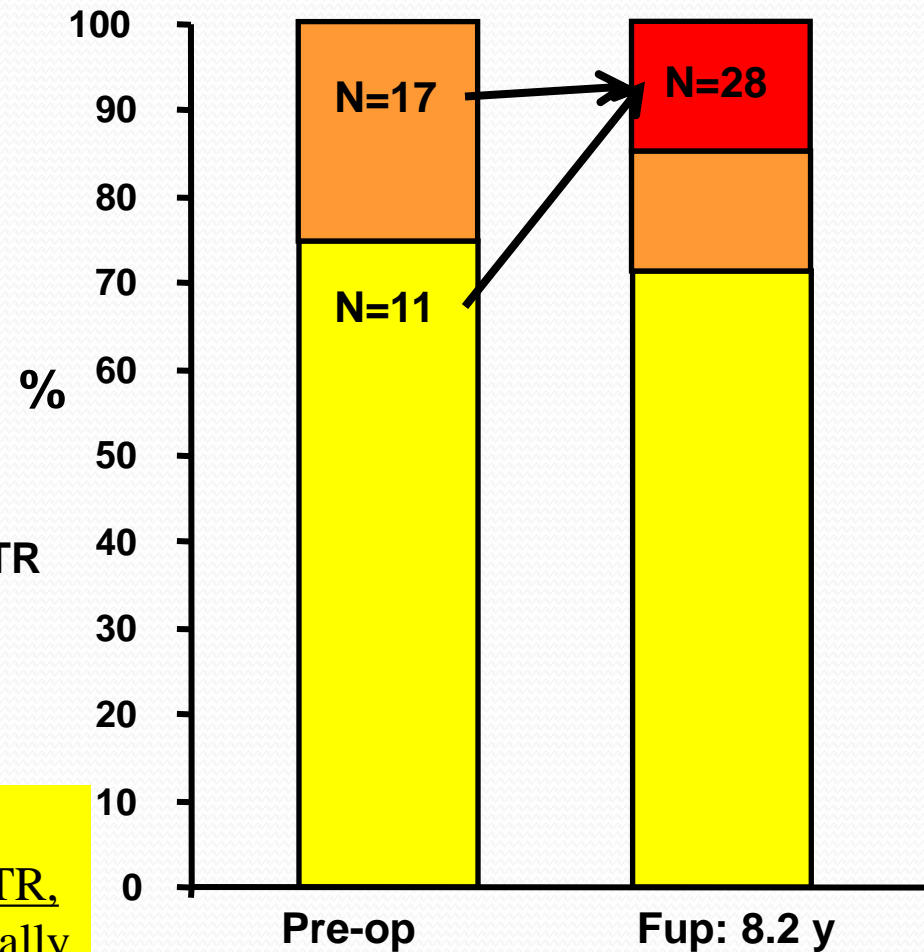
1. Without previous left-sided surgery
2. After previous surgery

B. Left-sided surgery

1. Severe TR
2. Moderate TR
3. No or mild TR

TR after Mitral Valve Surgery

- 174 patients with isolated mitral valve surgery and TR grade $\leq 2/4$
- 1/3 third of non corrected moderate TR developed severe TR



Multivariate analysis identified preoperative 2+ TR, atrial fibrillation, and huge left atrium as statistically significant predictors for late TR after surgery.

Mild-to-moderate functional tricuspid regurgitation in patients undergoing valve replacement for rheumatic mitral disease: the influence of tricuspid valve repair on clinical and echocardiographic outcomes

Joon Bum Kim,¹ Dong Gon Yoo,² Gwan Sic Kim,¹ Hyun Song,³ Sung-Ho Jung,¹ Suk Jung Choo,¹ Cheol Hyun Chung,¹ Jae Won Lee¹

¹Department of Thoracic and Cardiovascular Surgery, Asan Medical Center, University of Ulsan College of Medicine, Seoul, South Korea

²Department of Thoracic and Cardiovascular Surgery, Gangneung Asan Hospital, University of Ulsan College of Medicine, Gangneung, South Korea

³Department of Thoracic and Cardiovascular Surgery, Seoul Saint Mary's Hospital, College of Medicine, Catholic University of Korea, Seoul, South Korea

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ABSTRACT

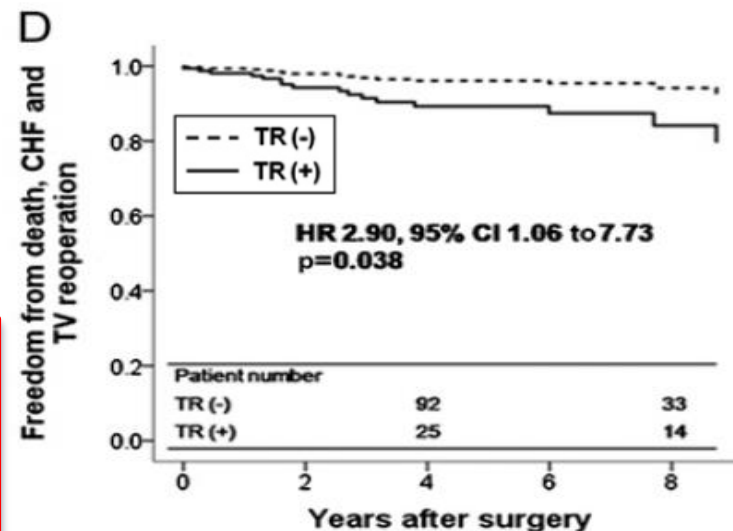
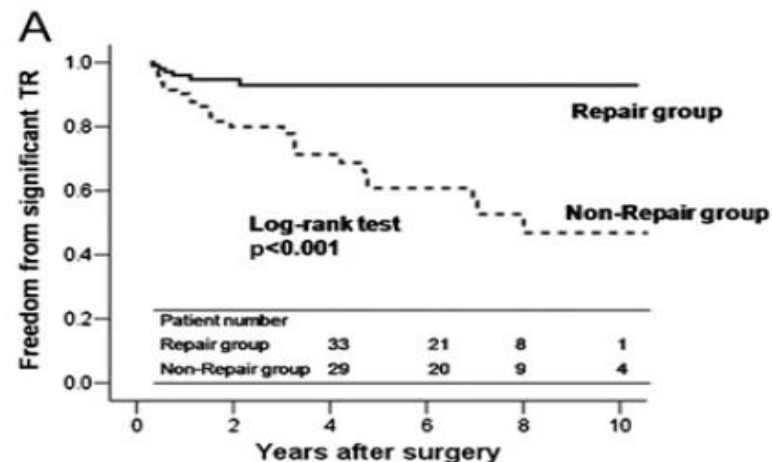
Background The decision to repair mild-to-moderate functional tricuspid regurgitation (TR) during left-side heart surgery remains controversial.

Objectives To avoid heterogeneity in patient population, patients with TR undergoing isolated mechanical mitral valve (MV) replacement for rheumatic mitral diseases were evaluated.

Methods Between 1997 and 2009, 236 patients with mild-to-moderate functional TR underwent first-time isolated mechanical MV replacement for rheumatic mitral diseases with (n=123; repair group) or without (n=113; non-repair group) tricuspid valve (TV) repair. Survival, valve-related complications, and TV function in these two groups were compared after adjustment for baseline characteristics using inverse-probability-of-treatment weighting.

Results Follow-up was complete in 225 patients (95.3%) with a median follow-up of 48.7 months (IQR 20.2–89.5 months), during which time 991 echocardiographic assessments were done. Freedom from moderate-to-severe TR at 5 years was $92.9 \pm 2.9\%$ in the repair group and $60.8 \pm 6.9\%$ in the non-repair group (p<0.001 and 0.048 in crude and adjusted analyses, respectively). After adjustment, both groups had similar risks of death (HR=0.57, p=0.43), tricuspid reoperation (HR=0.10, p=0.000) and congestive heart failure (HR=1.12, p=0.87). Postoperative moderate-to-severe TR was an independent predictor of poorer event-free survival (HR=2.90, p=0.038).

Conclusions These findings support the strategy of correcting mild-to-moderate functional TR at the time of MV replacement to maintain TV function and improve clinical outcomes.



Clinical Situations

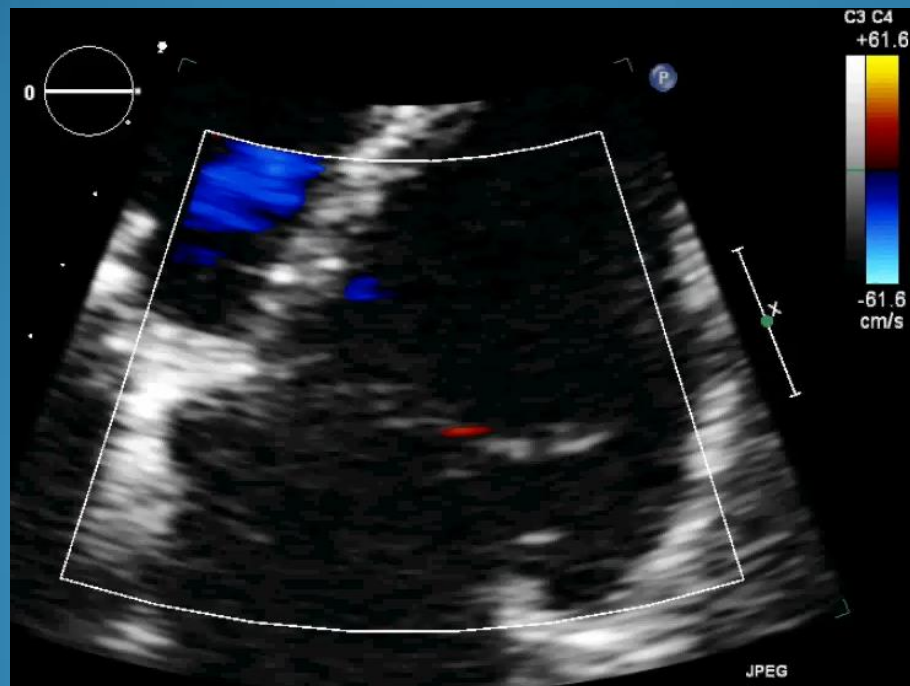
A. Severe isolated TR

1. Without previous left-sided surgery
2. After previous surgery

B. Left-sided surgery

1. Severe TR
2. Moderate TR
3. No or mild TR

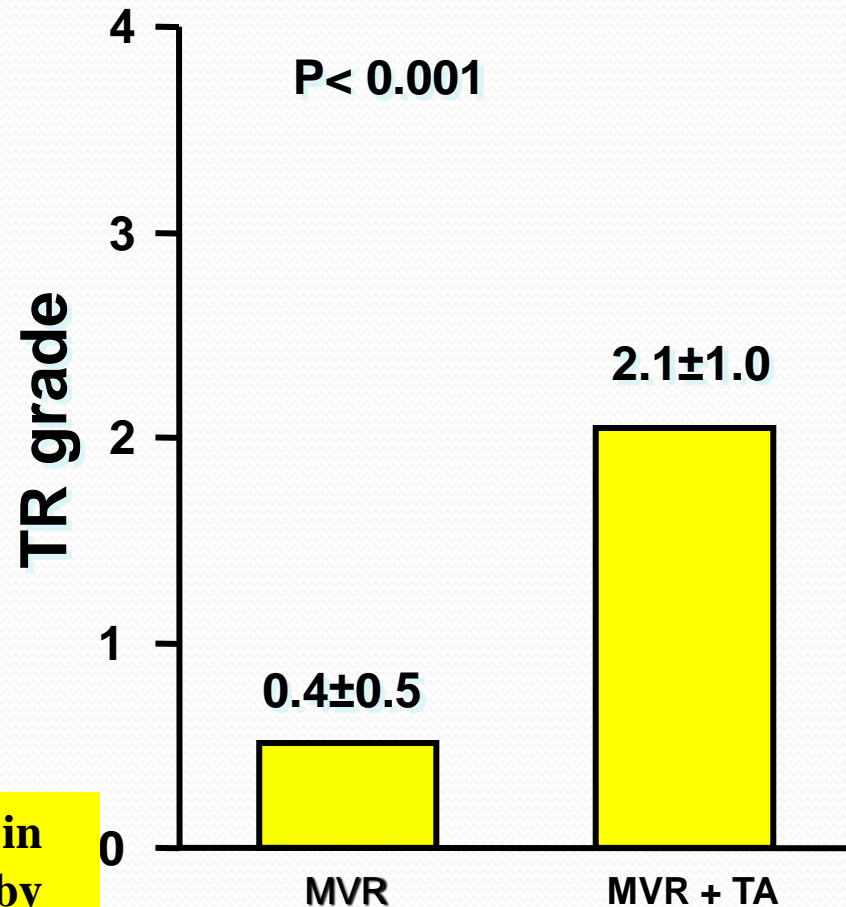
Could I feel safe in the absence of TR?



Development of TR late after Left-sided Valve Surgery

- 163 patients with isolated mitral valve repair (mainly degenerative MR) and TR grade < 2/4
- Fup at 5 years
- 49 patients with grade 3 or 4/4

TR increased by more than two grades in 48% of the patients in patients treated by mitral valve repair alone



Factors associated with development of late significant tricuspid regurgitation after successful left-sided valve surgery

H Song,¹ M-J Kim,² C H Chung,¹ S J Choo,¹ M G Song,¹ J-M Song,² D-H Kang,² J W Lee,¹ J-K Song²

ABSTRACT

Background: Persistent significant tricuspid regurgitation (TR) after successful left-sided valve surgery is frequently reported.

Objectives: To evaluate the incidence, risk factors and clinical impact of development of late significant TR after successful left-sided valve surgery.

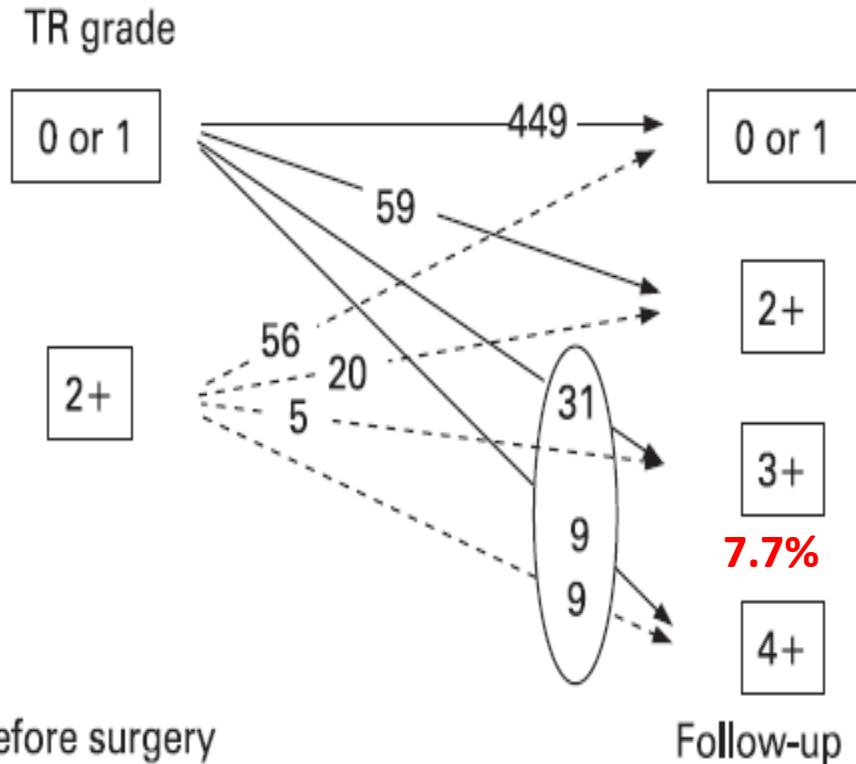
Methods and results: 638 patients (356 men, mean age 52 (SD 14) years) who had mild (\leq grade 2/4) TR and underwent successful surgery without any procedure for TR were analysed. Development of significant TR was

not been adequately investigated, and, moreover, the real clinical outcomes of late TR have not been assessed. The present study investigated the incidence, risk factors and clinical impact of late TR after open-heart surgery for left-sided valvular heart disease.

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mild TR.

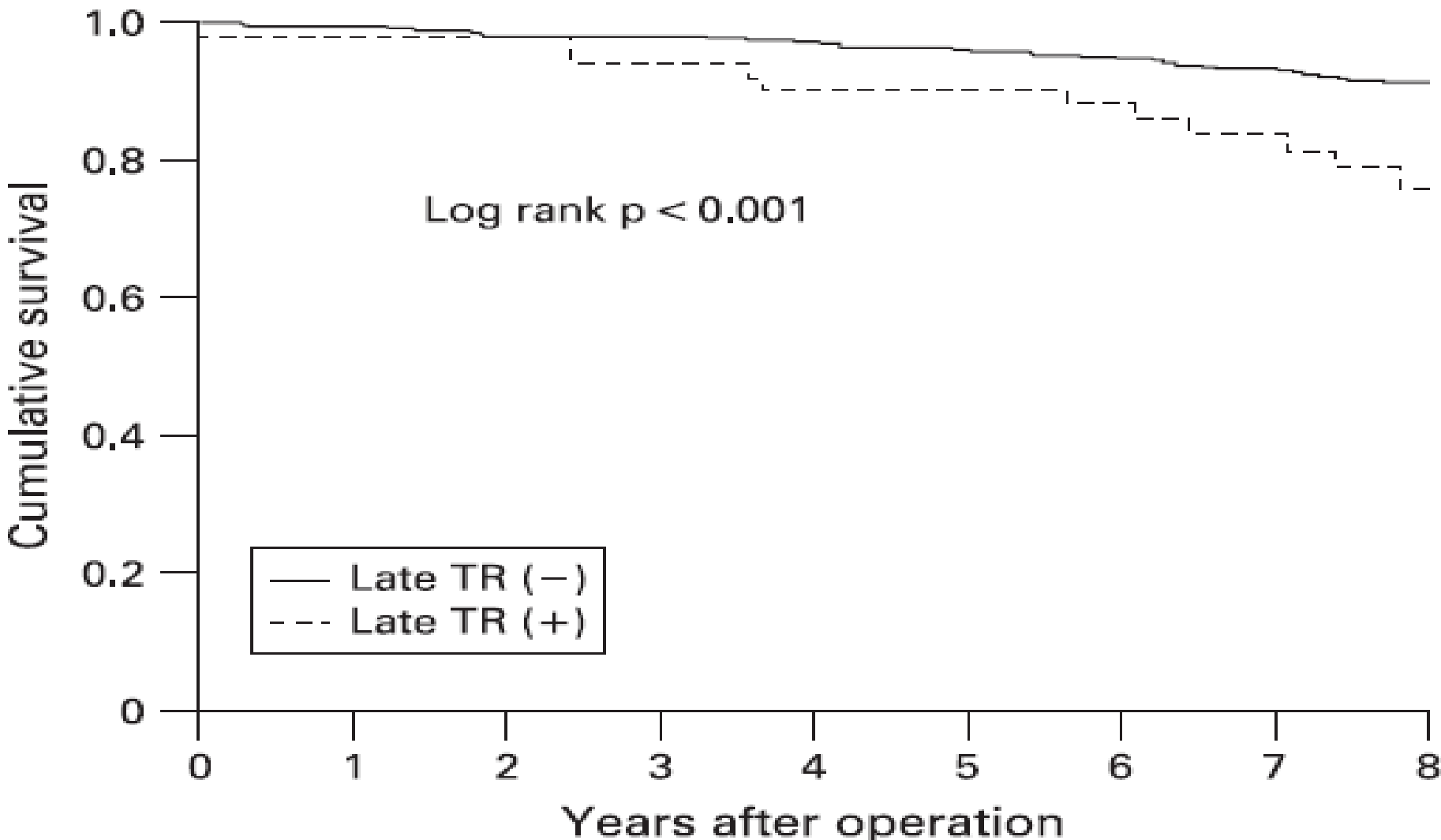
Determinants of late significant TR (grade 3+/4+)

- Age
- Female gender
- AF
- Post S-PAP
- Rheumatic etiology



Factors associated with development of late significant tricuspid regurgitation after successful left-sided valve surgery

H Song,¹ M-J Kim,² C H Chung,¹ S J Choo,¹ M G Song,¹ J-M Song,² D-H Kang,² J W Lee,¹ J-K Song²

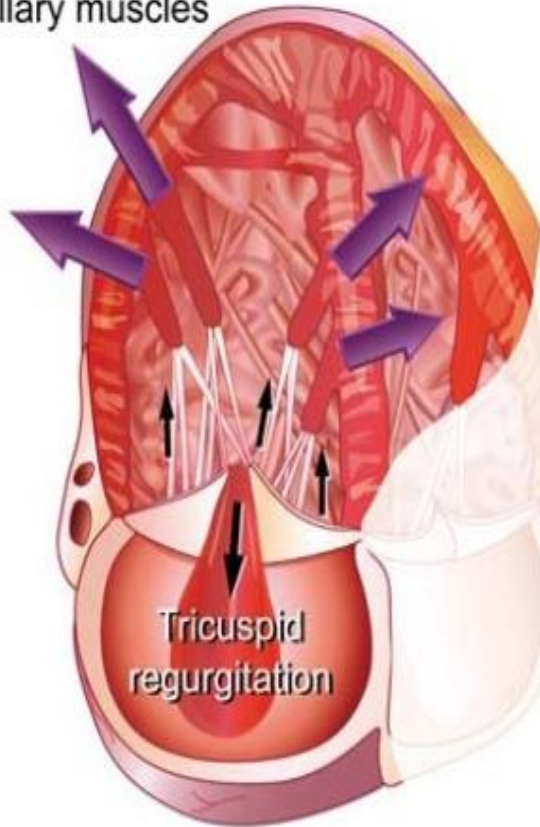


Take home message :
After left-valve surgery, late occurrence of TR is frequent even in no or mild TR and portends an adverse prognosis

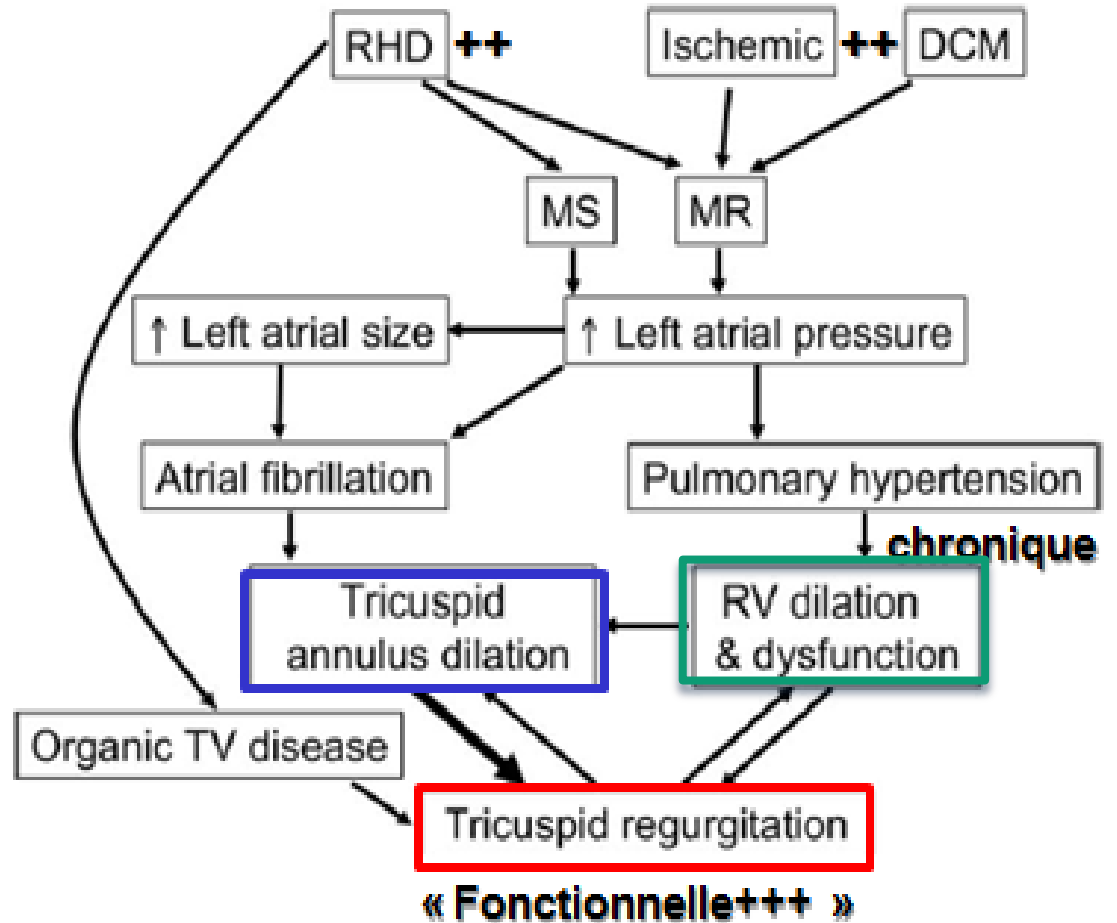
**How to better assess the risk
of occurrence of severe TR
after left-valve surgery?**

IT secondaire ou fonctionnelle

Displacement of the papillary muscles



Mascherbauer J et al.
Eur Heart J. 2010



Shiran A and Sagie A, JACC 2009

Dilatation AT = marqueur diagnostique + précoce

- Pas de mesure pré-opératoire standardisée
- Chirurgie = « gold-standard »
- Atriotomie droite systématique à visée diagnostique chez tous les patients opérés de valvulopathie mitrale
- Annuloplastie tricuspide

- si diamètre MAXIMAL (« étiré ») de l'AT CHIRURGICAL $\geq 70\text{mm}$

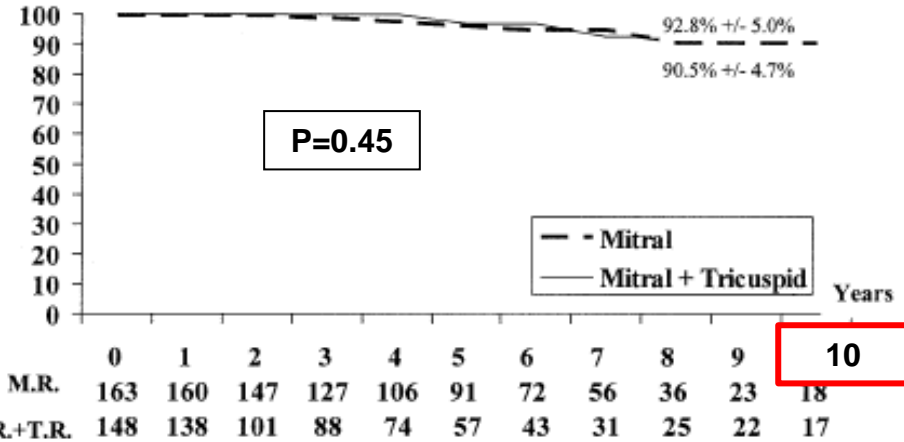
Commissure
antéro-septale



Commissure
antéro-postérieure

- indépendamment - des mesures du diamètre de l'AT en ETT
et - du degré d'IT

A Strategy Based on Annulus Diameter Measurement

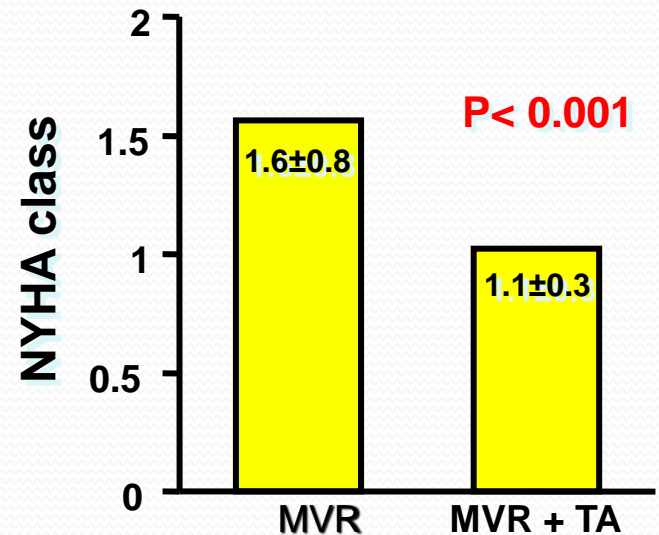


< 70 mm

≥ 70 mm

Isolated Mitral valve repair
N=163

Mitral valve repair +
tricuspid annuloplasty
N=148



Dilatation AT = marqueur diagnostique + précoce

➤ 311 patients ayant chirurgie de la VM
(65% dégénératifs, 11% rhumatismaux)

➤ 48% RVM + plastie tricuspide

⇒ ↘° IT

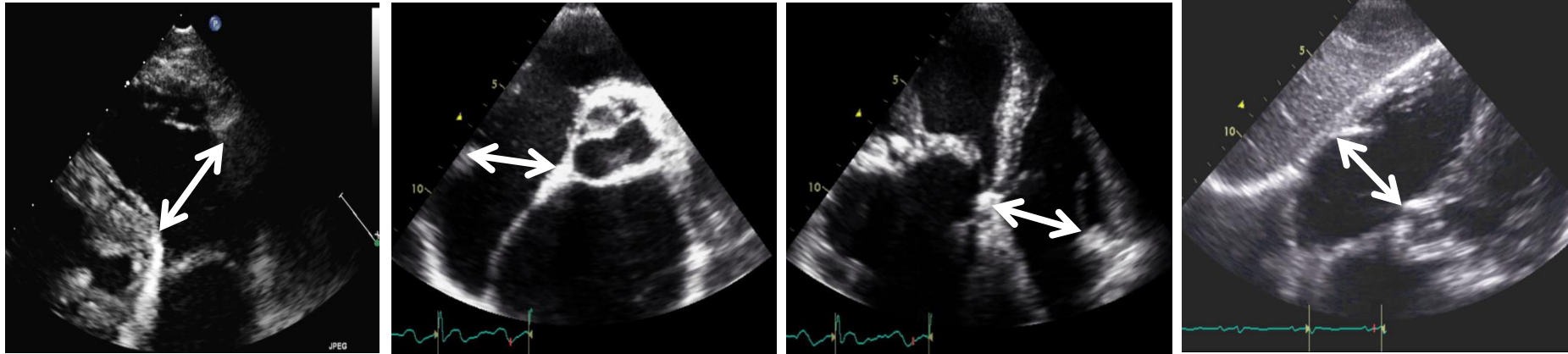
⇒ ↗° capacités fonctionnelles

10

	Before Surgery			After Surgery	
	Group 1 (MVR)	Group 2 (MVR + TVR)		Group 1 (MVR)	Group 2 (MVR + TVR)
Grade 0	54	38	88%	8	102
Grade 1	102	92		33	41
Grade 2	7	16		67	4
Grade 3	0	2		40	1
Grade 4	0	0		15	0
Mean TR grade	0.7 ± 0.5 ^a	0.9 ± 0.6 ^a		2.1 ± 1.0 ^b	0.4 ± 0.6 ^b

^a $p = 0.027$ Mann-Whitney. ^b $p < 0.001$ Mann-Whitney.

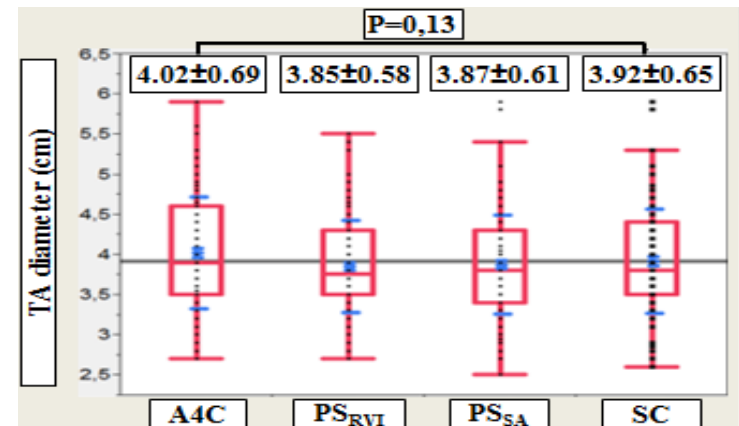
Mesures de l'AT en ETT-2D



➤ A4C la plus faisable ($P < 0,001$)
PSGCD:76%, PSGPA:65%, A4C:92%, SC:73%

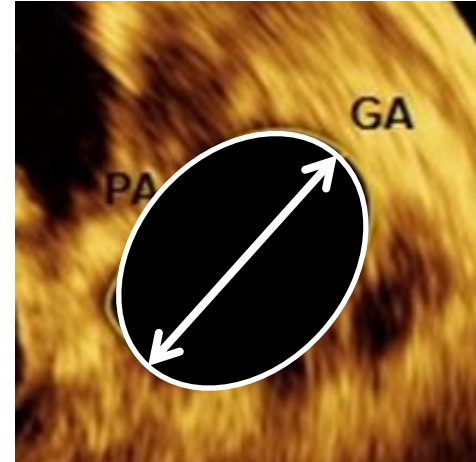
➤ A4C la plus reproductible
(intra- et inter-observateur)

➤ Mesures statistiquement différentes
entre les 4 incidences

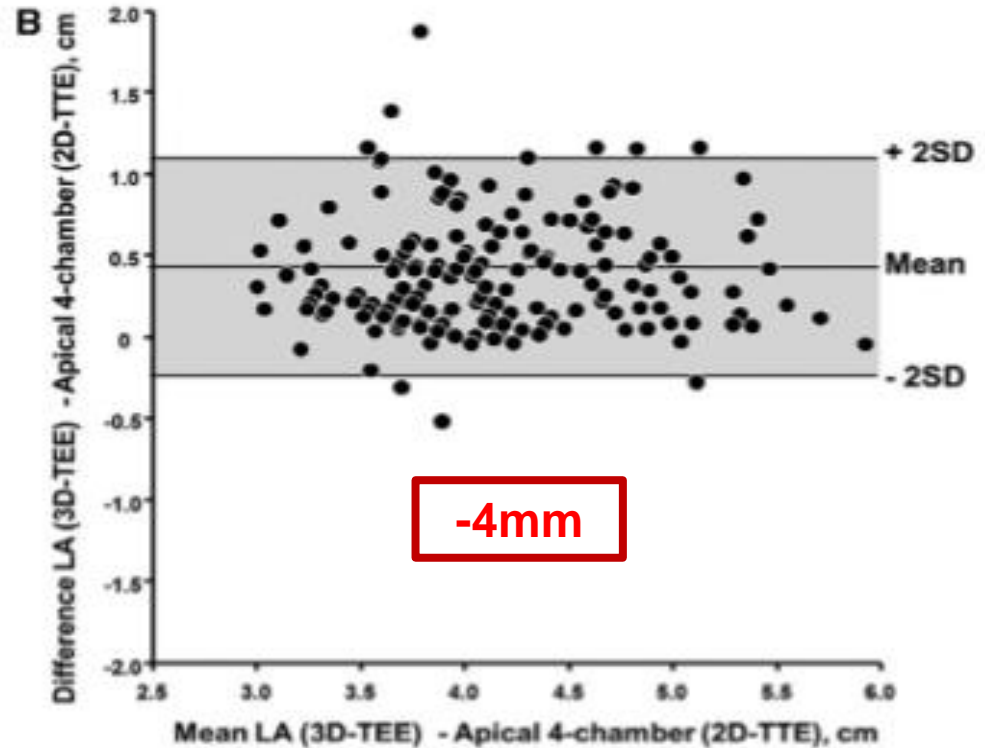
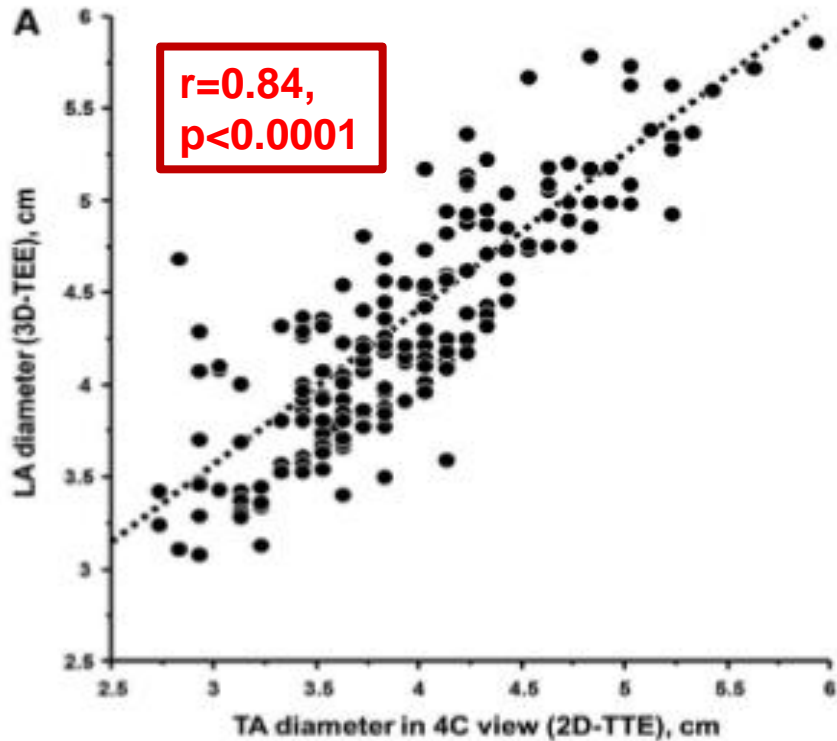




Comparaison A4C et Grand Axe ETO-3D



- Très bonne corrélation
- Diamètre de l'AT GA ETO3D >> A4C
- Sous-estimation systématique en A4C de **0.43** ± 0.35 cm



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

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Objectives: We hypothesize that concomitant tricuspid annuloplasty in patients with tricuspid annular dilatation who undergo mitral valve repair could prevent progression of tricuspid regurgitation and right ventricular remodeling.

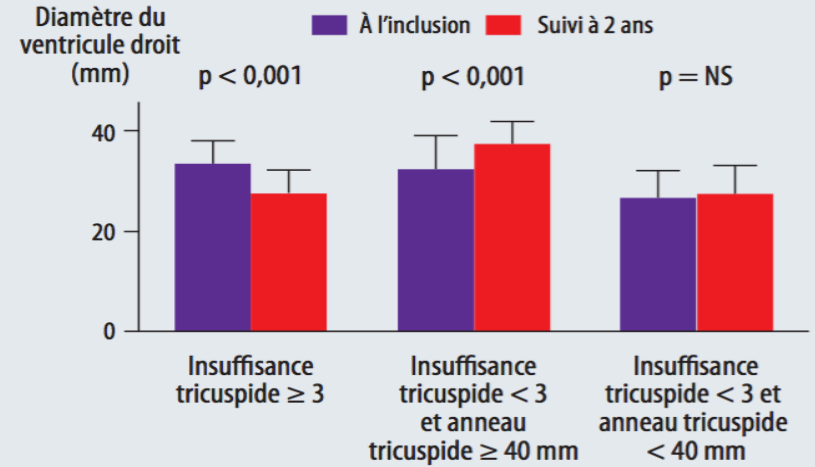
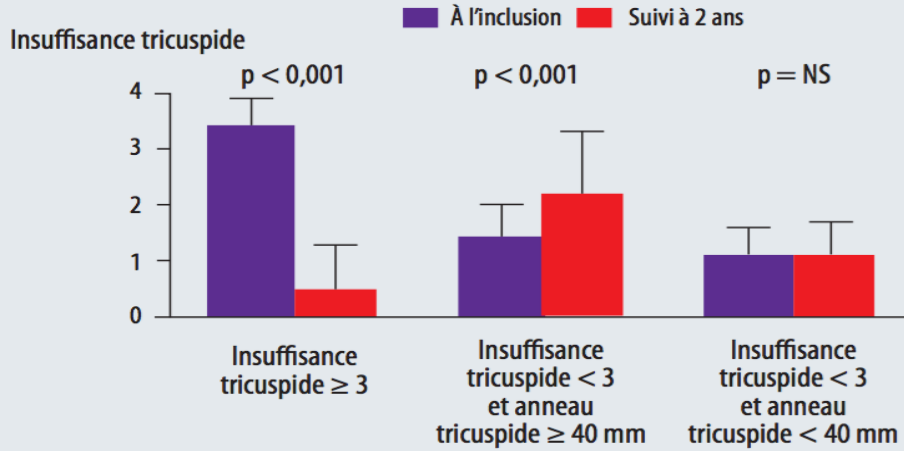
Methods: In 2002, 80 patients underwent mitral valve repair. Concomitant tricuspid annuloplasty was performed in 13 patients with grade 3 or 4 tricuspid regurgitation. In 2004, 102 patients underwent mitral valve repair. Concomitant tricuspid annuloplasty was performed in 21 patients with grade 3 or 4 tricuspid regurgitation and in 43 patients with an echocardiographically determined tricuspid annular diameter of 40 mm or greater. Patients underwent transthoracic echocardiographic analysis preoperatively and at the 2-year follow-up.

Results: In the 2002 cohort right ventricular dimensions did not decrease (right ventricular long axis, 69 ± 7 vs 70 ± 8 mm; right ventricular short axis, 29 ± 7 vs 30 ± 7 mm); tricuspid regurgitation grade and gradient remained unchanged. In the 2004 cohort right ventricular reverse remodeling was observed (right ventricular long axis, 71 ± 6 vs 69 ± 9 mm; right ventricular short axis, 29 ± 5 vs 27 ± 5 mm; $P < .0001$); tricuspid regurgitation diminished (1.6 ± 1.0 vs 0.9 ± 0.6 , $P < .0001$), and transtricuspid gradient decreased (28 ± 13 vs 23 ± 15 mm Hg, $P = .021$). Subanalysis of the 2002 cohort showed that in 23 patients without grade 3 or 4 tricuspid regurgitation but baseline tricuspid annular dilatation, the degree of tricuspid regurgitation was worse at the 2-year follow-up. Moreover, this caused right ventricular dilatation. Subanalysis of the 2004 cohort demonstrated reverse right ventricular remodeling and decreased tricuspid regurgitation in 43 patients with preoperative tricuspid annular dilatation who underwent tricuspid annuloplasty.

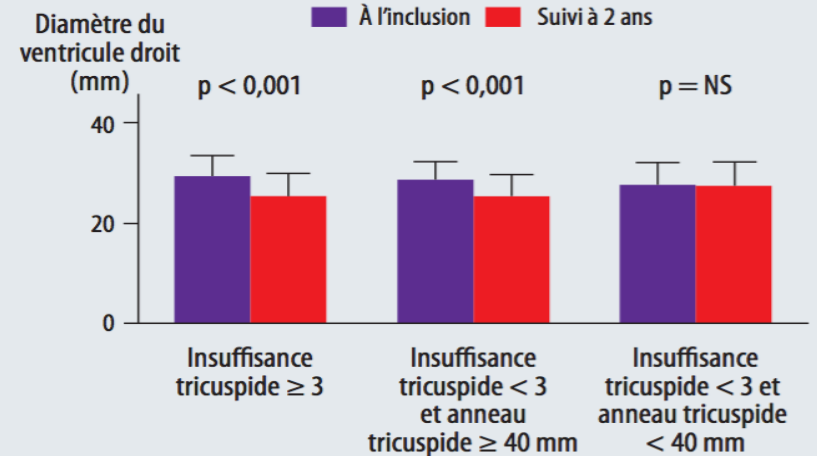
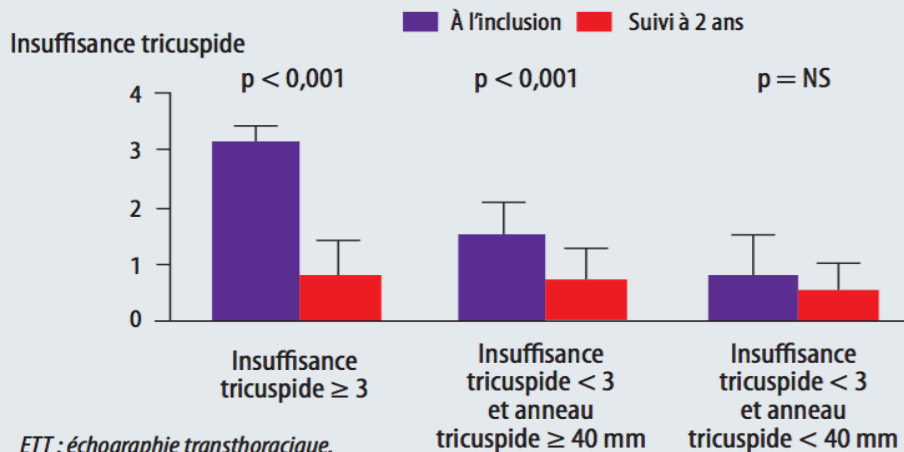
Conclusions: Concomitant tricuspid annuloplasty during mitral valve repair should be considered in patients with tricuspid annular dilatation despite the absence of important tricuspid regurgitation at baseline because this improves echocardiographic outcome. (J Thorac Cardiovasc Surg 2011;141:1431-9)

Dilatation AT = marqueur diagnostique + précoce

A. Première cohorte : 80 patients. Remplacement valvulaire mitral ± plastie tricuspide si IT ≥ 3



B. Deuxième cohorte : 102 patients. Remplacement valvulaire mitral ± plastie tricuspide si IT ≥ 3 ou diamètre maximal de l'anneau tricuspide en ETT ≥ 40 mm



ETT : échographie transthoracique.

**Tricuspid annulus diameter seems a
good parameter to guide the
indication for tricuspid surgery**

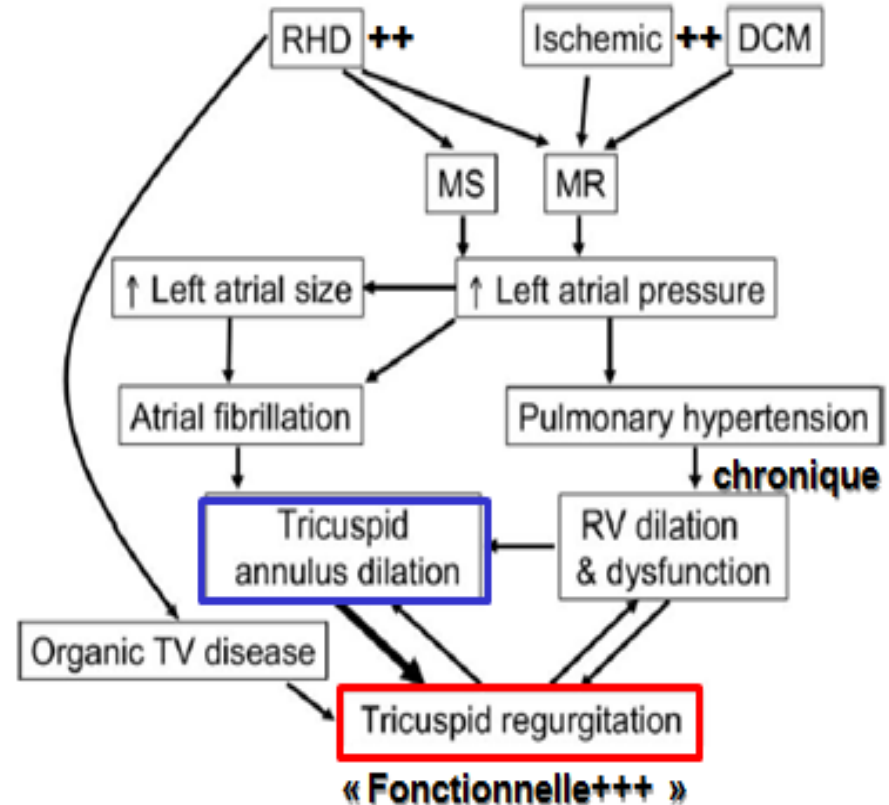
Facteurs prédictifs d'IT après correction d'une valvulopathie du cœur gauche

- Age
- Sexe féminin
- Durée entre début de l'atteinte valvulaire mitrale et chirurgie
- Valvulopathie mitrale rhumatismale (atteinte organique associée)
- Cardiopathie ischémique
- OG dilatée
- AC/FA
- HTAP
- Dilatation/dysfonction VD
- Dilatation de l'anneau tricuspide

Ruel M et al. J Thorac Cardiovasc Surg 2004

Ruel M et al. J Thorac Cardiovasc Surg 2004

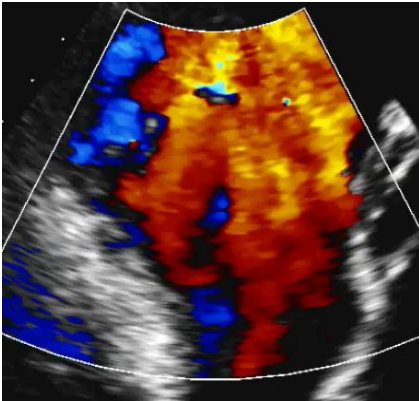
Wana G et al. Surg today 2008



Indications de chirurgie tricuspide (ESC 2017)

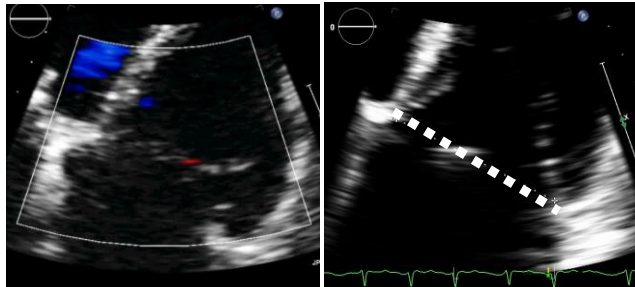
➤ Au moment d'une chirurgie valvulaire du coeur gauche

Insuffisance tricuspide



ET / OU

Dilatation de l'anneau tricuspide



Recommendations

Surgery is indicated in patients with severe primary tricuspid regurgitation undergoing left-sided valve surgery.

Surgery is indicated in patients with severe secondary tricuspid regurgitation undergoing left-sided valve surgery.

Surgery should be considered in patients with moderate primary tricuspid regurgitation undergoing left-sided valve surgery.

Surgery should be considered in patients with mild or moderate secondary tricuspid regurgitation with a dilated annulus (≥ 40 mm or > 21 mm/m² by 2D echocardiography) undergoing left-sided valve surgery.

Class^a

Level^b

I

C

I

C

IIa

C

IIa

C

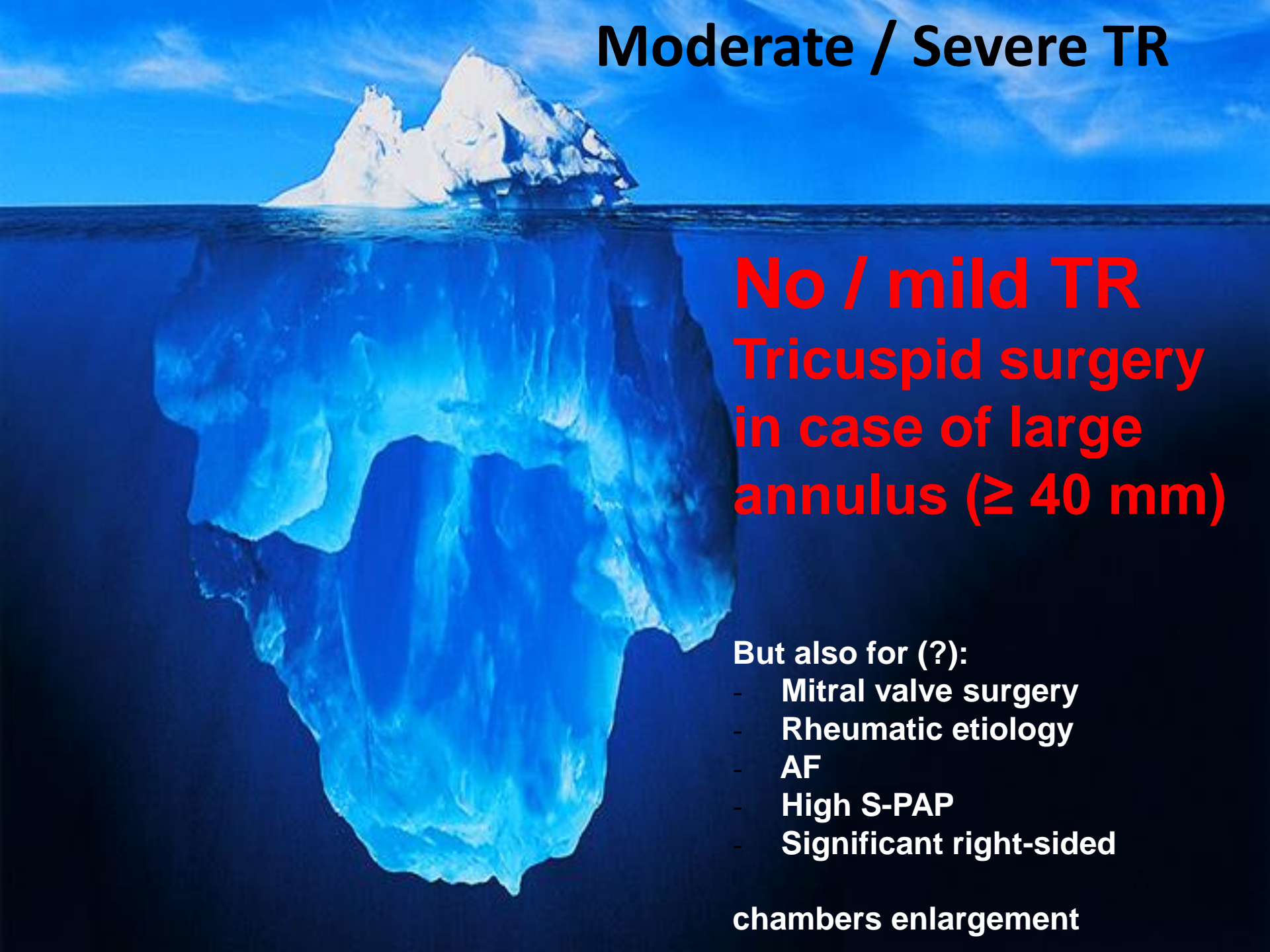
Conclusion

- TR is a common finding
- TR is associated with an increased long-term morbidity and mortality
- Consider early surgery before the occurrence
 - Chronic atrial fibrillation
 - Severe right ventricular enlargement and dysfunction
 - Intractable congestive heart failure with renal and liver dysfunction

- **For patients undergoing left-sided valve surgery:**
 - TR does not always regress after **correction of left-sided disease** and often progresses over time and negatively impacts the outcome
 - **Need to consider systematically a concomitant intervention on the tricuspid valve** (repair or replacement) : severity of TR, tricuspid annulus dilation
 - **Surgical tricuspid repair** : simple, quick, not associated with an increased mortality/morbidity

Merci

Moderate / Severe TR

An iceberg floating in the ocean. The tip of the iceberg, which is visible above the water, is relatively small and jagged. The much larger part of the iceberg is submerged below the water surface, illustrating that the visible part (Moderate/Severe TR) is only a fraction of the total (No/mild TR).

No / mild TR
Tricuspid surgery
in case of large
annulus (≥ 40 mm)

But also for (?):

- **Mitral valve surgery**
- **Rheumatic etiology**
- **AF**
- **High S-PAP**
- **Significant right-sided**

chambers enlargement

Pronostic de la chirurgie tricuspide associée à la chirurgie mitrale

Impact of Concomitant Tricuspid Annuloplasty on Tricuspid Regurgitation, Right Ventricular Function, and Pulmonary Artery Hypertension After Repair of Mitral Valve Prolapse

Joanna Chikwe, MD, Shinobu Itagaki, MD, Anelechi Anyanwu, MD, David H. Adams, MD

BACKGROUND For patients undergoing mitral valve (MV) repair, the indications for and results of concomitant tricuspid annuloplasty remain controversial.

OBJECTIVES This study was designed to compare a strategy of routine concomitant tricuspid annuloplasty for moderate tricuspid regurgitation (TR) or tricuspid annular dilation in patients undergoing degenerative MV surgery.

METHODS Of 645 consecutive patients (mean age 57 ± 13 years) undergoing primary repair of degenerative mitral regurgitation between 2003 and 2011, 419 (65%) underwent concomitant tricuspid annuloplasty for moderate TR and/or tricuspid annular dilation. These patients were retrospectively analyzed with longitudinal echocardiographic follow-up.

RESULTS Patients undergoing tricuspid valve repair were older (mean age 59.2 years vs. 52.3 years), had worse right and left ventricular function and higher pulmonary artery pressures, and were more likely to have had atrial fibrillation than patients undergoing isolated MV repair (all $p < 0.05$). No significant difference in 30-day mortality, morbidity, or permanent pacemaker requirement was seen between treatment groups. Freedom from moderate TR at 7 years was not significantly different in the 2 groups, but multivariate analysis showed that tricuspid annuloplasty was independently associated with freedom from late moderate TR ($p = 0.04$), and was an independent predictor of recovery of right ventricular function ($p = 0.02$).

CONCLUSIONS In patients with moderate TR or tricuspid annular dilation who were undergoing degenerative mitral repair, concomitant tricuspid annuloplasty is safe, effective, and associated with improved long-term right-sided remodeling. Routine treatment of moderate TR or tricuspid annular dilation at the time of MV repair appears to be beneficial. (J Am Coll Cardiol 2015;65:1931-8) © 2015 by the American College of Cardiology Foundation.

Performing Concomitant Tricuspid Valve Repair at the Time of Mitral Valve Operations Is Not Associated With Increased Operative Mortality

Vinay Badhwar, MD, J. Scott Rankin, MD, Max He, MS, Jeffrey P. Jacobs, MD, Anthony P. Furnary, MD, Frank L. Fazzalari, MD, Sean O'Brien, PhD, James S. Gammie, MD, and David M. Shahian, MD

Background. The performance of concomitant tricuspid valve repair (TVr) at the time of mitral valve repair or replacement (MVRR) has previously been associated with elevated short-term risk. Outcomes were assessed at incremental grades of tricuspid regurgitation (TR) to quantify the contemporary risk of concomitant TVr.

Methods. Between July 2011 and June 2014, 88,473 patients undergoing MVRR were examined using The Society of Thoracic Surgeons database. Outcomes with or without TVr, after isolated MVRR ($n = 62,118$) and MVRR with coronary artery bypass graft surgery (CABG [$n = 26,355$]), were independently analyzed at three levels of TR: none-mild, moderate, and severe. Risk-adjusted morbidity and mortality associated with the performance of concomitant TVr were evaluated using multivariable logistic regression.

Results. The TR was graded as none-mild in 74.3% of patients (65,769 of 88,473), moderate in 17.2% (15,222 of 88,473), and severe in 8.5% (7,482 of 88,473). The rate of TVr by TR grade was 3.5% (2,308 of 65,769) for

none-mild, 30.6% (4,661 of 15,222) for moderate, and 75.6% (5,654 of 7,482) for severe. Overall risk-adjusted occurrence of any morbidity associated with performance of TVr was increased in both groups (MVRR odds ratio [OR] 1.36, 95% confidence interval [CI]: 1.24 to 1.48; and MVRR plus CABG OR 1.33, 95% CI: 1.19 to 1.49). However, at all grades of TR, TVr was not associated with increased risk-adjusted mortality (MVRR OR 0.99, 95% CI: 0.84 to 1.17; and MVRR plus CABG OR 1.04, 95% CI: 0.85 to 1.27).

Conclusions. In contemporary patients, concomitant TVr is not associated with a risk-adjusted increase in mortality, regardless of TR severity. A more liberal approach to TVr at the time of MVRR may be justified when long-term benefits are thought to outweigh incremental short-term morbidity risk. Further investigation of longitudinal TVr outcomes is warranted.

(Ann Thorac Surg 2016;■:■-■)

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