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The Tricuspid Valve: The "Not So Forgotten" Valve

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The Society of Thoracic Surgeons

EACTS
European Association For Cardio-Thoracic Surgery

The Tricuspid Valve: The “Not So Forgotten” Valve

- No Conflicts of Interest to declare with regards to this subject

The Tricuspid Valve: The “Not So Forgotten” Valve

INCIDENCE OF TRICUSPID REGURGITATION ASSOCIATED TO LEFT VALVE DISEASE:

- 8% King et al (Circulation 70:1993; 1984)
- 35% Marsocci et al (Rovelli ed. Cardiologia; 1988)
- In 80% of these the TR is “functional”
- In 15 - 20% the lesion is primarily organic (rheumatic)

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MINIMIZATION OF THE RIGHT VENTRICLE

Conservative management of tricuspid regurgitation

Braunwald NS, Ross J, Morrow AG. *Circulation 1967: 35:163:9.*

- In the “majority” of patients with secondary TR, surgical treatment of the mitral (aortic) disease corrects the problems of the right side

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FACTS

- The results of surgery of the MV are less favorable in patients with associated right-side disease.
- RV disease with significant involvement of the TV represents advanced disease that has a decisive effect on natural history and evolution after surgery.
- Even when the mitral valve surgery has long-term success, in many cases there is a progressive increase of the TR.

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BECAUSE

- Secondary (functional) RT with severe annular dilatation can cause irreversible deterioration of the RV function
- A long clinical course can cause further clinical deterioration and hemodynamics, therefore increasing surgical risk

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Ann Thorac Surg 2005;79:127-32

Secondary tricuspid regurgitation or dilatation: which should be the criteria for surgical repair?

GD Dreyfus, Corby PJ, Chan KM, Bahrami T

Department of Cardiothoracic Surgery, Royal Brompton and Harefield NHS Trust, Harefield Hospital, Harefield, Middlesex, United Kingdom.

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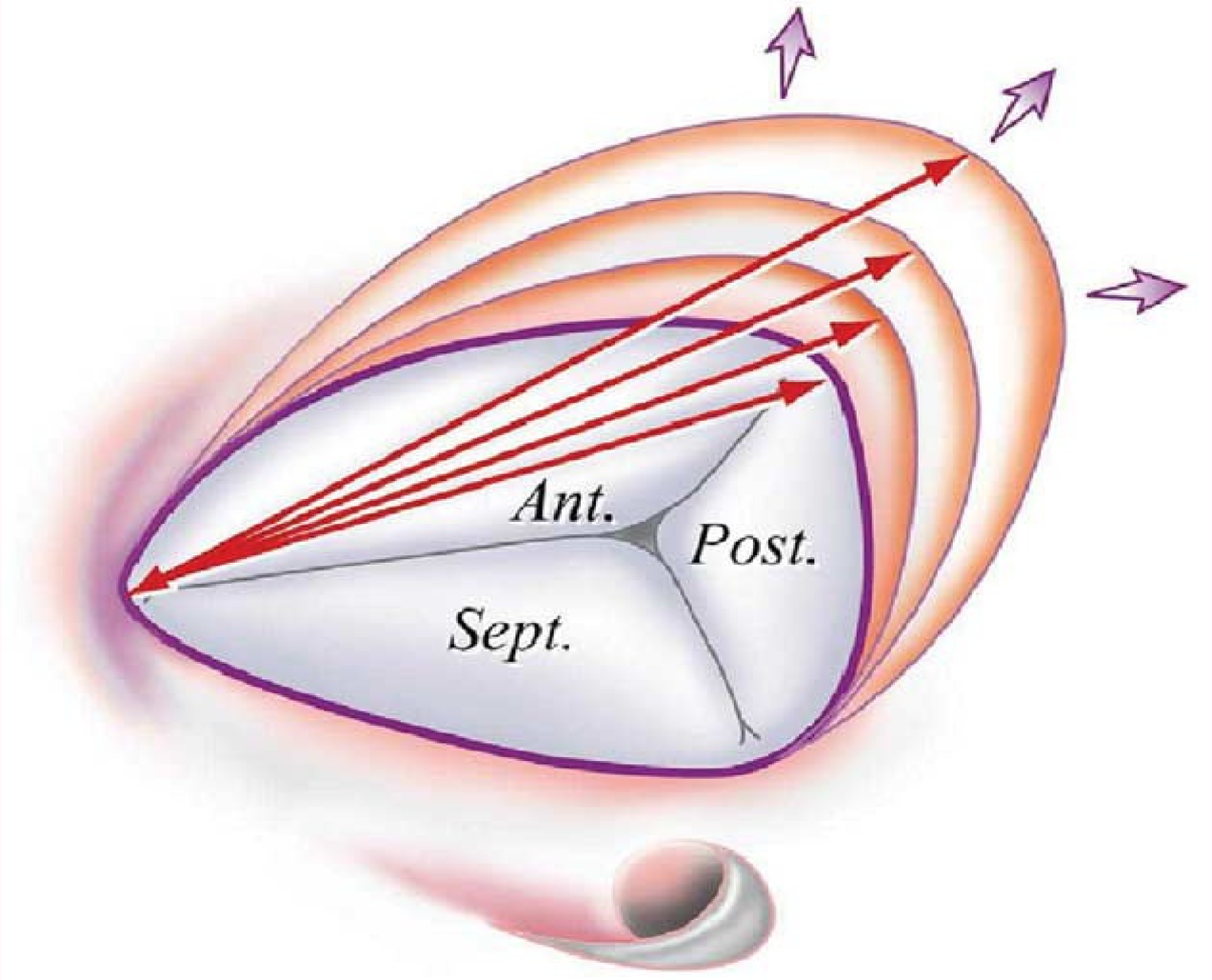

GD Dreyfus. Ann Thorac Surg 2005;79:127-32

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CONCLUSIONS

- ♥Secondary tricuspid dilatation is present in a significant number of patients with severe mitral regurgitation without tricuspid regurgitation.
- ♥It is a progressive disease which does not resolve with correction of the primary lesion alone.
- ♥Tricuspid annuloplasty at the time of mitral valve surgery in these patients results in improved functional capacity without any increase in perioperative morbidity or mortality.

GD Dreyfus. Ann Thorac Surg 2005;79:127-32

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The Journal of
Thoracic and Cardiovascular Surgery

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

Nico R. Van de Veire, Jerry Braun, Victoria Delgado, Michel I.M. Versteegh, Robe A. Dion, Robert J.M. Klautz and Jeroen J. Bax

J Thorac Cardiovasc Surg 2011;141:1431-1439

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.

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“It is probable that this lesion (*tricuspid regurgitation*) is often partly or mainly organic”

(Prophylactic annuloplasty?)

Barlow JB.
Perspectives on the mitral valve, 1987

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Heart. 2007 February; 93(2): 271–276. PMCID: PMC1861404
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Management of tricuspid valve regurgitation

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When should you repair/replace the tricuspid valve in association with left-sided heart disease?

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TRICUSPID REGURGITATION -DECISION MAKING PROBLEMS

- How to predict those patients that will return post mitral valve surgery with persistent, bothersome tricuspid regurgitation?
- What to do with lesser degrees of tricuspid incompetence?

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Indications for surgery in tricuspid disease

	Class	Level
Surgery is indicated in symptomatic patients with severe TS.	I	C
Surgery is indicated in patients with severe TS undergoing left-sided valve intervention.	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/m²) 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 dilation 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

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REMAINING CONTROVERSIES IN TRICUSPID SURGERY

- Choice between annuloplasty and replacement
- Eficacy of the different methods of anuloplasty
- Choice of prosthesis

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Article Contents

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POSITION STATEMENT

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POSITION STATEMENT

Management of tricuspid valve regurgitation

Position statement of the European Society of Cardiology Working Groups of Cardiovascular Surgery and Valvular Heart Disease

Manuel J. Antunes[a,*], José Rodríguez-Palomares[b,c], Bernard Prendergast[d], Michele De Bonis[e], Raphael Rosenhek[f], Nawwar Al-Attar[g], Fabio Barili[h], Filip Casselman[i], Thierry Folliguet[j], Bernard Iung[k], Patrizio Lancellotti[l,m], Claudio Muneretto[n], Jean-François Obadia[o], Luc Pierard[p], Piotr Suwalski[q,r] and Pepe Zamorano[s], on behalf of the ESC Working Groups of Cardiovascular Surgery and Valvular Heart Disease

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REPLACEMENT vs. REPAIR

- Only exceptionally will the TV need to be replaced as a first procedure, because the valve tolerates well a less-than-perfect repair

- ANNULOPLASTY is the surgery of choice
  - Bicuspidization
  - DeVega suture
  - Carpentier (ring)

Antunes MJ, Barlow JB. Heart 2007:93.201-6

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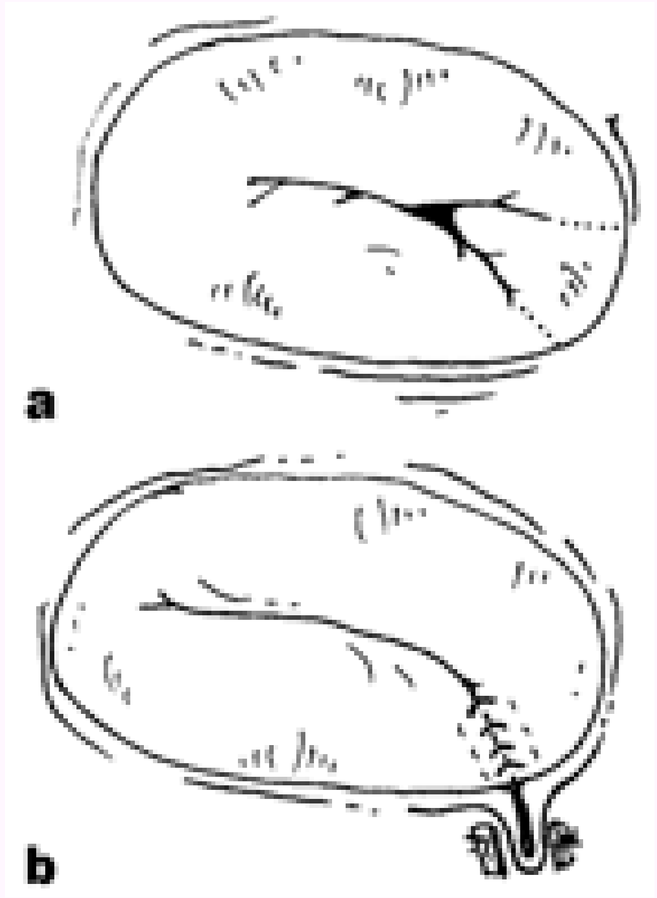

Bicuspidization

Kay, Maselli-Campagna, and Tsuji, 1965

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The Journal of
Thoracic and Cardiovascular Surgery

Suture bicuspidization of the tricuspid valve versus ring annuloplasty for repair of functional tricuspid regurgitation: Midterm results of 237 consecutive patients

Ravi K. Ghanta, Raymond Chen, Narendren Narayanasamy, Siobhan McGurk, Stuart Lipsitz, Frederick Y. Chen and Lawrence H. Cohn

J Thorac Cardiovasc Surg 2007;133:117-126

Methods: From 1999 to 2003, 237 patients underwent tricuspid annuloplasty for functional tricuspid regurgitation as part of their cardiac surgical procedure. Bicuspidization was performed in 157 patients and ring annuloplasty in 80 patients.
Conclusions: Bicuspidization annuloplasty and ring annuloplasty were effective at eliminating tricuspid regurgitation at 3 years postoperatively. Bicuspidization annuloplasty is a simple, inexpensive option for addressing functional tricuspid regurgitation.

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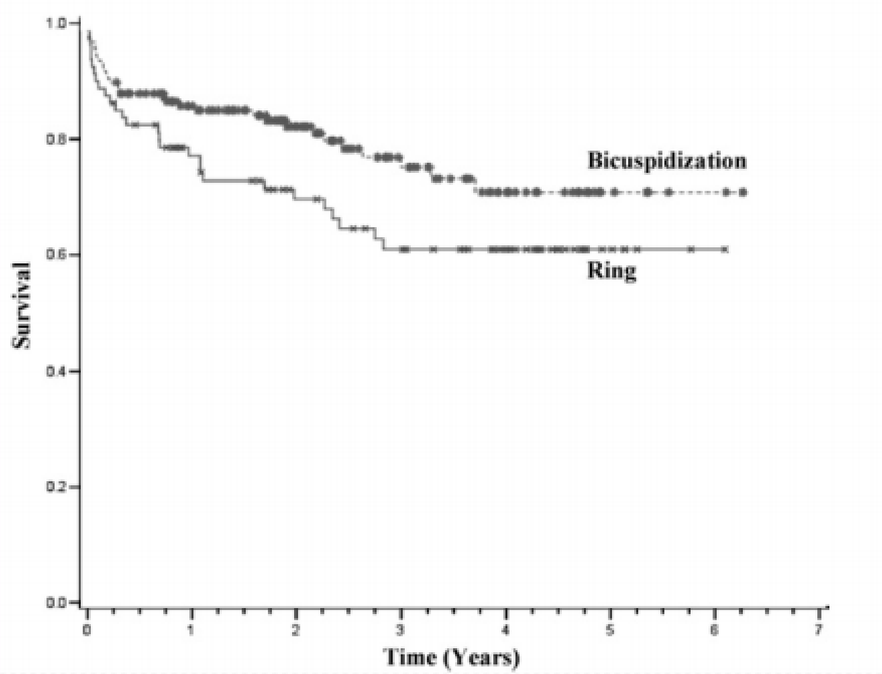

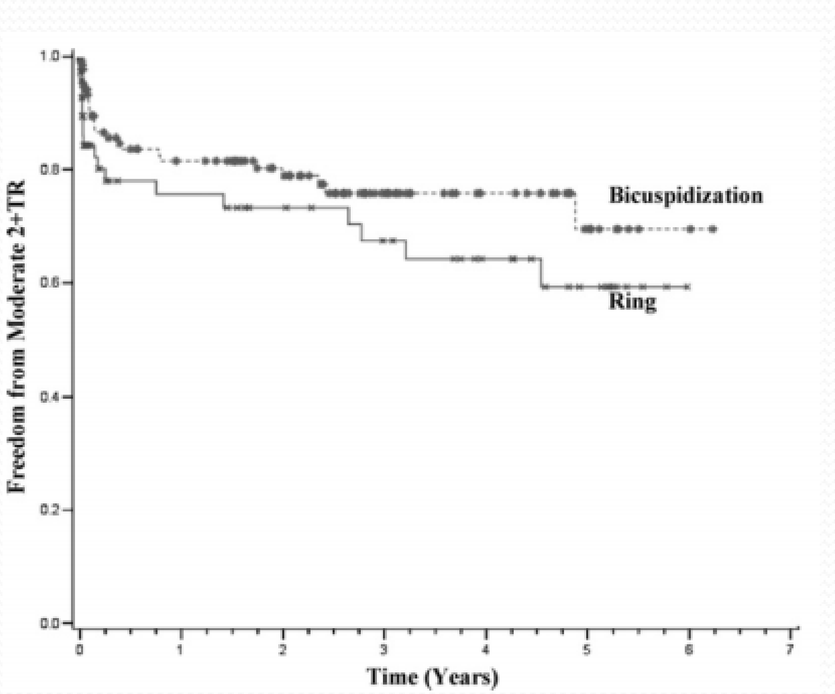

Ghanta RK. J Thorac Cardiovasc Surg 2007;133:117-126

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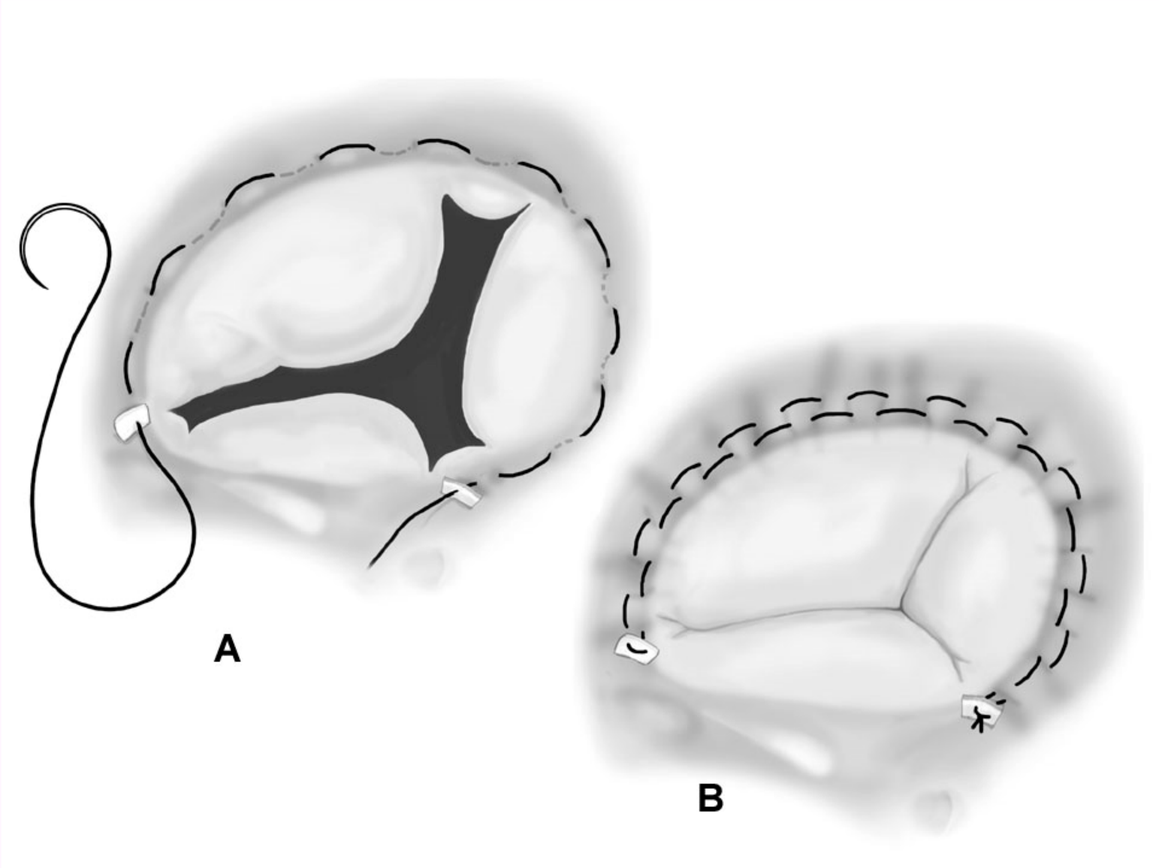

De Vega N, Rev Esp Cardiol, 1972

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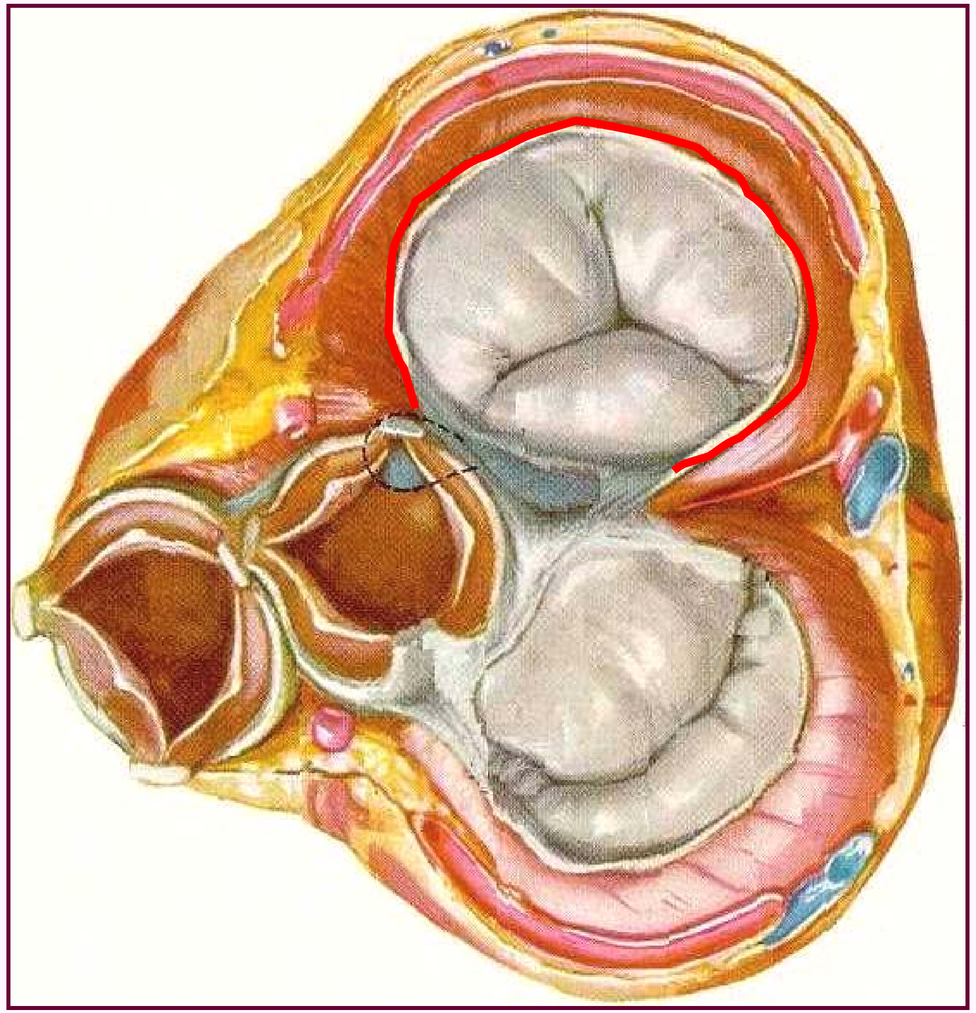

5/6 of dilation occurs in the mural portion.

Deloche A. Ann Chir Thorac Cardiovasc 4:32; 1973

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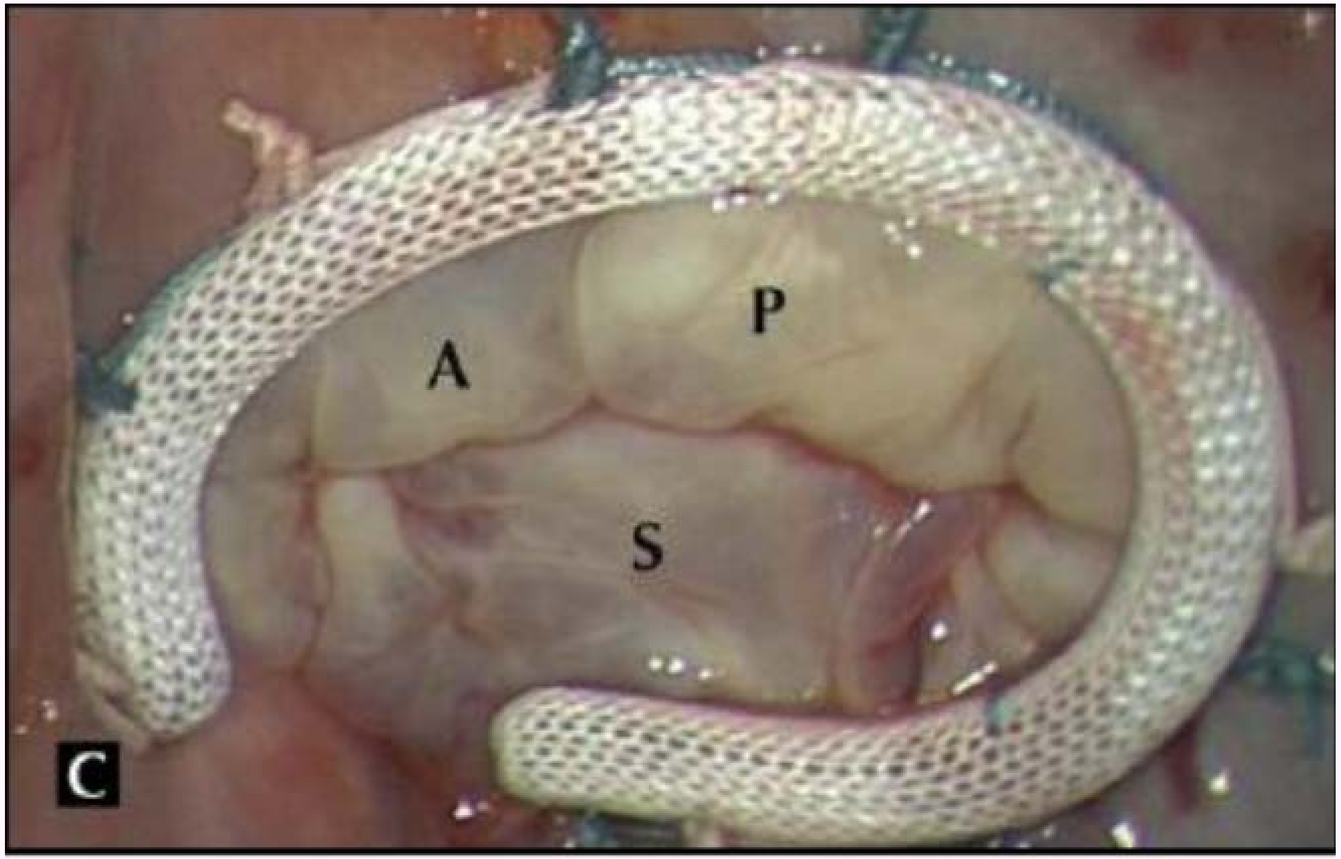

Tricuspid annuloplasty - Carpentier ring,1971

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Tricuspid Valve Repair With an Annuloplasty Ring Results in Improved Long-Term Outcomes

Gilbert H. L. Tang, MD; Tirone E. David, MD; Steve K. Singh, MD; Manjula D. Maganti, MSc; Susan Armstrong, MSc; Michael A. Borger, MD, PhD

Background—The purpose of this study was to compare the long-term results of tricuspid valve (TV) repair with or without an annuloplasty ring.

Methods and Results—702 patients underwent TV repair at our institution (1978 to 2003), of which 493 had, predominantly, a De Vega procedure (no ring) and 209 had an annuloplasty ring (ring). TV pathology was functional (secondary) in 74% of patients. Concomitant procedures consisted of mitral valve surgery in 80% of patients, aortic valve surgery in 33%, and coronary bypass in 14%. Clinical and echocardiographic follow-up data were obtained. Follow-up was 99% complete and was 5.9±4.9 (mean±SD) years long. Ring patients were younger (55±14 versus 59±14 years; $P=0.001$) and less likely to have coronary artery disease (10% versus 17%; $P=0.02$), more likely to be female (75% versus 65%; $P=0.01$) and having had previous cardiac surgery (56% versus 42%; $P=0.001$). Operative times were similar between the 2 groups. Long-term survival, event-free survival and freedom from recurrent TR were significantly better in the ring group, and there was a trend toward fewer TV reoperations. Multivariable analysis demonstrated that the use of an annuloplasty ring was an independent predictor of long-term survival (hazard ratio [HR], 0.7; 95% confidence interval [CI], 0.5 to 1.0; $P=0.03$) and event-free survival (HR, 0.8; CI, 0.6 to 1.0; $P=0.04$).

Conclusions—Placement of an annuloplasty ring in patients undergoing tricuspid valve repair is associated with improved survival and event-free survival. (***Circulation*. 2006;114[suppl I]:I-577–I-581.**)

Key Words: outcomes ■ tricuspid valve ■ valve repair

Tang GHL et al. Circulation.**2006; 114: I-577-I-581**

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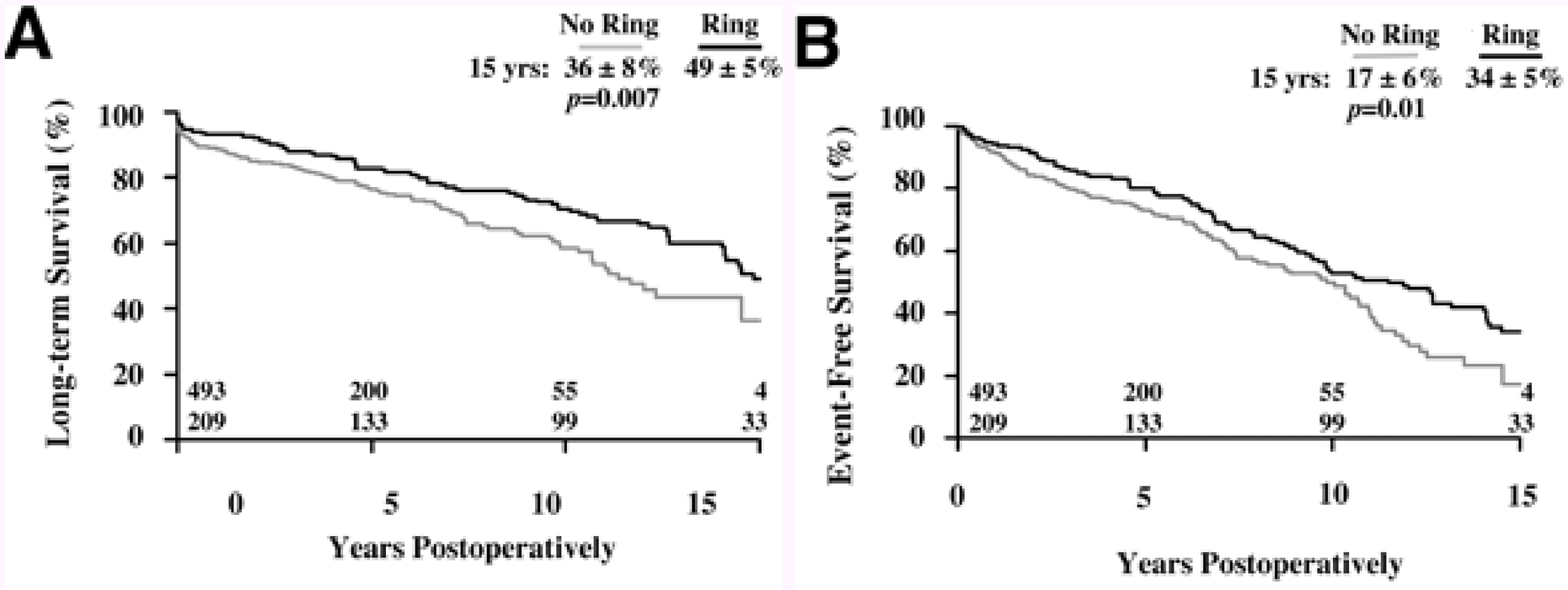

Tang GHL et al. Circulation.**2006; 114: I-577-I-581**

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THE ANNALS OF THORACIC SURGERY

Repair of Rheumatic Tricuspid Valve Disease: Predictors of Very Long-Term Mortality and Reoperation

J. Aurelio Sarralde, José M. Bernal, Javier Llorca, Alejandro Pontón, Lorena Diez-Solorzano, Juan R. Giménez-Rico and José M. Revuelta

Ann Thorac Surg 2010;90:503-508
DOI: 10.1016/j.athoracsur.2010.03.105

Methods. 299 consecutive patients (mean age 50.8 13.7 years) underwent surgical repair of the tricuspid valve for multivalvular organic rheumatic disease. Prosthetic ring annuloplasty was performed in 78 patients, commissurotomy and ring annuloplasty in 82, isolated commissurotomy in 10, suture annuloplasty in 105, and commissurotomy and suture annuloplasty in 24. This study reported better results with the conventional De Vega’s suture annuloplasty compared with ring annuloplasty.

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Interactive CardioVascular and Thoracic Surgery Advance Access published March 28, 2012

Interactive CardioVascular and Thoracic Surgery 0 (2012) 1–7
doi:10.1093/icvts/ivs070

BEST EVIDENCE TOPIC

Is a tricuspid annuloplasty ring significantly better than a De Vega’s annuloplasty stitch when repairing severe tricuspid regurgitation?

Maziar Khorsandi[a], Amit Banerjee[b], Harpreet Singh[b] and Aseem R. Srivastava[c,*]

[a] Department of Cardiothoracic Surgery, Royal Infirmary of Edinburgh, Edinburgh, UK
[b] Department of Cardiothoracic and Vascular Surgery, G B Pant Hospital, New Delhi, India
[c] Department of Cardiothoracic Surgery, University of Pittsburgh Medical Center, Pittsburgh, USA

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Received 11 November 2011; received in revised form 24 January 2012; accepted 3 February 2012

One cohort study of 129 patients concluded that ring annuloplasty has the lowest rate of recurrence compared with De Vega’s suture repair. In contrast, we reviewed one recent study and four older studies and found no significant difference between the two techniques. We reviewed one study that reported De Vega’s suture repair as a superior technique to ring annuloplasty.

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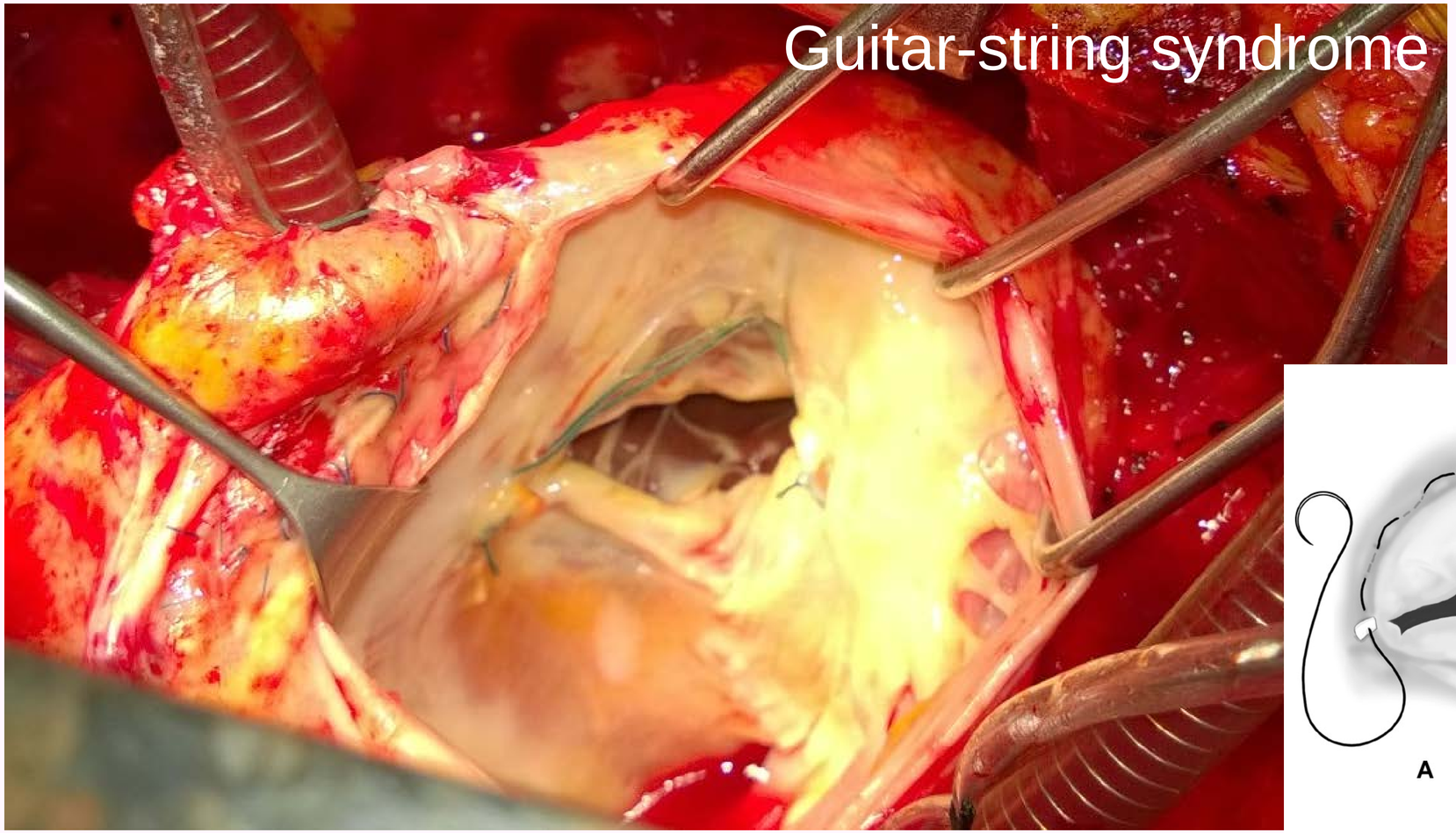

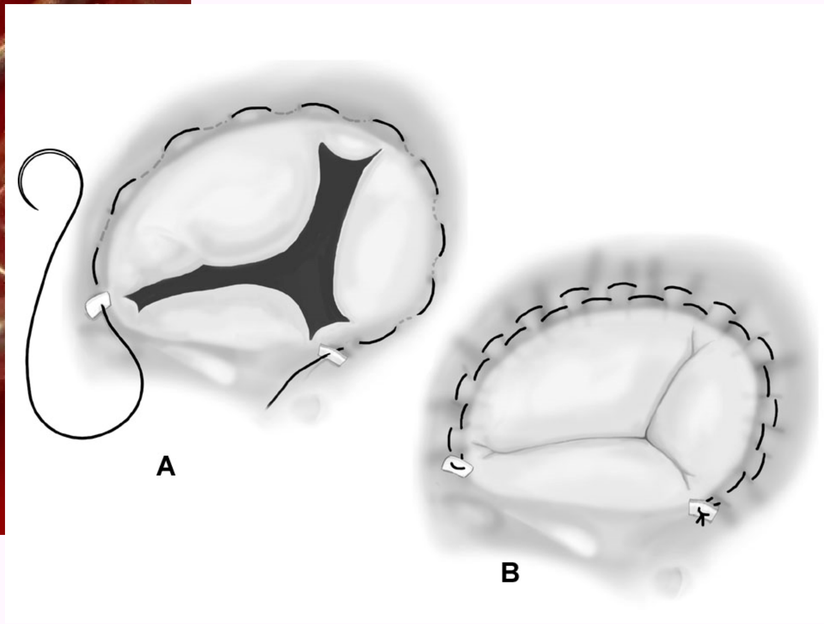

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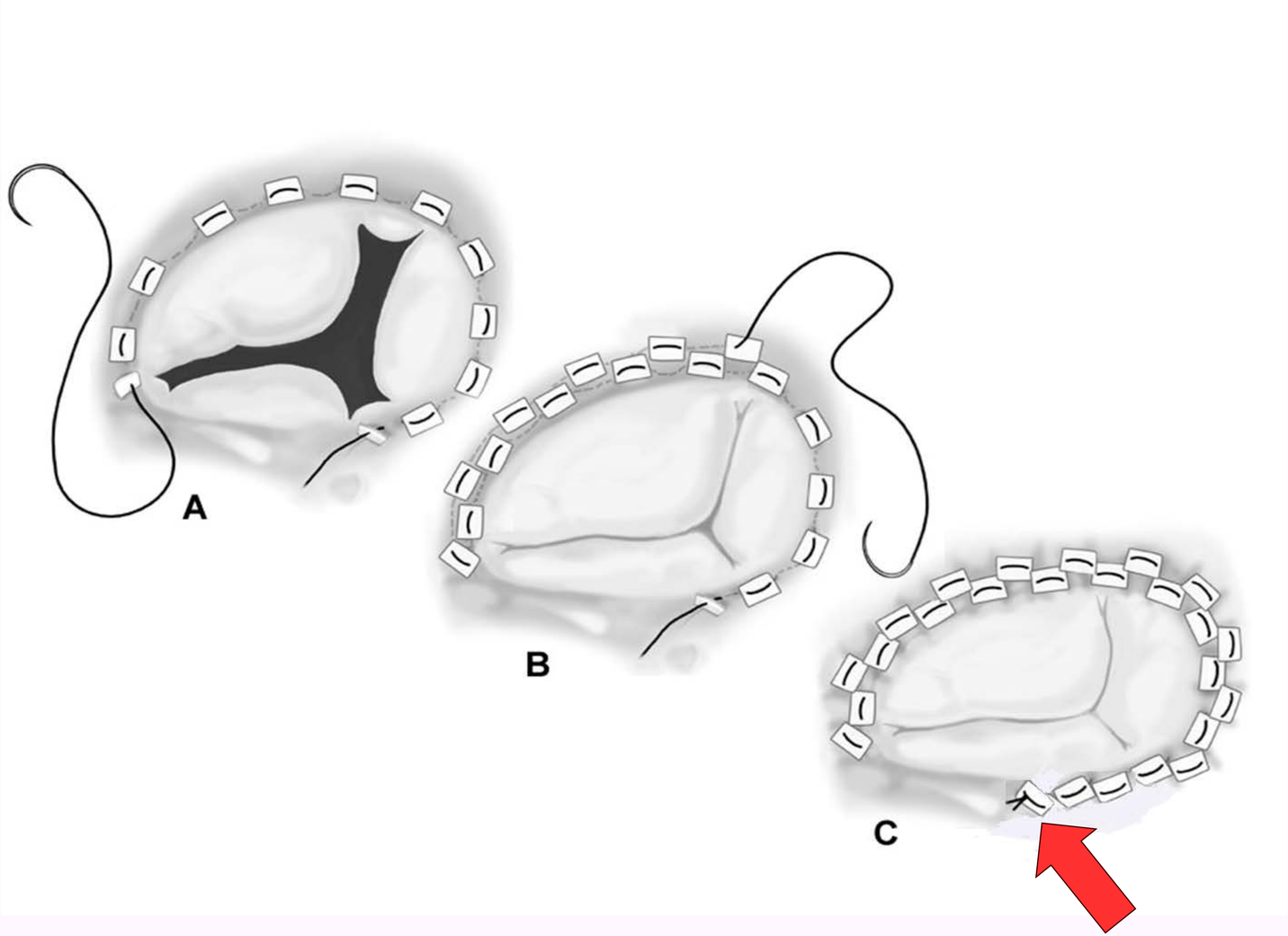

Antunes MJ, Girdwood RW. Ann Thorac Surg, 1987

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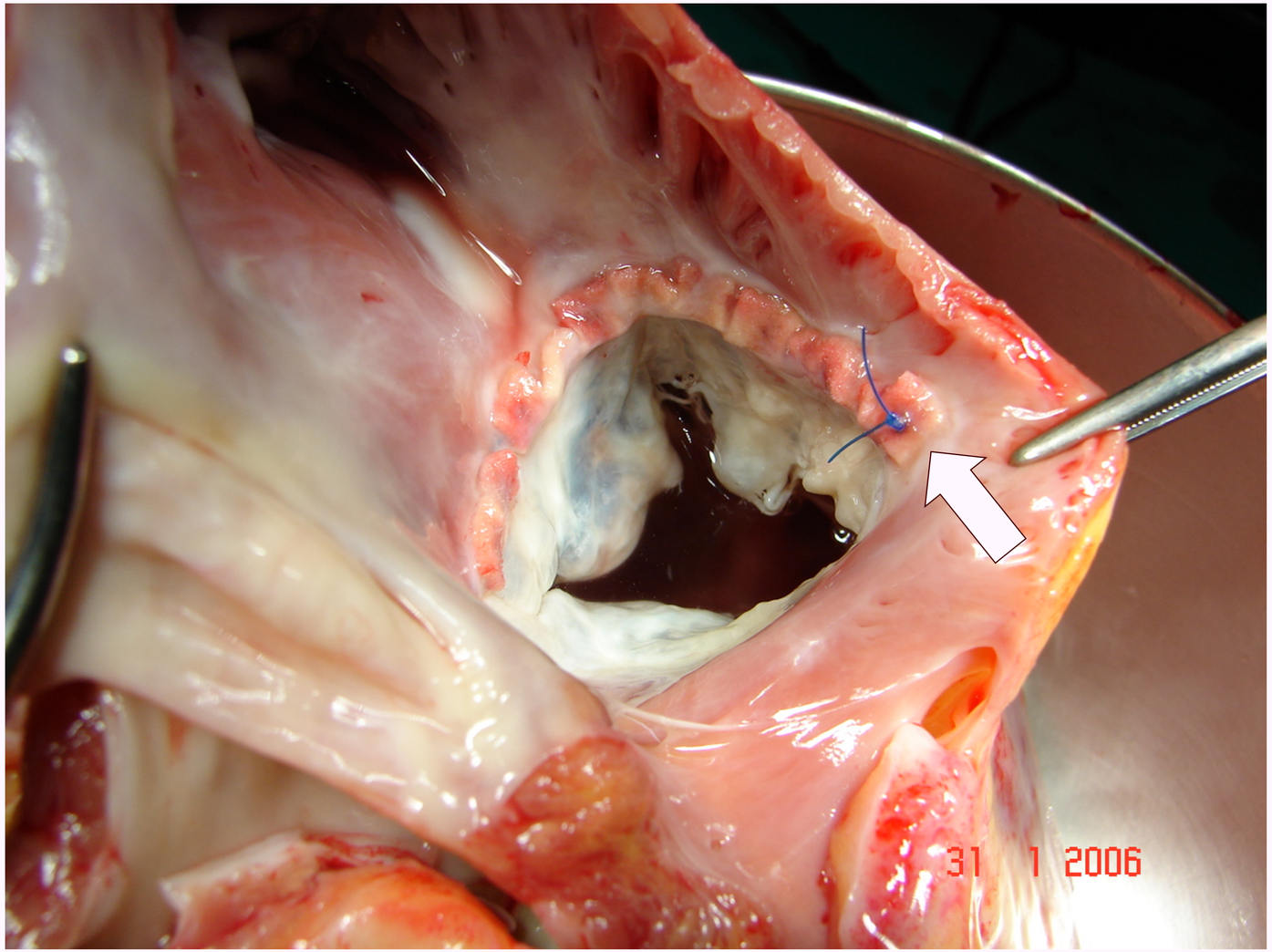

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… it is fast, technically simple and prevents a common cause of failure of the De Vega procedure, which is tearing of the suture from the tissues, a condition called "Guitar-string tricuspid“, leading to recurrence of tricuspid insufficiency.

Antunes MJ, Girdwood RW. Ann Thorac Surg, 1987

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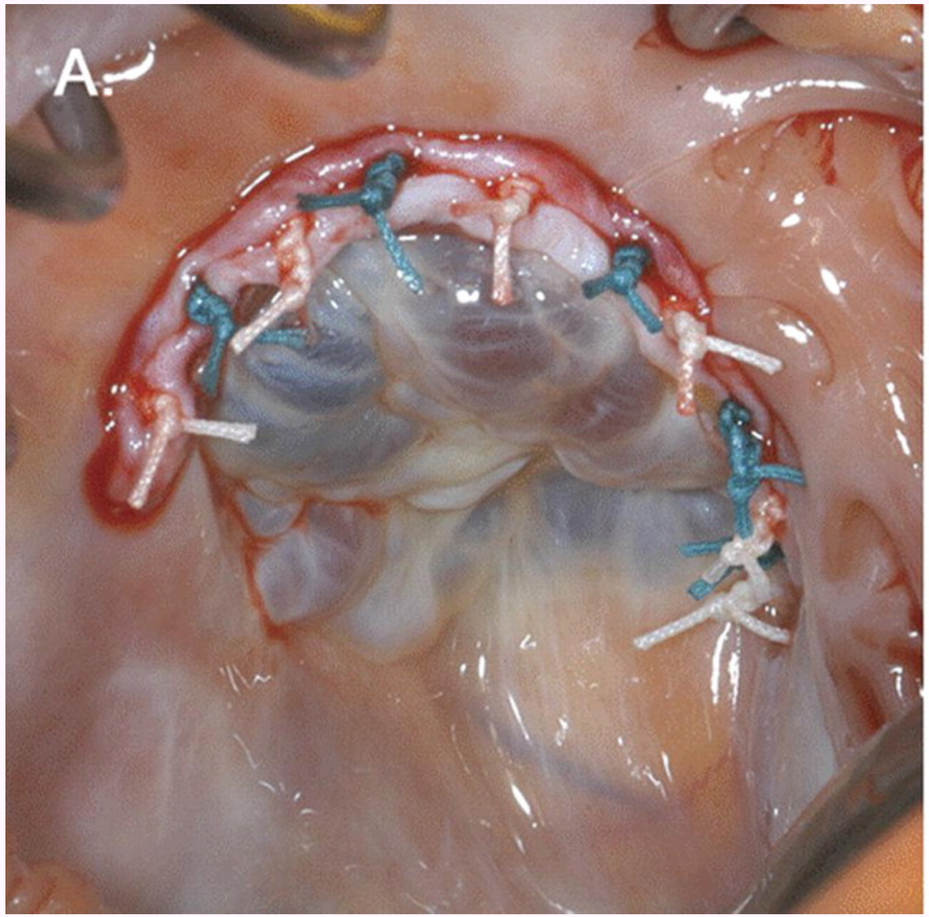

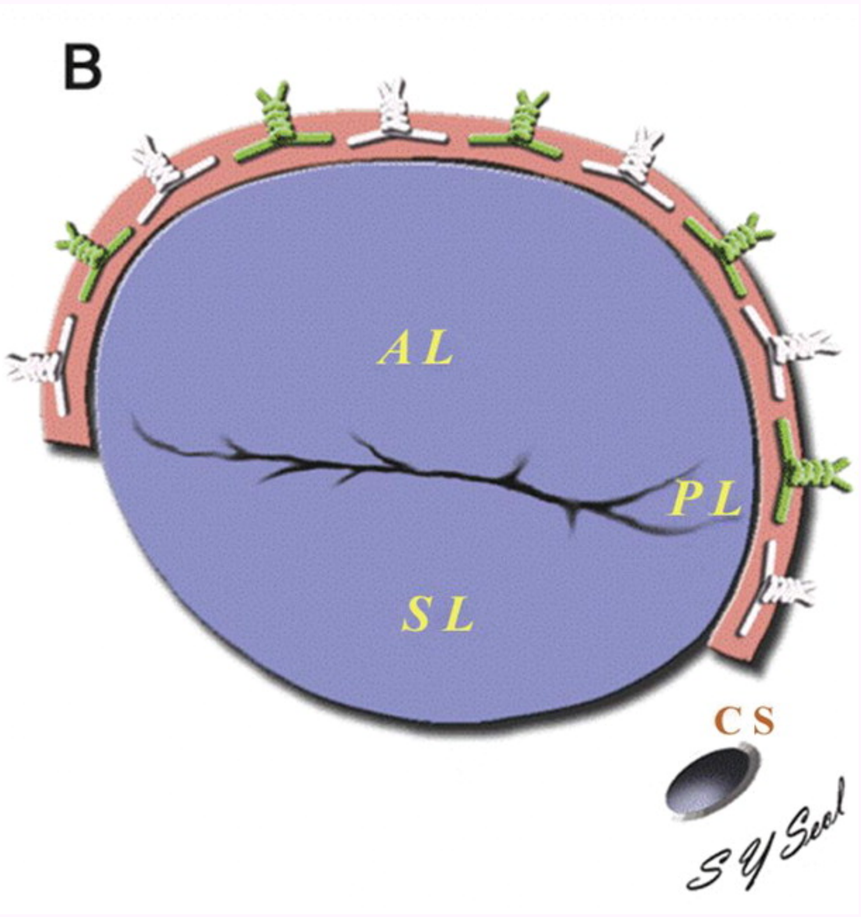

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Pericardial strip Tricuspid Annuloplasty

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J Thorac Cardiovasc Surg 2011;143:1050-5

Increased risk of dehiscence after tricuspid valve repair with rigid annuloplasty rings.

Pfannmüller B, Doenst T, Eberhardt K, Seeburger J, Borger MA, Mohr FW
Department of Cardiac Surgery, University of Leipzig Heart Center, Leipzig, Germany.

CONCLUSIONS: Although both rigid and flexible systems provide acceptable early tricuspid valve repair results, use of a rigid ring increases risk of subsequent ring dehiscence.

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- The implantation of a ring is specifically indicated when there is organic involvement of the TV, usually with stenosis, where commissurotomy is also necessary

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CONCLUSION - I

- Secondary tricuspid dilatation is present in a significant number of patients with severe mitral regurgitation without tricuspid regurgitation. It is a progressive disease which does not resolve with correction of the primary lesion alone
- Tricuspid annuloplasty at the time of mitral valve surgery results in improved functional capacity without any increase in perioperative morbidity or mortality

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CONCLUSION - II

- Functional TR can be ignored only in patients with predictable and significant reduction in pulmonary resistance
- The quality of the repair of the left sided valvulopathy appears fundamental to avoid late tricuspid regurgitation.

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