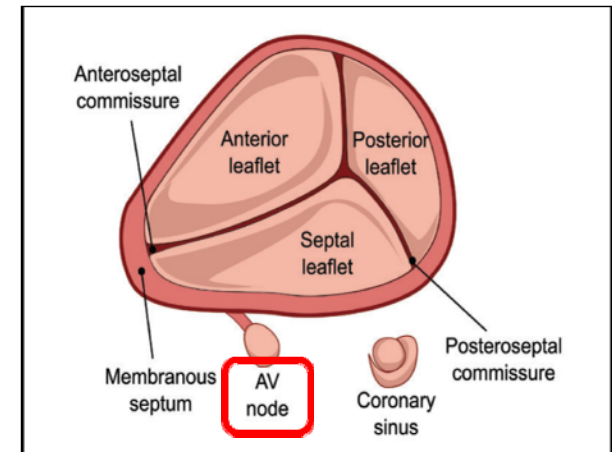


Tricuspid valve surgery

Jae Hang Lee
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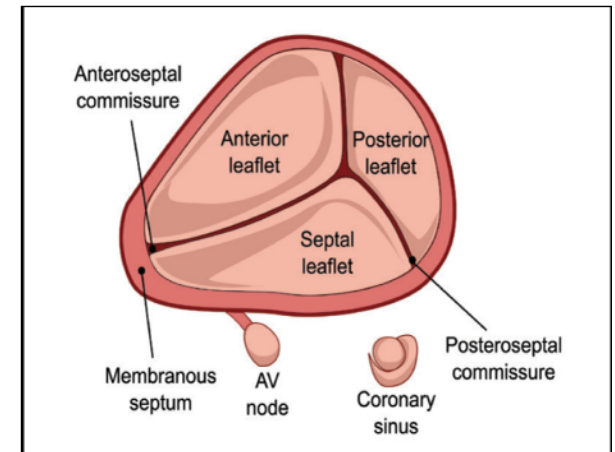
Anatomy

- Most apically placed
- Largest orifice among the 4 valves
- The leaflets are thinner and more translucent
- TV annulus
 - 20% larger than MV annulus
 - complex three-dimensional shape and does not conform to a flat ring

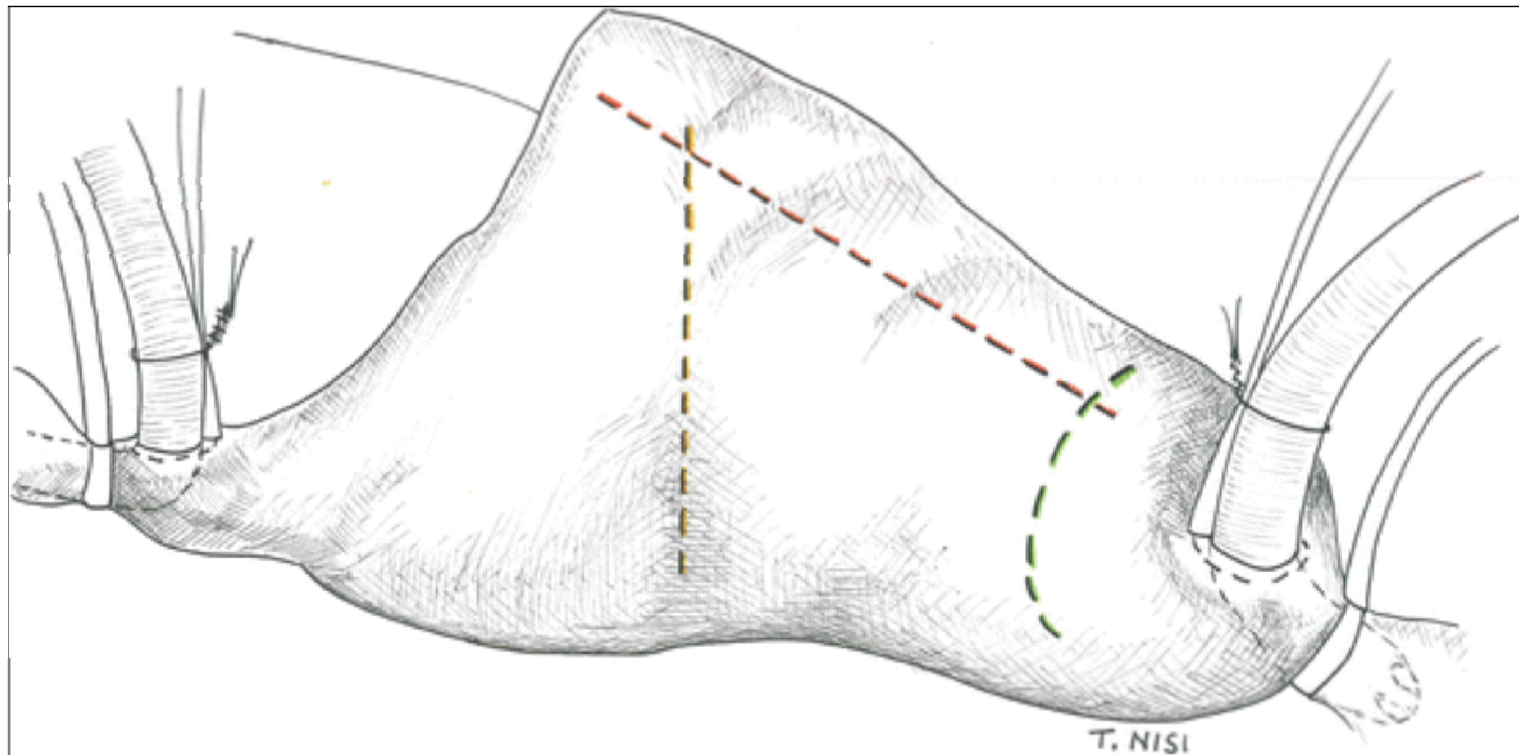


Anatomy

- **Anterior leaflet**
 - Largest among the 3 leaflets
- **Posterior leaflet**
 - Lesser functional significance
- **Septal leaflet**
 - Basis for spontaneous closure of the PM-VSD

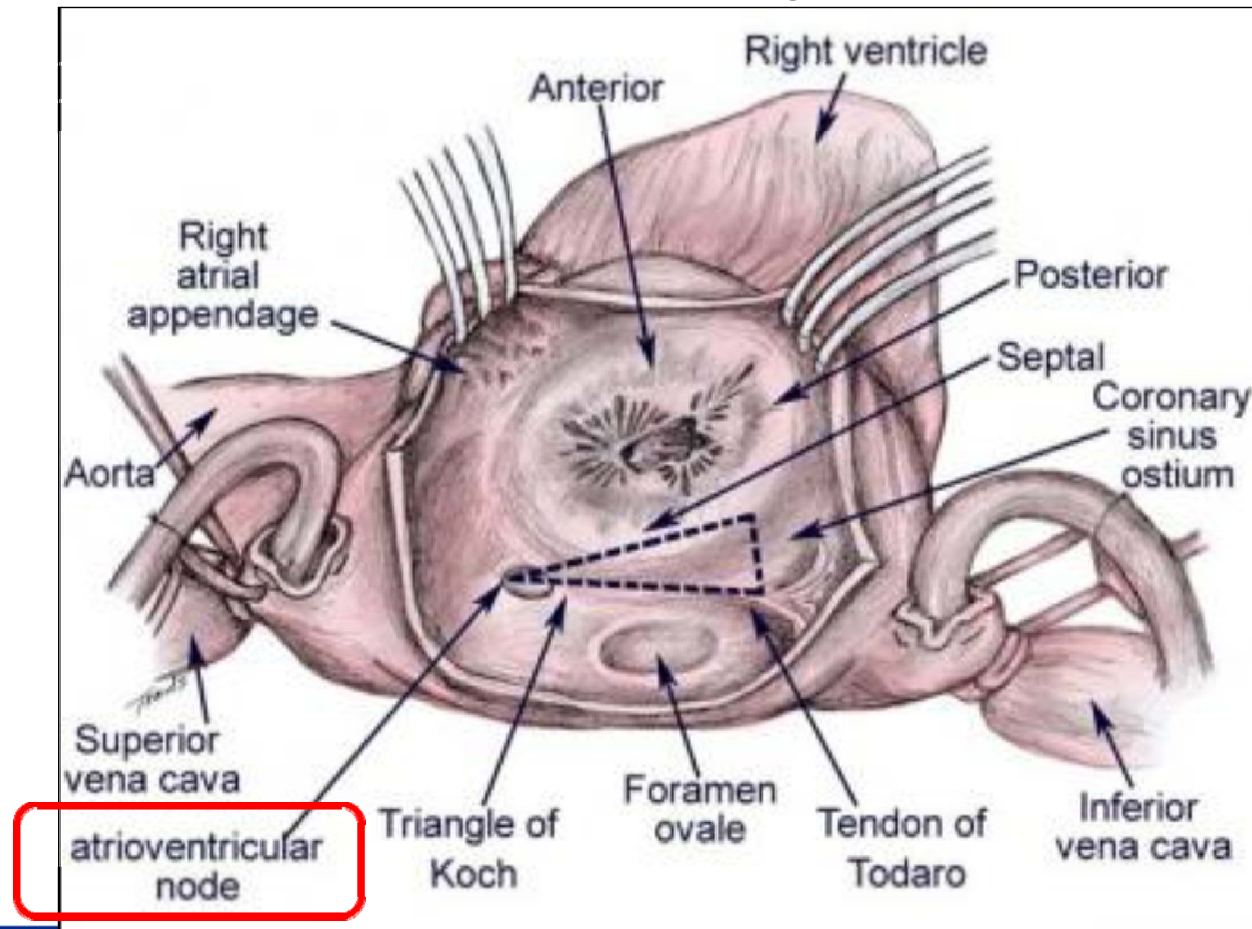


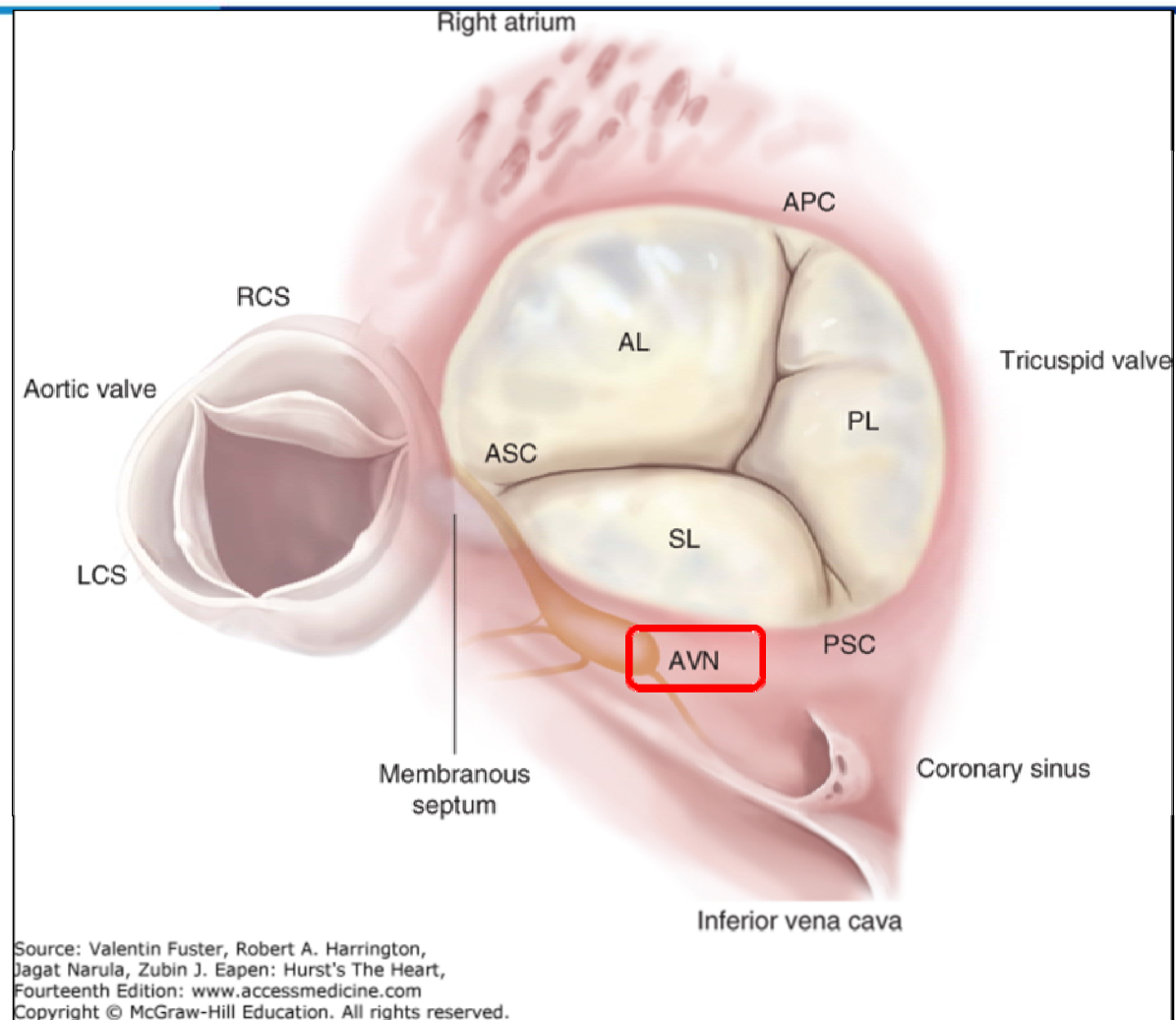
Exposure



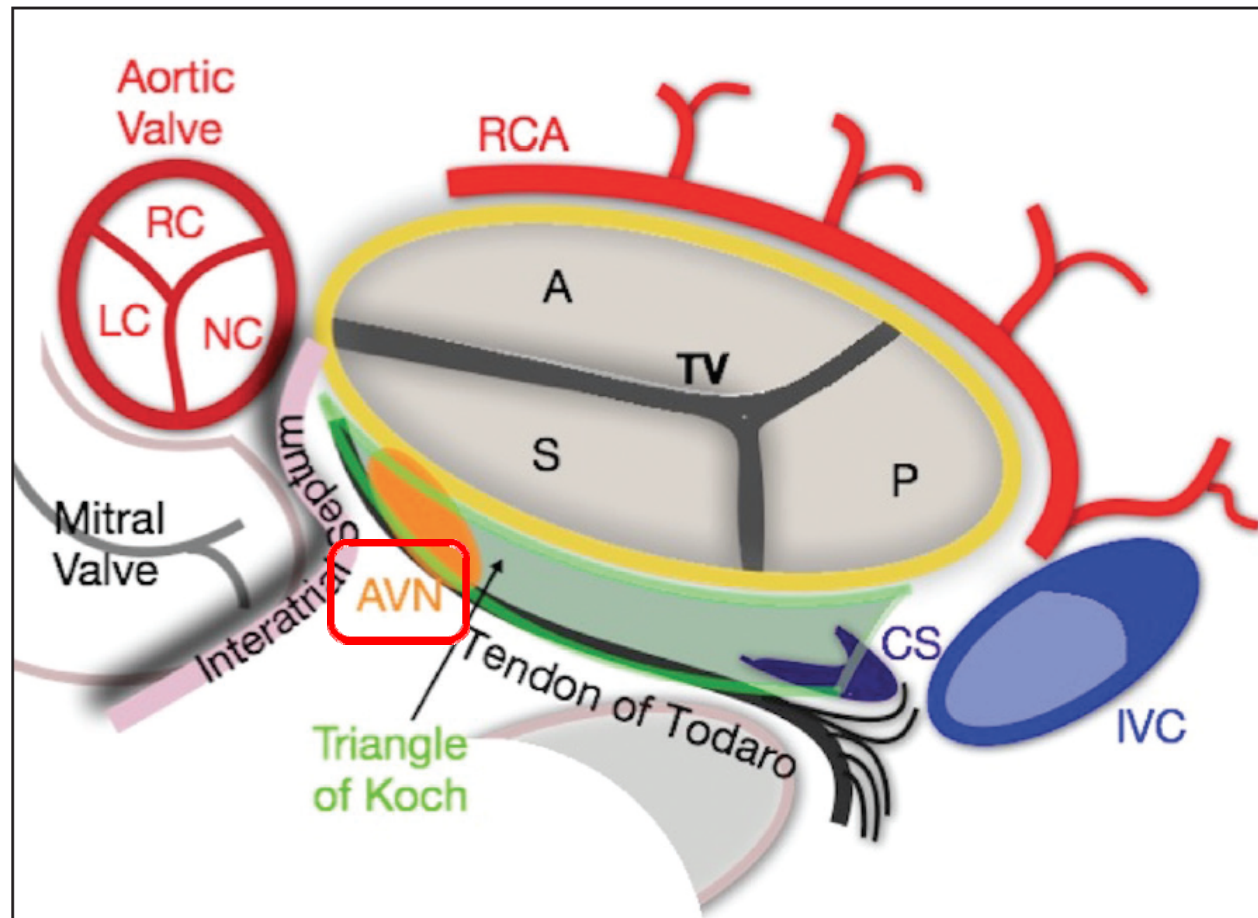
De Bonis M, et al. *Tricuspid Valve Disease: Surgical Techniques*; 2018.

Anatomy





Anatomy



Tricuspid regurgitation

Pathophysiology

- *Most TR is secondary to tricuspid annular dilatation : functional TR..!!*
 - *80%*
 - RV failure
 - Pulmonary vascular disease (Mitral valve disease)
 - RV infarction
 - Congenital : pulmonary stenosis, primary pulmonary HTN, Marfan (annular dilatation)
 - May diminish or disappear if RV decrease in size with HF treatment..!!

Pathophysiology

- Primary TR
 - Congenital disease
 - Ebstein anomaly, AV canal defect, corrected TGA
 - Rheumatic
 - Carcinoid syndrome
 - Prolapse caused by myxomatous change
 - Others
 - Tumor (ex. myxoma), PM leads, endomyocardial fibrosis, trauma, endocarditis..

Primary TR: diseases of the TV leaflets or chordal structures, or both*Congenital disease*

- Ebstein's anomaly
- Tricuspid valve dysplasia, hypoplasia, or cleft
- Double orifice TV
- Unguarded tricuspid valve orifice

Acquired disease

- Infective Endocarditis (e.g., intravenous drug abuse).
- Marantic endocarditis
- Rheumatic heart disease
- Carcinoid syndrome, serotonin-active drugs
- Tricuspid valve prolapse, flail
- Mediastinal radiation
- Cardiac device (PPM, ICD) leads
- Blunt chest wall trauma
- Right ventricular endomyocardial biopsy
- Degenerated bioprosthesis

Secondary TR: Diseases affecting the right ventricle and tricuspid annulus

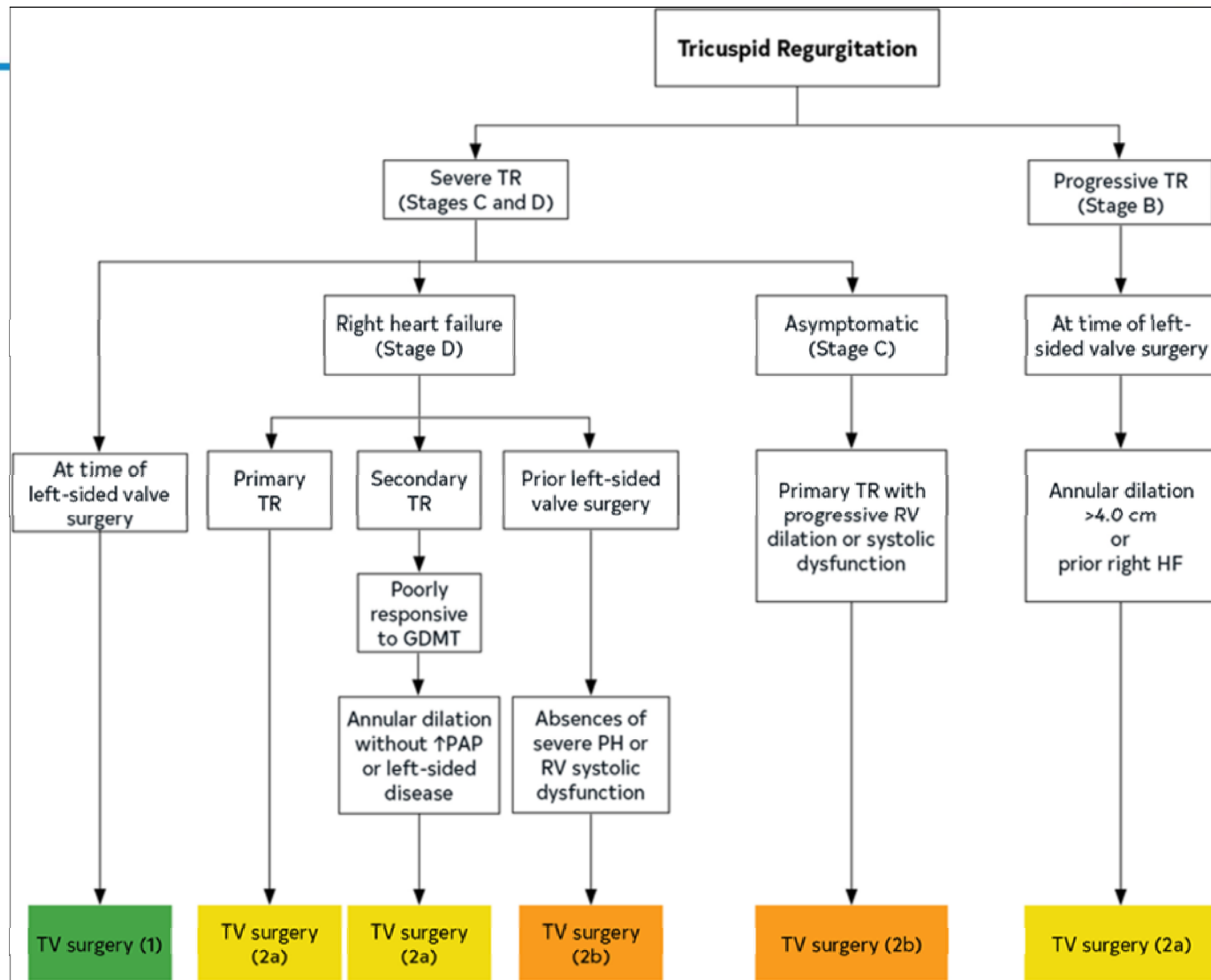
- Right ventricular and tricuspid annular dilatation,
- Left-sided valvular and/or myocardial disease,
- Pulmonary hypertension independent of left-sided cardiac pathology,
- Right ventricular infarction with remodeling,
- Papillary muscle dysfunction,
- Chronic right ventricular pacing (dyssynchrony),
- Atrial fibrillation.

Symptoms

- *TR is generally well tolerated in absence of pulmonary HTN..!!*
- Rt. Side HF with pul HTN + TR
 - Ascites, hepatomegaly, edema
- Wt.loss, cachexia, cyanosis, jaundice
- Jugular distension, venous thrill & murmur
- Pulsations of an enlarged liver

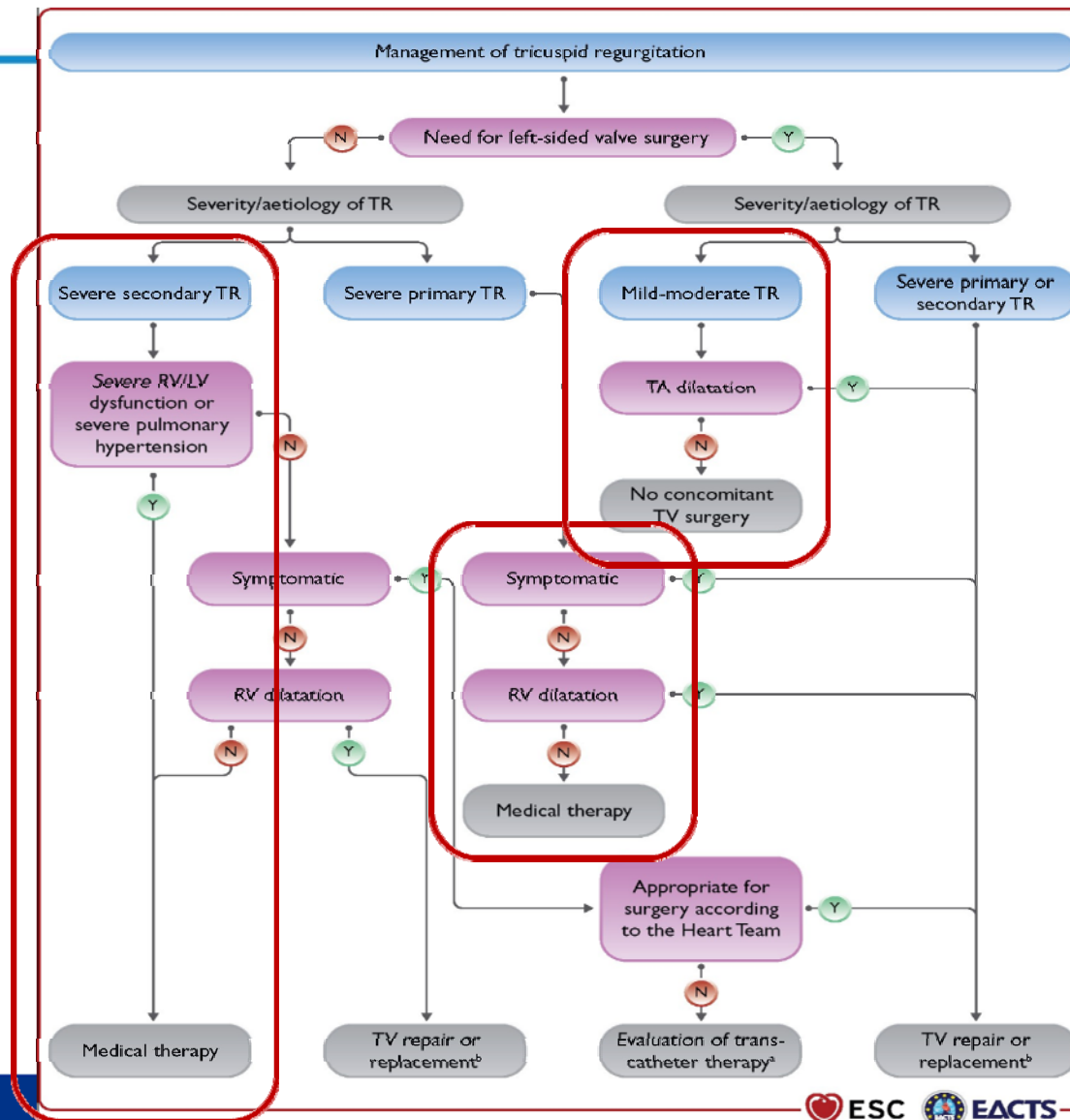
Treatment

- Medical
 - Diuretics if Rt. side heart failure / Reduce PAP and PVR
 - Antiarrhythmics
- Surgical
 - Mostly annuloplasty
 - If, TVR → Bioprosthesis \geq Mechanical
 - : risk of thrombosis, d/t lower flow rate



Recommendations for Timing of Intervention		
Referenced studies that support the recommendations are summarized in Online Data Supplement 32.		
COR	LOE	Recommendations
1	B-NR	1. In patients with severe TR (Stages C and D) undergoing left-sided valve surgery, tricuspid valve surgery is recommended. ⁷⁻⁸
2a	B-NR	2. In patients with progressive TR (Stage B) undergoing left-sided valve surgery, tricuspid valve surgery can be beneficial in the context of either 1) tricuspid annular dilation (tricuspid annulus end diastolic diameter >4.0 cm) or 2) prior signs and symptoms of right-sided HF. ⁹⁻¹⁰
2a	B-NR	3. In patients with signs and symptoms of right-sided HF and severe primary TR (Stage D), isolated tricuspid valve surgery can be beneficial to reduce symptoms and recurrent hospitalizations. ¹¹⁻¹⁴

2a	B-NR	4. In patients with signs and symptoms of right-sided HF and severe isolated secondary TR attributable to annular dilation (in the absence of pulmonary hypertension or left-sided disease) who are poorly responsive to medical therapy (Stage D), isolated tricuspid valve surgery can be beneficial to reduce symptoms and recurrent hospitalizations. ^{11,12,15-19}
2b	C-LD	5. In asymptomatic patients with severe primary TR (Stage C) and progressive RV dilation or systolic dysfunction, isolated tricuspid valve surgery may be considered. ^{12,20}
2b	B-NR	6. In patients with signs and symptoms of right-sided HF and severe TR (Stage D) who have undergone previous left-sided valve surgery, reoperation with isolated tricuspid valve surgery may be considered in the absence of severe pulmonary hypertension or severe RV systolic dysfunction. ^{1,2,11,18}

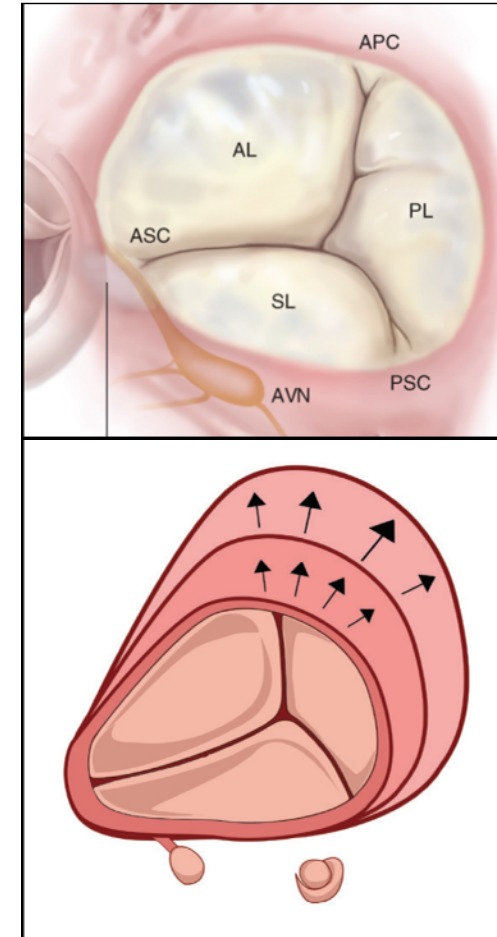
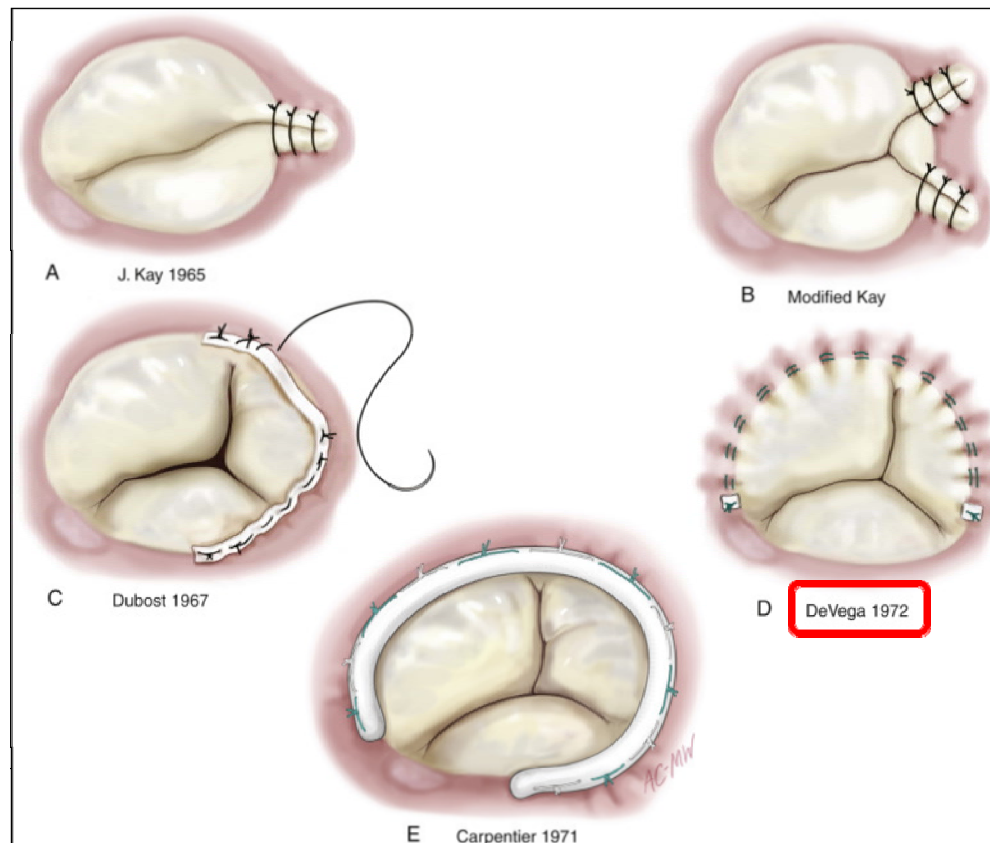


2021 ESC/EACTS guideline

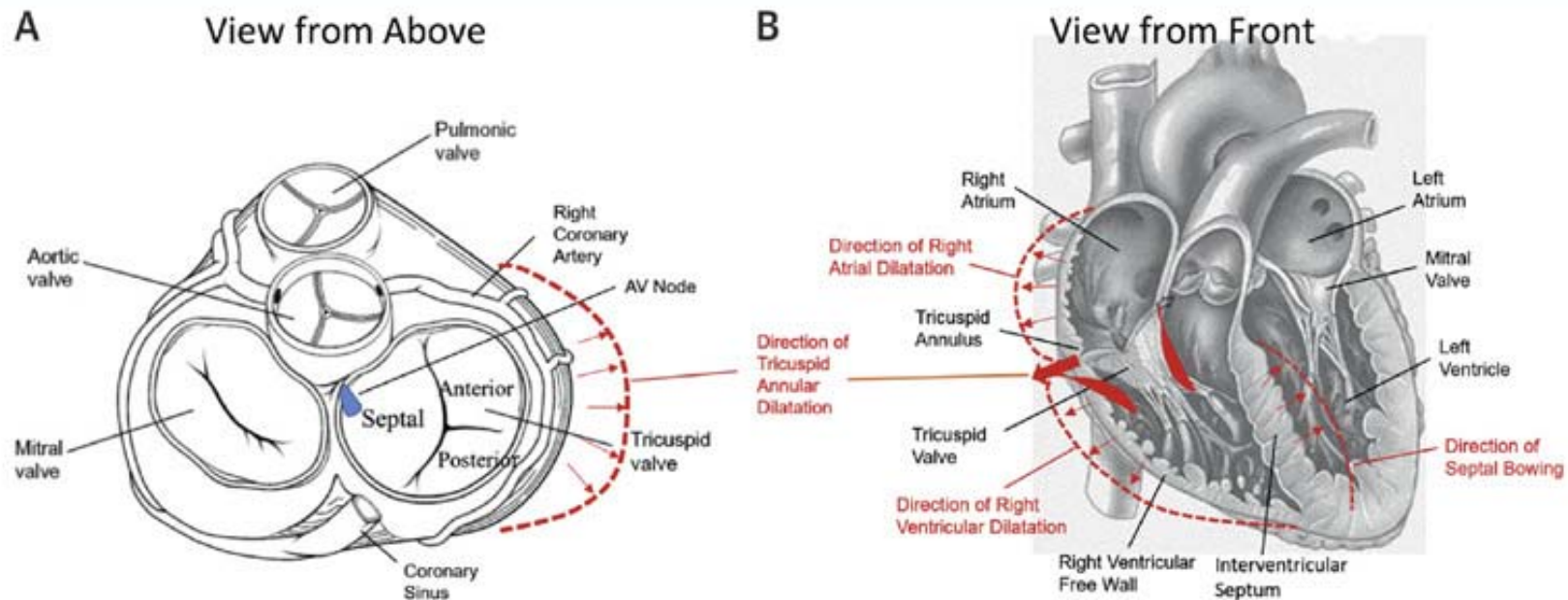
Recommendations	Class ^a	Level ^b
Recommendations on tricuspid stenosis		
Surgery is recommended in symptomatic patients with severe tricuspid stenosis. ^c	I	C
Surgery is recommended in patients with severe tricuspid stenosis undergoing left-sided valve intervention. ^d	I	C
Recommendations on primary tricuspid regurgitation		
Surgery is recommended in patients with severe primary tricuspid regurgitation undergoing left-sided valve surgery.	I	C
Surgery is recommended in symptomatic patients with isolated severe primary tricuspid regurgitation without severe RV dysfunction.	I	C
Surgery should be considered in patients with moderate primary tricuspid regurgitation undergoing left-sided valve surgery.	IIa	C
Surgery should be considered in asymptomatic or mildly symptomatic patients with isolated severe primary tricuspid regurgitation and RV dilatation who are appropriate for surgery.	IIa	C

Recommendations on secondary tricuspid regurgitation		
Surgery is recommended in patients with severe secondary tricuspid regurgitation undergoing left-sided valve surgery. ^{423–427}	I	B
Surgery should be considered in patients with mild or moderate secondary tricuspid regurgitation with a dilated annulus (≥ 40 mm or > 21 mm/m ² by 2D echocardiography) undergoing left-sided valve surgery. ^{423,425–427}	IIa	B
Surgery should be considered in patients with severe secondary tricuspid regurgitation (with or without previous left-sided surgery) who are symptomatic or have RV dilatation, in the absence of severe RV or LV dysfunction and severe pulmonary vascular disease/hypertension. ^{418,433 e}	IIa	B
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. ^f	IIb	C

Annuloplasty

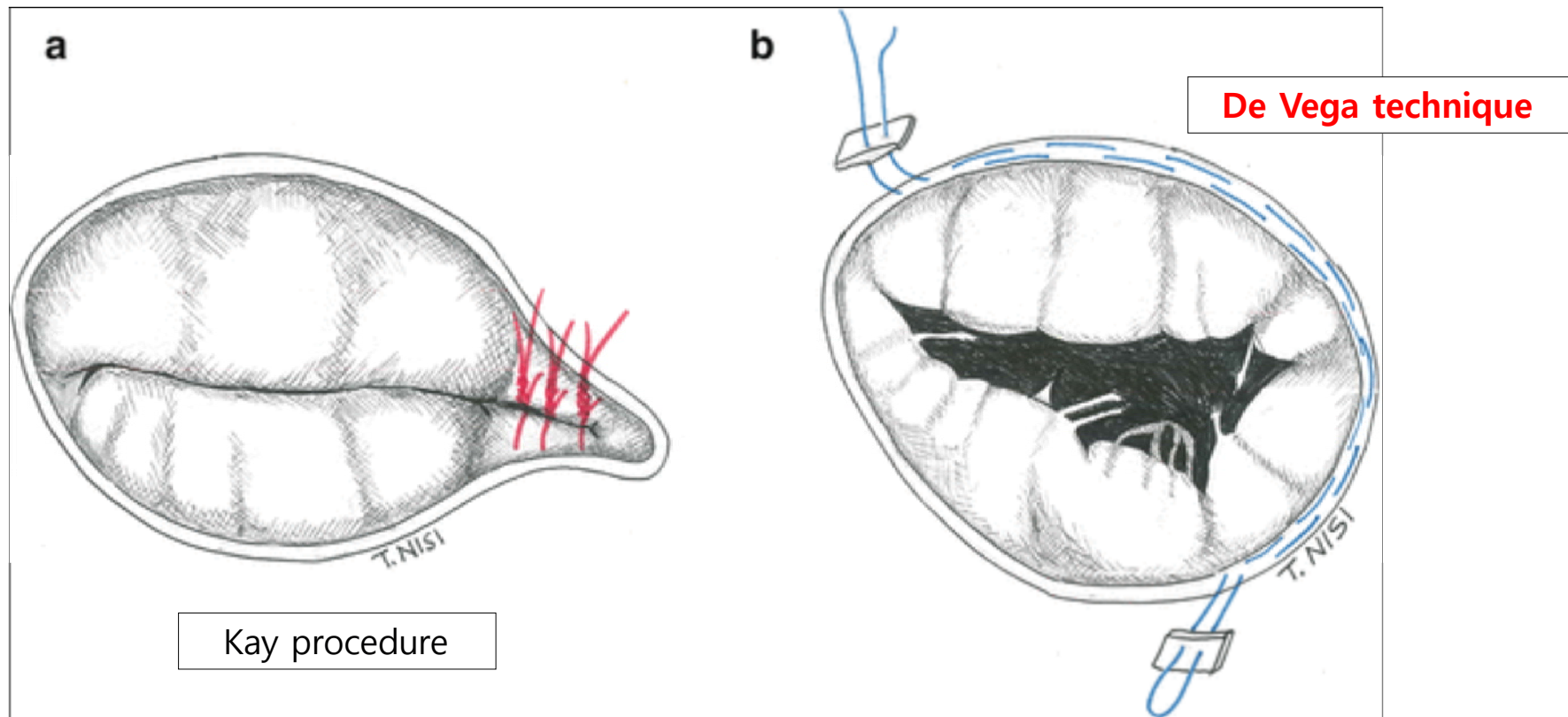


CENTRAL ILLUSTRATION: Appreciating the Complex Anatomy of the TV Anatomy Is Essential to Understand the Pathophysiology of Tricuspid Regurgitation



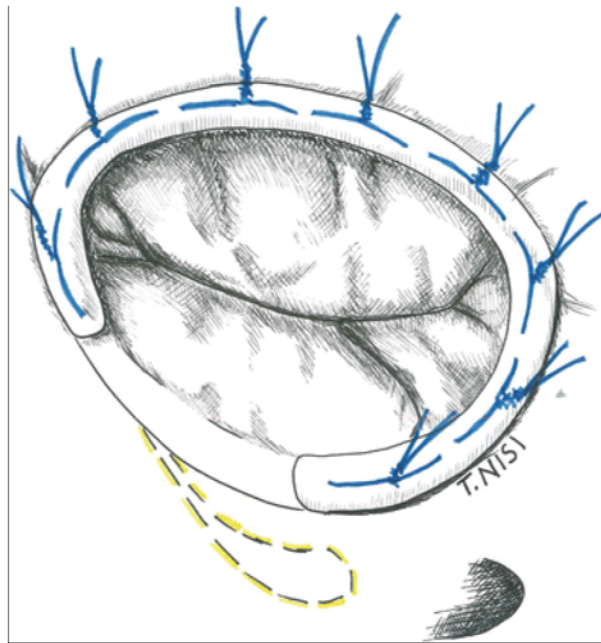
Dahou, A. et al. J Am Coll Cardiol Img. 2019;12(3):458-68.

Surgical techniques

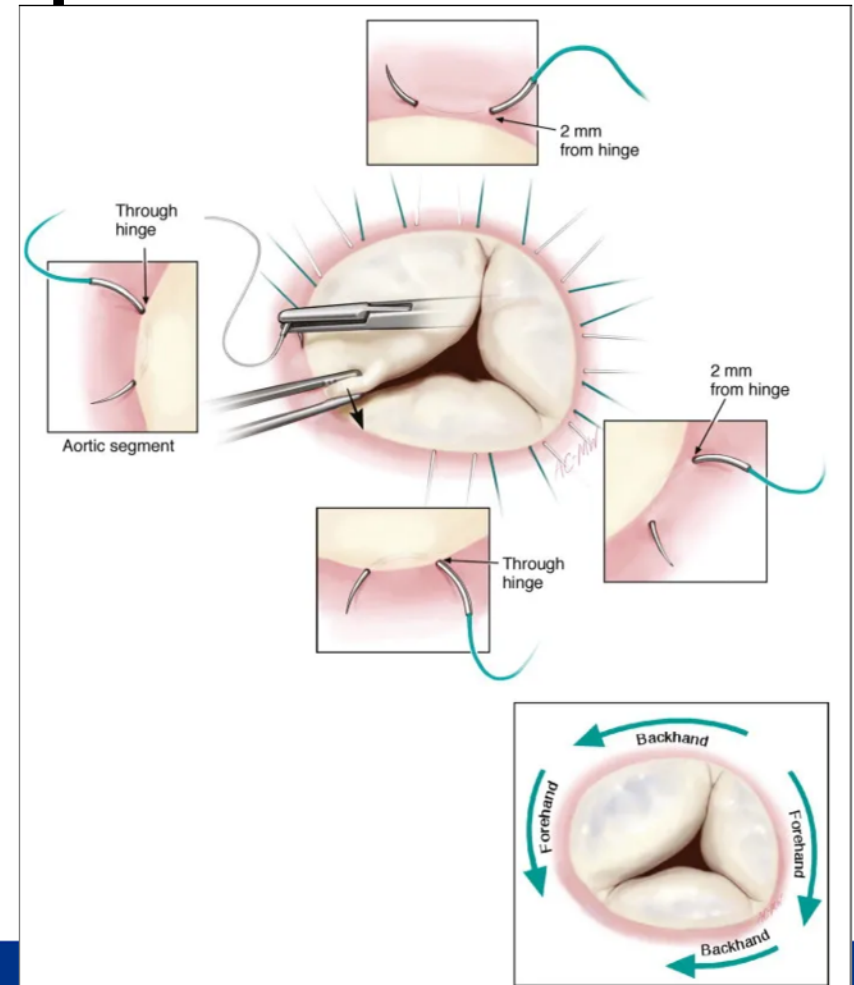


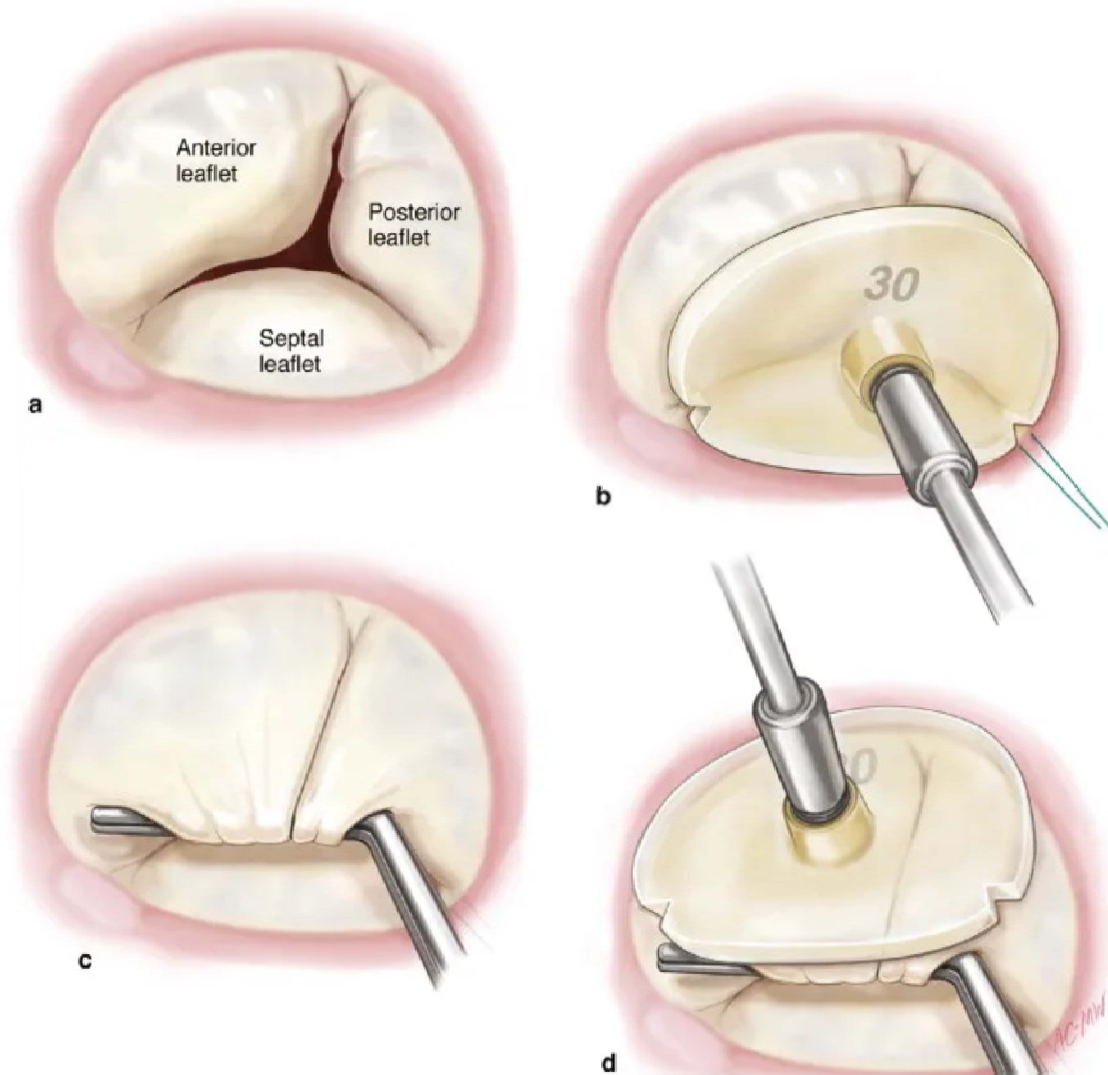
De Bonis M, et al. *Tricuspid Valve Disease: Surgical Techniques*; 2018.

Surgical techniques



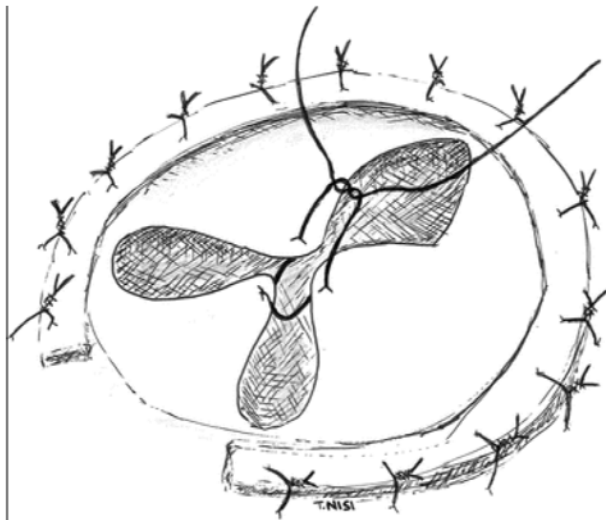
Ring annuloplasty



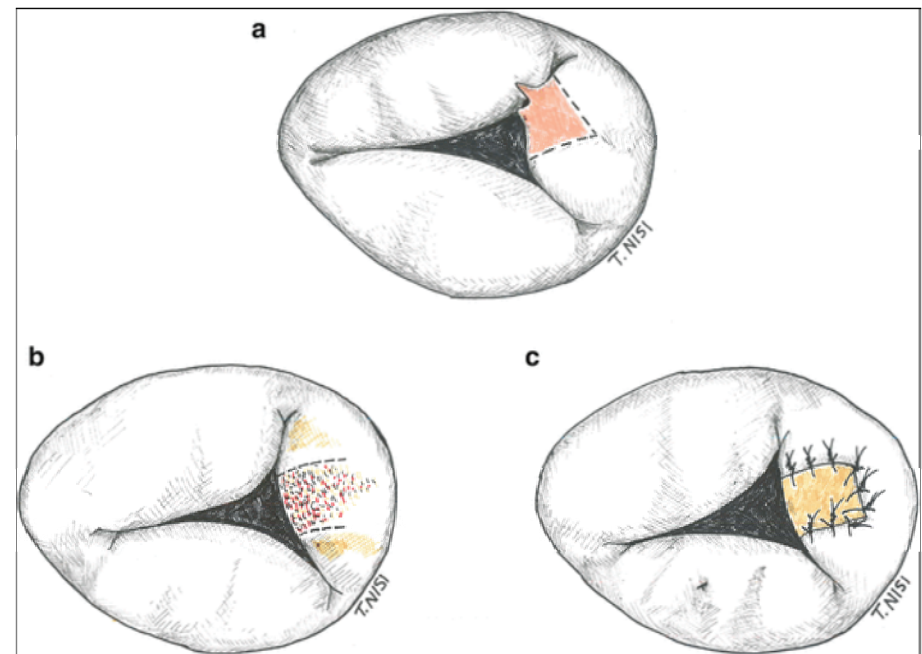


Carpentier A, et al. *Carpentier's Reconstructive Valve Surgery*; 2010.

Surgical techniques



Clover Technique



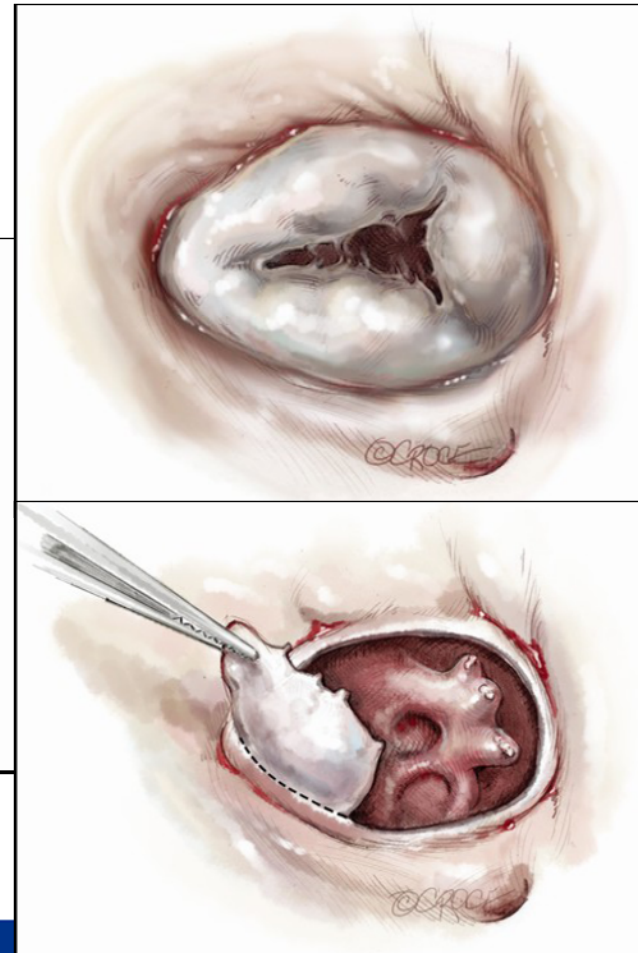
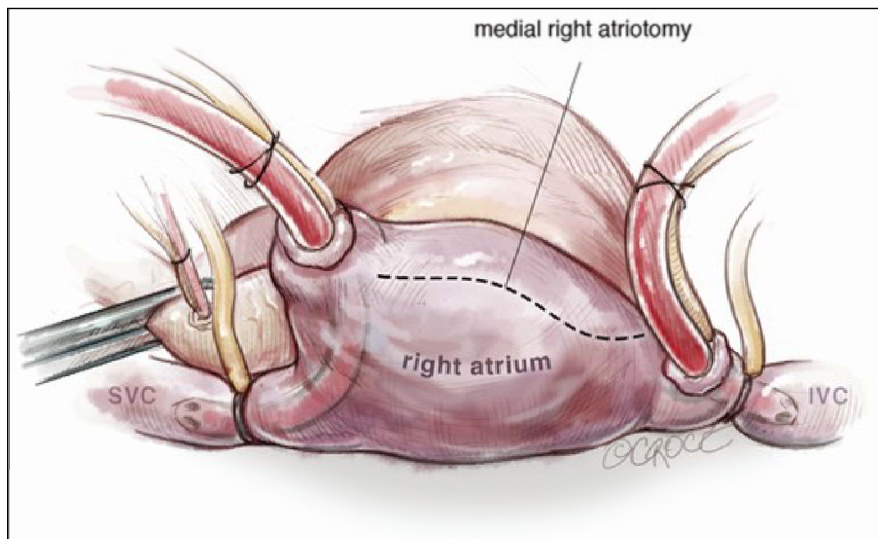
De Bonis M, et al. *Tricuspid Valve Disease: Surgical Techniques*; 2018.

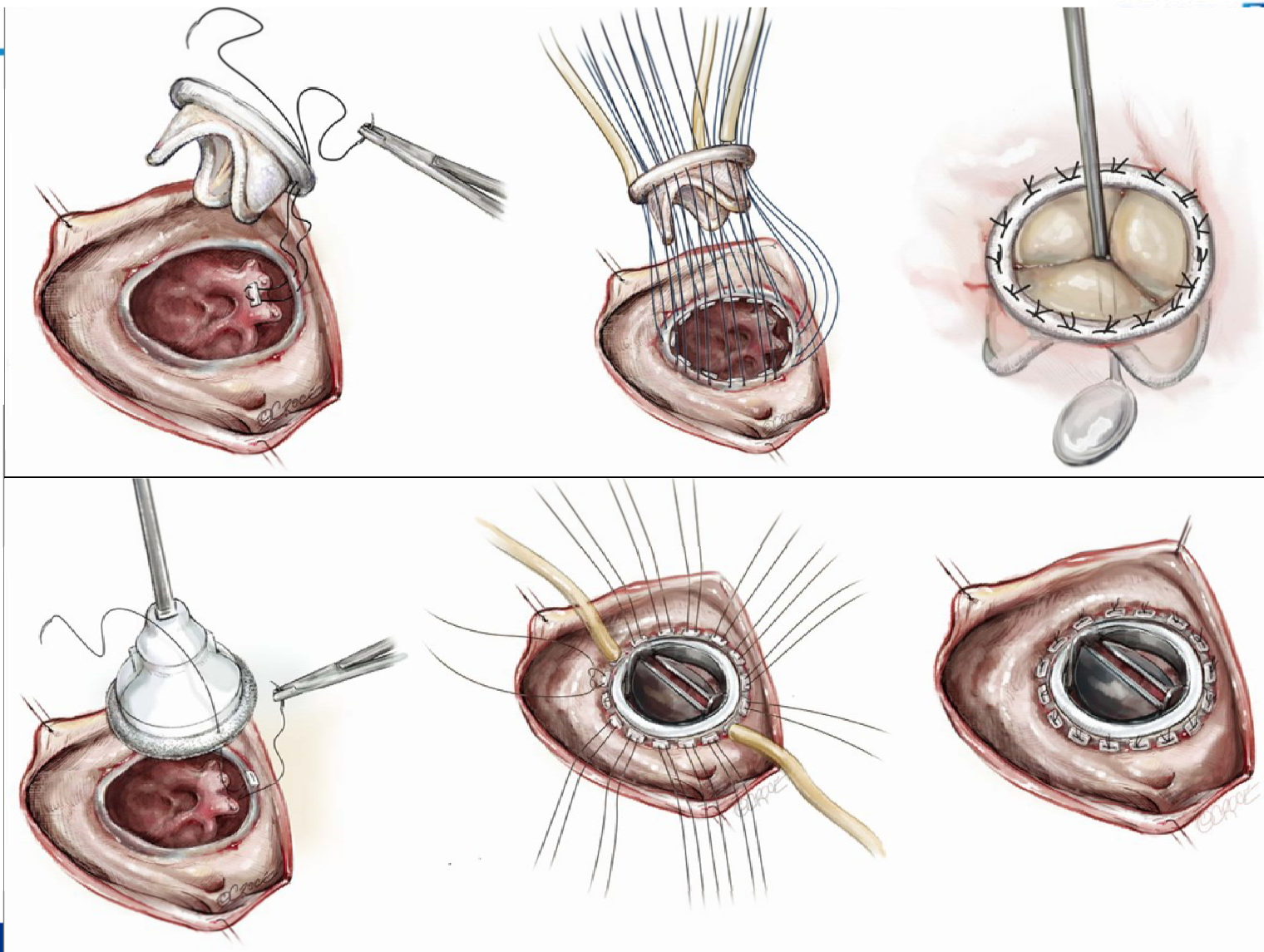
Tricuspid stenosis

Pathophysiology & symptoms

- Mostly rheumatic, rare isolated TS
- Symptoms : similar to TR
 - Fatigue
 - Distension of neck veins
 - Hepatomegaly, ascites, peripheral edema

Tricuspid valve replacement





Thank you for your attention~!

