

# TRICUSPID REGURGITATION

## CAUSES & PATHOLOGY

### Primary TR – anatomic abnormal valve

- Congenital diseases: Ebstein, AV canal defect, TGA corrected
- Rheumatic fever involves tricuspid valve directly
- **Combination of TR and TS in carcinoid syndrome**
- **Prolapse** caused by myxomatous changes
  - o **20% of patients with MVP**
  - o Associated with ASD
- Tumors (myxoma), pacemaker leads, repeated endomyocardial biopsy, endomyocardial fibrosis, methysergide induced valvular disease, fen-phen, lupus
- Trauma, endocarditis, dilated CMP, after surgical excision of tricuspid valve

### Most TR is **secondary** to tricuspid annulus dilation (functional TR) – 80%

- RV failure (dilated annulus)
- Pulmonary vascular disease (mitral valve disease)
- RV systolic pressure > 55 mmHg will cause functional TR
- RV infarction
- *Congenital heart disease*: pulmonary stenosis, pulmonary HTN in Eisenmenger, primary pulmonary HTN, *cor pulmonale*, Marfan (dilation of the annulus)
- May diminish or disappear if RV decrease in size with HF treatment

## CLINICAL PRESENTATION

- TR is generally well tolerated in absence of pulmonary hypertension
- **R-side HF with pulmonary HTN + TR**
  - o Ascites, hepatomegaly, massive edema, low CO
- Physical exam
  - o Weight loss, cachexia, cyanosis, jaundice
  - o AF is common
  - o Jugular distension – prominent a c-v wave (x-x' disappears), **Y descent is sharp**
  - o May have venous thrill and murmur in the neck
  - o Hyperdynamic RV impulse
  - o Pulsations of an enlarged liver
  - o Edema and ascites
- **Auscultation**
  - o Right S<sub>3</sub> - **↑** at inspiration
  - o Pulmonary hypertension – P<sub>2</sub> **↑**
  - o **TR (with pHTN)**: high pitch **pansystolic murmur**, loudest at **4<sup>th</sup> intercostal** space in parasternal region, *occasionally loudest in subxiphoid area*
  - o **TR (in absence pHTN)**: low intensity murmur, **protosystole**
  - o Murmur prominent at the *apex* when **RV is severely dilated** and occupies the anterior surface of the heart (difficult to distinguish from MR)

- *Maneuvers*: murmur ↑ with inspiration (**CARVALLO SIGN**), exercise, leg raising, hepatic compression
- May hear a early diastolic flow across tricuspid valve in left parasternal region following S<sub>3</sub> – flow across AV valve
- *Prolapse*: non ejection systolic click and late systolic murmurs in LLSB
  - Inspiration: click occurs later, murmur ↑ and shorter

## ECHOCARDIOGRAPHY

- Present in 70% of normal individuals
- Dilatation of RA, RV and IVC is sensitive for severe chronic TR (mostly secondary TR) but **NOT SPECIFIC** to TR
- There is a linear relationship between annular diameter and tricuspid regurgitant volume. A **diastolic diameter >40 mm (or >21 mm/m<sup>2</sup>) indicates significant annular dilation** and an increased risk of persistent or progressive TR after isolated mitral valve surgery
- Look for a flail leaflet
- Paradoxal ventricular septal movement = volume and pressure overload of RV if severe TR
- **Ebstein : exaggerated motion and delayed closure of valve**

★ **Suggested reference:** Zoghbi W. et al. Recommendations for the evaluation of the severity of native valvular regurgitation with two-dimensional and Doppler echocardiography. 2003 J Am Society Echocardiography;16:777-802.

|                             | Mild               | Moderate                | Severe   |
|-----------------------------|--------------------|-------------------------|--|
| Tricuspid valve             | Normal             | Normal or abnormal      | Abnormal, flail leaflet, poor coaptation                       |
| RV/RA/IVC size              | Normal             | Normal or dilated       | Usually dilated  |
| Jet area (cm <sup>2</sup> ) | < 5                | 5-10                    | > 10   |
| VC width (cm)               |                    |                         | > 0.7  |
| PISA radius (cm)            | ≤ 0.5              | 0.6-0.9                 | > 0.9  |
| Jet density and contour CW  | Soft and parabolic | Dense, variable contour | Dense, triangular with early peaking (“ <b>dagger shape</b> ”) |
| Hepatic vein flow           | Systolic dominance | Systolic blunting       | Systolic reversal  |

★ **Suggested reference:** Nishimura R. A. et al. 2014 ACC/AHA guidelines for the management of patients with valvular heart disease. J Am Coll Cardiol 2014;63:e57-185 – **table 19**

### TTE is indicated:

- Evaluate the severity of TR, etiology, sizes of right sided chambers and IVC, RV systolic function, estimate systolic PAP
- Evaluate left sided heart disease

## CATHETERIZATION

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Useful to measure pulmonary artery pressures and pulmonary vascular resistance (PVR) when noninvasive imaging data are discordant.

- **Thermodilution CO can be inaccurate with severe TR**
- Fick CO should be measured to apply to PVR

### *Findings*

- RA pressure ↑ and RVEDP ↑
- **Prominent c-v wave (ventricularization of atrial pressure – absence of x descent)**
  - TR progression – RAP contour resembles RV pressure pulse
- **↑ RAP at inspiration**
- Pulmonary arterial systolic pressure helps to define **primary (PAPs < 40 mmHg)** than **secondary (PAP > 55 mmHg) TR**

## EXERCISE TESTING

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Can be useful to evaluate patient's exercise capacity with severe TR with mild or no symptoms.

## EKG

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- Incomplete right BBB
- Q waves in V1
- AF (common)

## CHEST X-RAY

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- Cardiomegaly
- **RA is prominent**
- **Distension of azygos vein (↑RAP)**
- Pleural effusion
- Upward diaphragm

## MANAGEMENT

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### *Medical*

- Diuretics if right sided heart failure
- Treatments to reduce elevated pulmonary artery pressure and pulmonary vascular resistance (IIB)

### *Surgical*

- TR is well tolerated in absence of pHTN = **no surgery required**
- **Valvectomy** (complete excision of valve) is well tolerated – dilation of RV-RA occurs months-years after

- Endocarditis – TVR is frequently reinfected in IVDU, can be considered 6-9 months after ATB and valve excision
- Surgery with secondary severe TR (with or without annular dilation) in pHTN setting (2<sup>nd</sup> MS) = valvulotomy + ring annuloplasty
  - Mild TR with annular dilation should be treated because it will progress
- Surgical mortality 13,9%
- TVR if residual TR during surgery or primary TR (ex. Ebstein)
- Bioprosthesis valve is 1<sup>st</sup> choice for TVR
  - Risk of thrombosis is ↑ mechanical prosthesis > mitral or aortic valve
    - Lower flow rate
  - Durability more than 10 years

★ Suggested reference: Nishimura R. A. et al. 2014 ACC/AHA guidelines for the management of patients with valvular heart disease. J Am Coll Cardiol 2014;63:e57-185 – figure 5

**Content of this summary from these references:**

- Otto C & Bonow R. Valvular Heart Disease. (2012) In Bonow R. *et al.* Braunwald's Heart Disease, 9<sup>th</sup> edition, pp. 1468-1539. Philadelphia, PA: Elsevier.
- Nishimura R. A. et al. 2014 ACC/AHA guidelines for the management of patients with valvular heart disease. J Am Coll Cardiol 2014;63:e57-185.
- Zoghbi W. et al. Recommendations for the evaluation of the severity of native valvular regurgitation with two-dimensional and Doppler echocardiography. 2003 J Am Society Echocardiography;16:777-802.