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-cv 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 S3 - ↑ at inspiration
  o Pulmonary hypertension – P2 ↑
  o TR (with pHTN): high pitch pansystolic murmur, loudest at 4th 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 S₃ – 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/m2) 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


<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
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<tbody>
<tr>
<td>Tricuspid valve</td>
<td>Normal</td>
<td>Normal or abnormal</td>
<td>Abnormal, flail leaflet, poor coaptation</td>
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<tr>
<td>RV/RA/IVC size</td>
<td>Normal</td>
<td>Normal or dilated</td>
<td>Usually dilated</td>
</tr>
<tr>
<td>Jet area (cm²)</td>
<td>≤ 5</td>
<td>5-10</td>
<td>&gt; 10</td>
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<tr>
<td>VC width (cm)</td>
<td></td>
<td></td>
<td>&gt; 0.7</td>
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<tr>
<td>PISA radius (cm)</td>
<td>≤ 0.5</td>
<td>0.6-0.9</td>
<td>&gt; 0.9</td>
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<tr>
<td>Jet density and contour CW</td>
<td>Soft and parabolic</td>
<td>Dense, variable contour</td>
<td>Dense, triangular with early peaking (<strong>dagger shape</strong>)</td>
</tr>
<tr>
<td>Hepatic vein flow</td>
<td>Systolic dominance</td>
<td>Systolic blunting</td>
<td>Systolic reversal</td>
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**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

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

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

ECG

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

CHEST X-RAY

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

MANAGEMENT

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 (2nd MS)
  = valvulotomy + ring annuloplasty
  o 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 1st choice for TVR
  o Risk of thrombosis is ↑ mechanical prosthesis > mitral or aortic valve
    ▪ Lower flow rate
  o Durability more than 10 years


Content of this summary from these references: