

# PULMONARY REGURGITATION

## ETIOLOGIES

- Dilatation of valve ring *secondary* to **pulmonary hypertension or dilation of pulmonary artery**
- Endocarditis
- Surgical treatment of congenital PS
- Surgical treatment of Tetralogy of Fallot
- Congenital valve anomaly: absent, malformed, fenestrated or supernumerary leaflets
  - o Associated with **TdF, VSD, PS**
- Rare: trauma, carcinoid, rheumatic involvement, injury due to PA catheter, syphilis

## CLINICAL PRESENTATION

- Isolated PR cause RV volume overload
- Complicated eventually by pulmonary hypertension = RV failure
- Septic pulmonary emboli and pHTN in *endocarditis*

## PHYSICAL EXAM

- RV Hyperdynamic – palpable systolic pulsations in left parasternal area, lift
- Enlarged PA – systolic pulsations of 2<sup>nd</sup> left intercostal space
- Auscultation
  - o **↑P<sub>2</sub> 2<sup>nd</sup> to pulmonary hypertension**
    - *Absent in congenital absence of pulmonary valve*
  - o **Wide split of S<sub>2</sub>**
  - o Nonvalvular systolic ejection click 2<sup>nd</sup> **pulmonary artery expansion** – midsystolic murmur in 2<sup>nd</sup> LICS
  - o **S<sub>3</sub> and S<sub>4</sub> in 4<sup>th</sup> LICS, ↑ with inspiration**
  - o **Diastolic murmur without pHTN**
    - Low pitch
    - 3-4<sup>th</sup> LICS, near sternum
    - 0,04s after P<sub>2</sub>
    - ↑ with inspiration
  - o **Graham-Steel murmur**: annular dilation 2<sup>nd</sup> to pulmonary HTN (PAPs > 55 mmHg)
    - High pitch
    - Decrescendo
    - After P<sub>2</sub>
    - 2-4<sup>th</sup> LICS
    - Loud P<sub>2</sub> or fused S<sub>2</sub>
    - Ejection sound
    - Systolic murmur of TR
    - Low frequency presystolic murmur (flow across tricuspid valve – rare)
    - ↑ Inspiration
    - ↓ Valsalva

## ELECTROCARDIOGRAPHY

- RV diastolic overload (rSr or rsR in precordial leads)
- RV hypertrophy in presence of pulmonary hypertension

## CHEST X-RAY

- Enlarged PA
- Enlarged RV

## ECHOCARDIOGRAPHY

- Doming of the leaflet
- Hypoplasia, dysplasia or absence of the valve
- Dilatation of the pulmonary artery, RA, RV
- In absence of pulmonary hypertension, systolic dysfunction and dilatation of RV is an indirect sign of significant pulmonary regurgitation (volume overload)

★ **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
Pulmonary valve	Normal	Normal of abnormal	Abnormal
RV size	Normal	Normal of dilated	Dilated
Jet size by color Doppler	Thin	Intermediate	Large, wide origin and brief duration
Jet density - CW	Soft, slow deceleration	Dense	Dense, steep deceleration, early termination of diastolic flow
Pulmonary systolic flow - PW	Slightly increased	Intermediate	Increased

★ **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 21**

**CMR:** important role – PA dilation, quantify PR severity, RV dilation and systolic function

## MANAGEMENT

- PR alone requires specific treatment
- PVR – pulmonary allograft is preferred
- Treat underlying cause of pulmonary HTN – will ameliorate the PR

**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.