

Septal defects with severe PHT: When is it too late to close them?

Bharat Dalvi, MD
Glenmark Cardiac Centre
Mumbai, India

Septal defects with severe PHT

- Rare in the developed world
- Not an uncommon problem in the developing countries
- 0.8% of all the out patients – Eisenmenger's syndrome

Severe PHT: A spectrum

- With normal or near normal PVR
- With elevated PVR which is reversible
- With elevated PVR which is irreversible

Two basic things

- ***PHT is not synonymous with PVR***
 - 6 month old with a large PMVSD and systemic PA pressure
 - 16 year old with a large PMVSD and systemic PA pressure
- ***High PVR is not necessarily irreversible***

When is it too late?

- Severe PHT with irreversibly high PVR
- Closing the defect – COUNTERPRODUCTIVE
- Severe PHT with normal/reversibly high PVR
- Closing the defect – Significant benefit in terms of QOL as well as longevity

Million Dollar question

- How to clinically or otherwise recognize
- Irreversible PVR
- Normal/reversible PVR

Holistic Approach

- Clinical
- ECG
- CxR
- 2DE/CD
- Cardiac catheterization
 - Basal
 - After O₂ and pulmonary vasodilators
 - Temporary (balloon) occlusion of the defect

Hemodynamic point of view

- Pretricuspid shunts: Predominantly diastolic
 - Shunt reversal may not occur despite high PVR till such time RV diastolic function is normal
 - Shunt reversal with normal or mildly elevated PVR due to associated TR
- Post tricuspid shunts: Predominantly systolic or continuous

Clinical Evaluation

- Symptoms: Characterized by fixed output state and hypoxia
 - SOB
 - Easy fatigability
 - Syncope
 - Claudication
 - Hemoptysis

Clinical Evaluation

- Signs:
 - Cyanosis \pm clubbing
 - Small heart (except valve regurgitation)
 - RV apex
 - Parasternal heave
 - EC
 - Narrow splitting of A2P2 with loud P2
 - Short/absent murmurs
 - No flow murmurs

Post exercise SaO₂/PO₂

- UL for ASD/VSD
- LL for PDA
- Avoid in the presence of H/O post exertional syncope

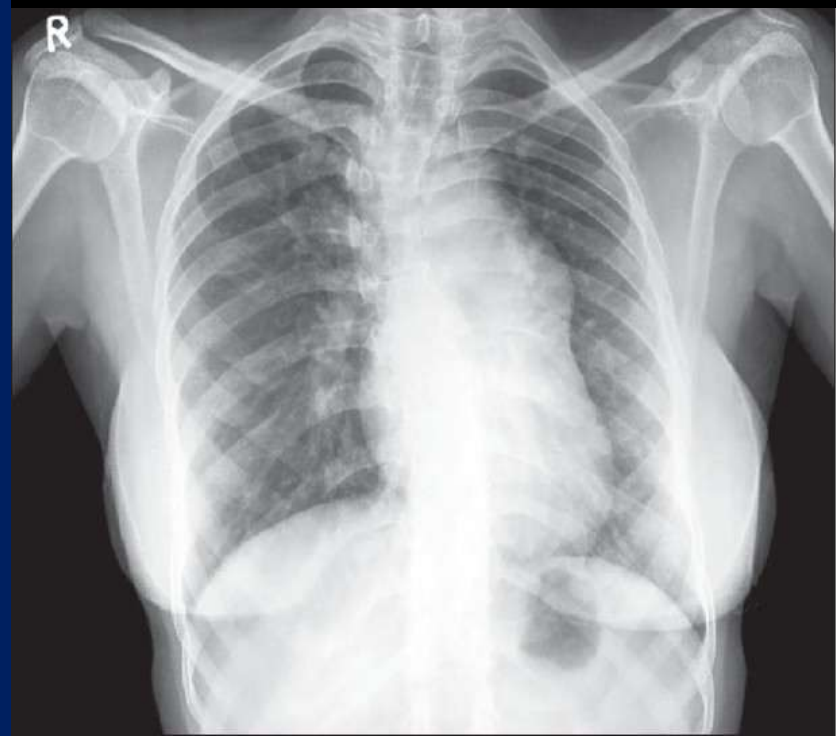
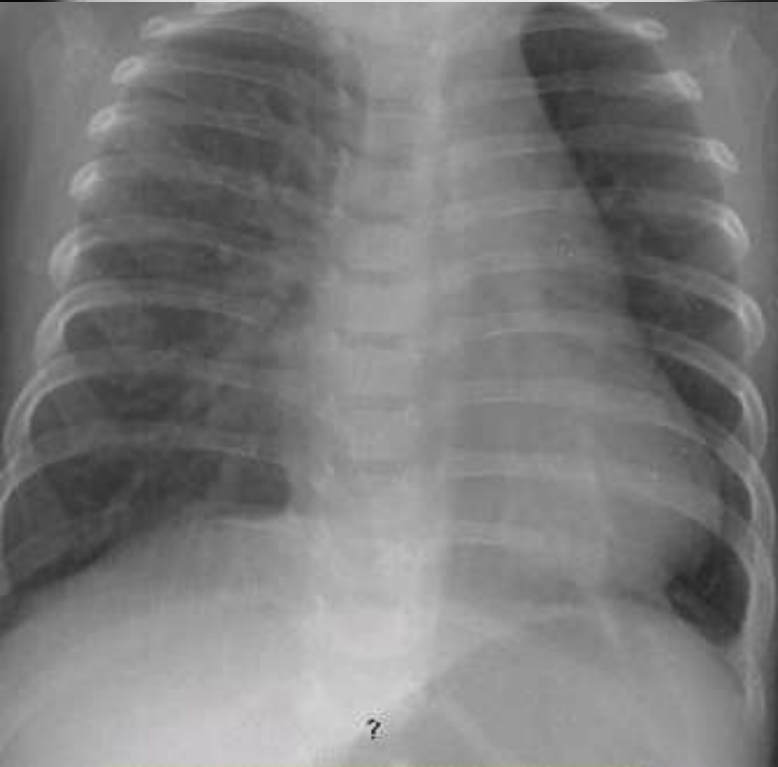
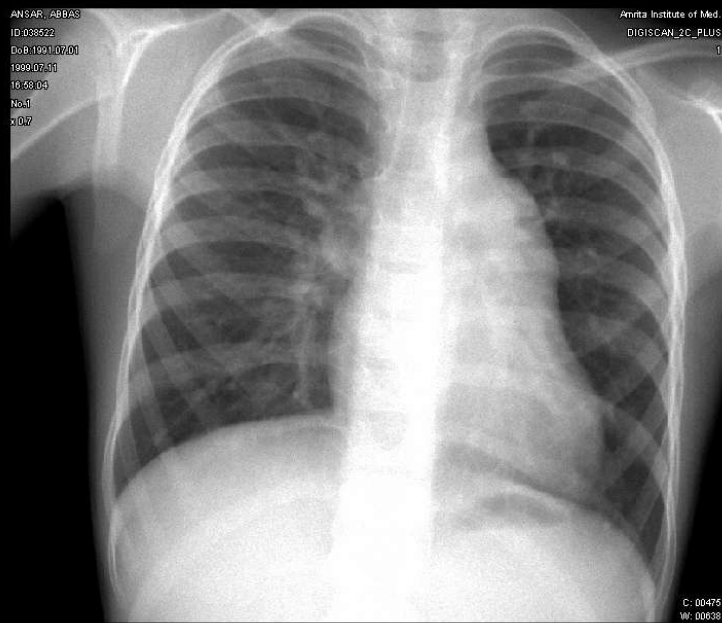
Clinical Evaluation

- Age
- Presence of Down's syndrome
- Born at high altitude
- Unilateral pulmonary artery stenosis/absence



X-ray chest

- Normal sized heart
- Large central PAs
- Presence of peripheral pruning



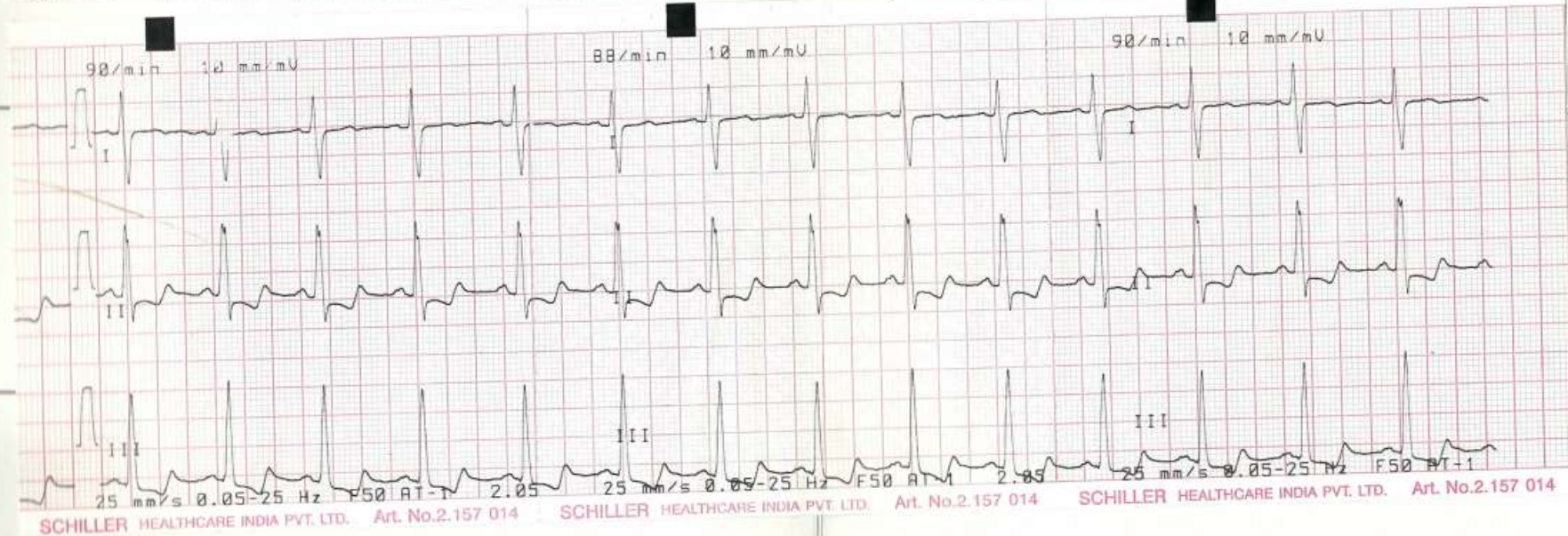
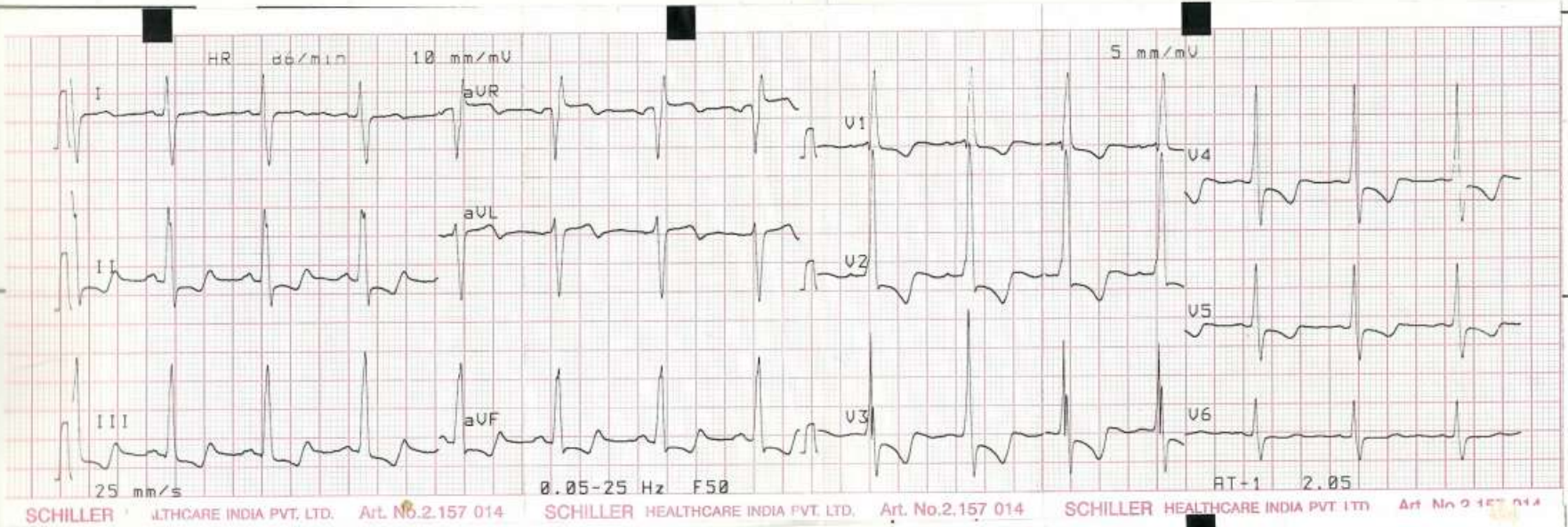
ECG

- Right axis deviation
- RVH
- Absence of LV forces

Rashmi Parmar

04/08/10

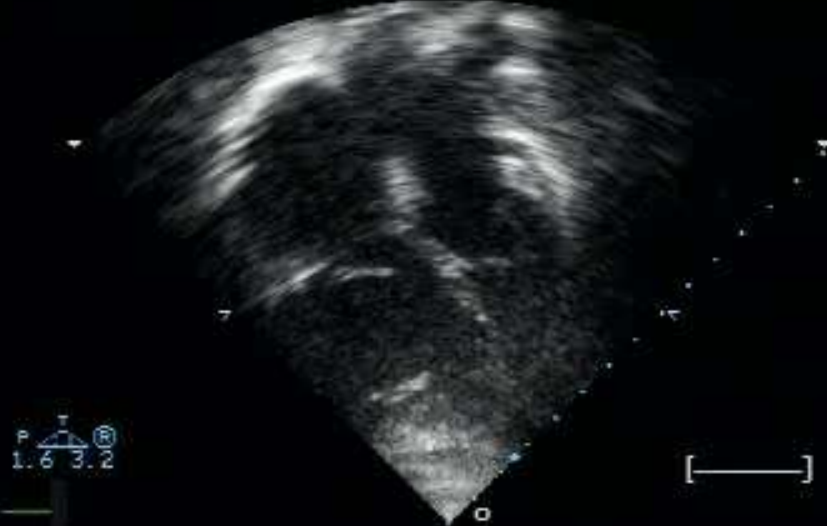
"Please obtain ph
copy of this ECG
record fades with



2DE/CD

- RA and RV are pressure overloaded
- PA pressure is systemic or more
- Flow becomes bidirectional
- TR and PR develop
- Estimates of PA systolic and mean pressure

MI: 1.6 53 PRACHI GLENMARK CARDIAC
 10 JAN 11 16:12:58 ZZY/F CENTRE
 0/0/C/H5 14CM DR B V DALVI Adult
 GAIN 58 COMP 78



P T
 1.6 3.2

MI: 1.4 TIS: 1.1
 53
 27 MAR 08
 08:55:17
 0/0/C/H5/A
 GLENMARK CARDIAC
 CENTRE
 Adult
 SAIRABANU
 16Y/F

GAIN 68
 COMP 74

14CM

P T
 1.6 3.2



2.5MHZ
 66
 66
 66

MI: 1.6
 53
 04 AUG 10
 16:34:13
 0/0/C/H5
 GLENMARK CARDIAC
 CENTRE
 Adult
 RASHMI
 30Y/F
 DR B V DALVI

GAIN 58
 COMP 78

15CM
 64HZ

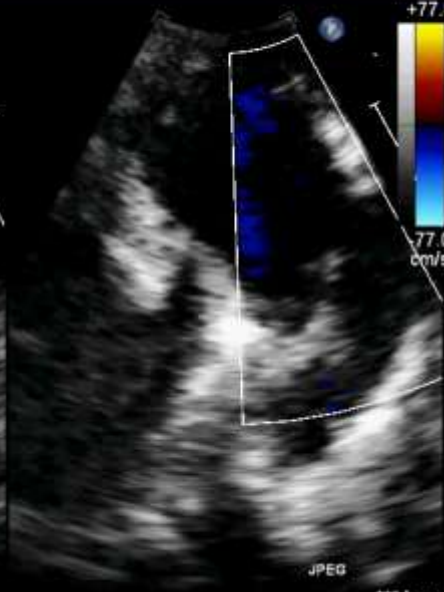
P T
 1.6 3.2



PHILIPS HAMDAN 4Y/M 05/28/2013 12:39:41PM TIS1.4 MI 0.9
 SELF S5-1/Ped-CHD

FR 27Hz
 8.4cm

2D
 45%
 C 50
 P Low
 HGen
 CF
 68%
 2.5MHz
 WF High
 Med



M3 MM
 +77.0
 77.0
 cm/s

JPEG

*** bpm

Recommendation for Cardiac Cath

CLASS I

- Cardiac catheterization to assess the operability of adults with intra/extracardiac shunt and PAH (*Level of Evidence: C*)

Cardiac Catheterization – Is it a Gold Standard?

- O₂ consumption: **ASSUMED**
- AV Oxygen difference: Dissolved oxygen is **ASSUMED** to be zero. Not true for patient breathing O₂
- Mixed venous blood is **ASSUMED** to be in various combinations of SVC and IVC
- Poiseuille-Hagen equation for PVR **ASSUMES**
 - **Steady state fluid**
 - **Newtonian fluid**
 - **Rigid system**

Sources of error

- Recording pressures: Balancing, zeroing, transducer frequency response
- PO₂ used to calculate SaO₂ rather than direct measurement of SaO₂

Cath Numbers

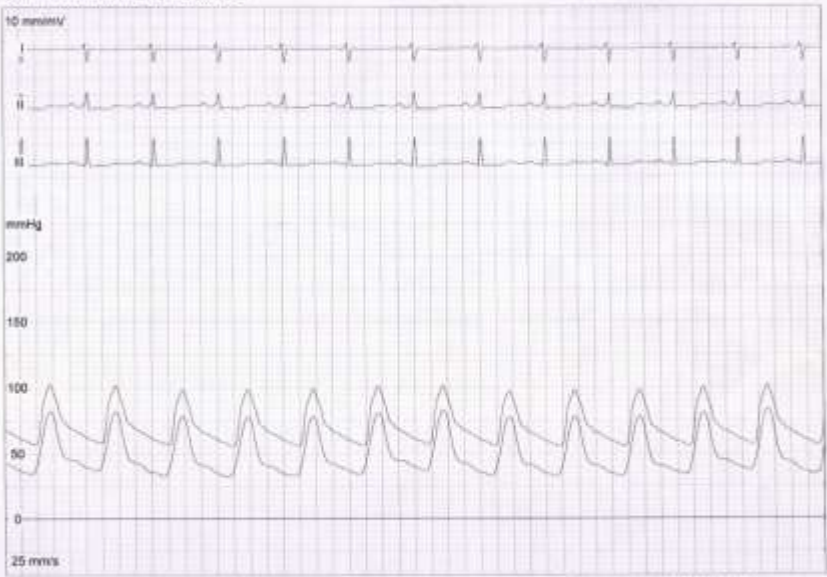
- PVR estimation on room air, with 100% O₂ and with NO
 - PVRI > 8 Wood units. m²
 - PVR/SVR > 0.66
- Balloon occlusion on catheterization table :
 - < 25% drop in PAP (ASD)
 - No fall or increase (PDA)

BASELINE

PA 70/39/52

BALABHAI NANAVATI HOSPITAL, MUMBAI

Version: WPC0000XP - HEMO V0.32



Directory: ASD1571 Patient: MRS JAYSHREE/D R V DALVI / / Comment:

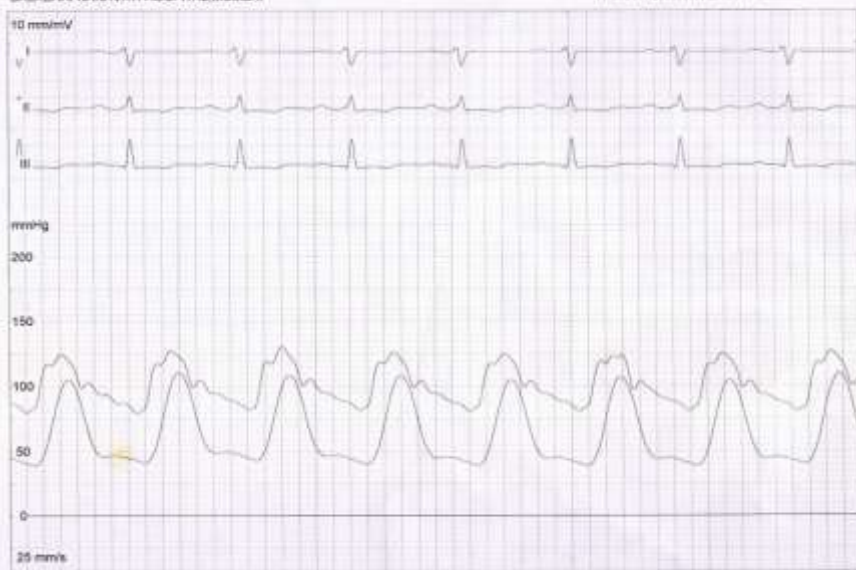
Realtime printed on: 19-08-2011 10:09:05

ART 130/87

post Op PA 109/40/61

BALABHAI NANAVATI HOSPITAL, MUMBAI

Version: WPC0000XP - HEMO V0.32



Directory: ASD1571 Patient: MRS JAYSHREE/D R V DALVI / / Comment:

Realtime printed on: 19-08-2011 10:37:37

post-occlusive Time-20 min

ART 140/90/112
PA - 88/39/54

BALABHAI NANAVATI HOSPITAL, MUMBAI

Version: WPC0000XP - HEMO V0.32



Directory: ASD1571 Patient: MRS JAYSHREE/D R V DALVI / / Comment:

Realtime printed on: 19-08-2011 10:14:04

MISS. RAJPUT, REENA, V. 14/YRS
F
19514-B-16057

DR. SV. SATHE/DR. B. DALVI/CNM
RUBY HALL CLINIC
20050615
111650

Lao - 89 deg ,Caud - 0 deg
Zoom: 99%



Run 1 Of 16
Frame 4 Of 21

MISS. RAJPUT, REENA, V. 14/YRS
F
19514-B-16057

DR. SV. SATHE/DR. B. DALVI/CNM
RUBY HALL CLINIC
20050615
111650

Rao - 31 deg ,Caud - 0 deg
Zoom: 99%



Run 3 Of 16
Frame 14 Of 60

RUBY HALL CLINIC

Version WIN2000 : HEMO V0.21



Directory Patient / /
Comment

Offline printed on : 15-06-2005 , 13:16:11

Conclusion

- It is difficult to judge with one single parameter whether it is too late
- One needs to take a holistic view and multidimensional approach
- Counseling the family appropriately is very essential

In Jurisprudence

“Justice delayed

is

justice denied”

“Treatment delayed
is
treatment denied”