POST GRADUATE UPDATE
IN
CLINICAL CARDIOLOGY

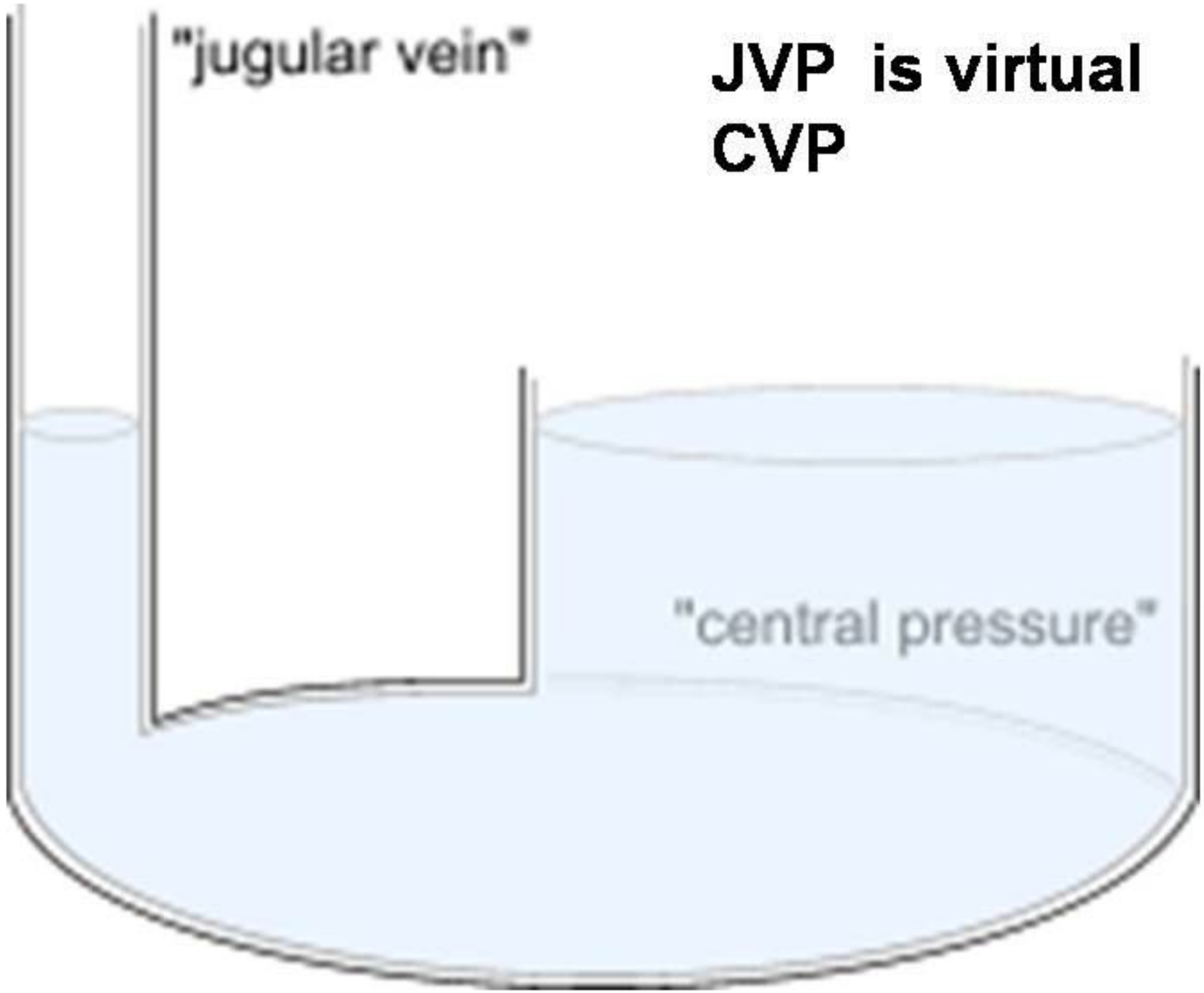
9th - 11th March 2012

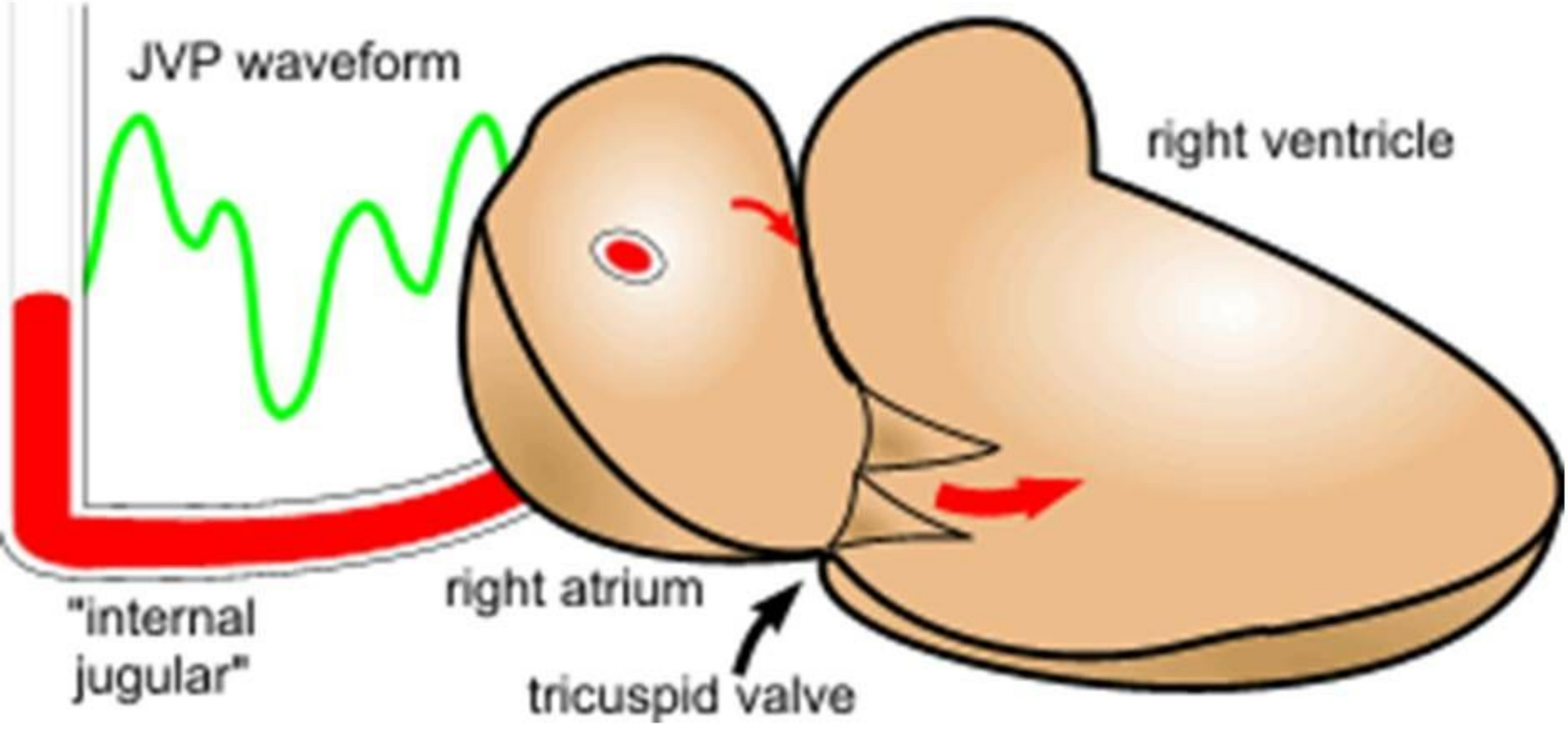
Venue:

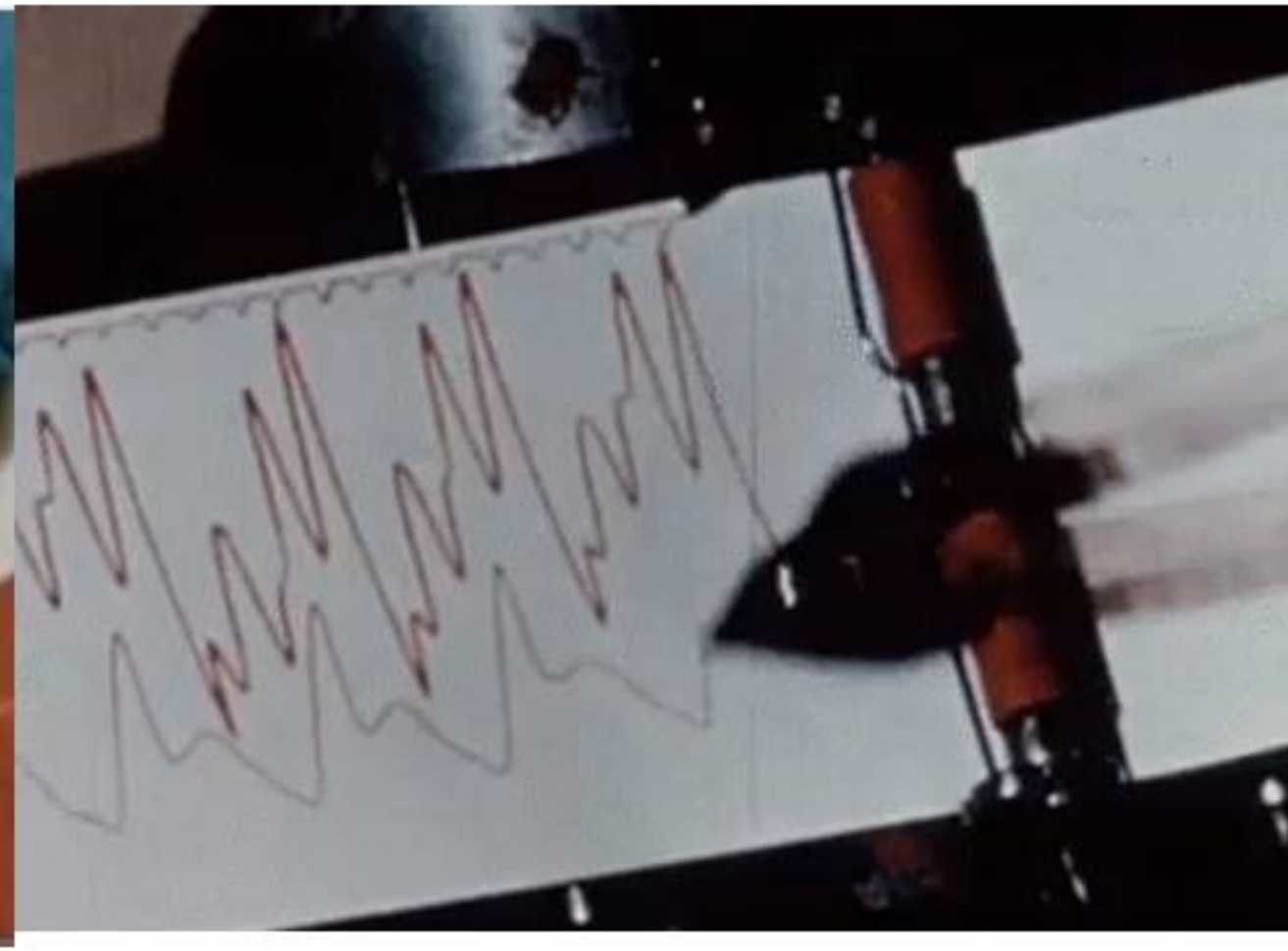
TICEL Bio-Park
Taramani, Chennai

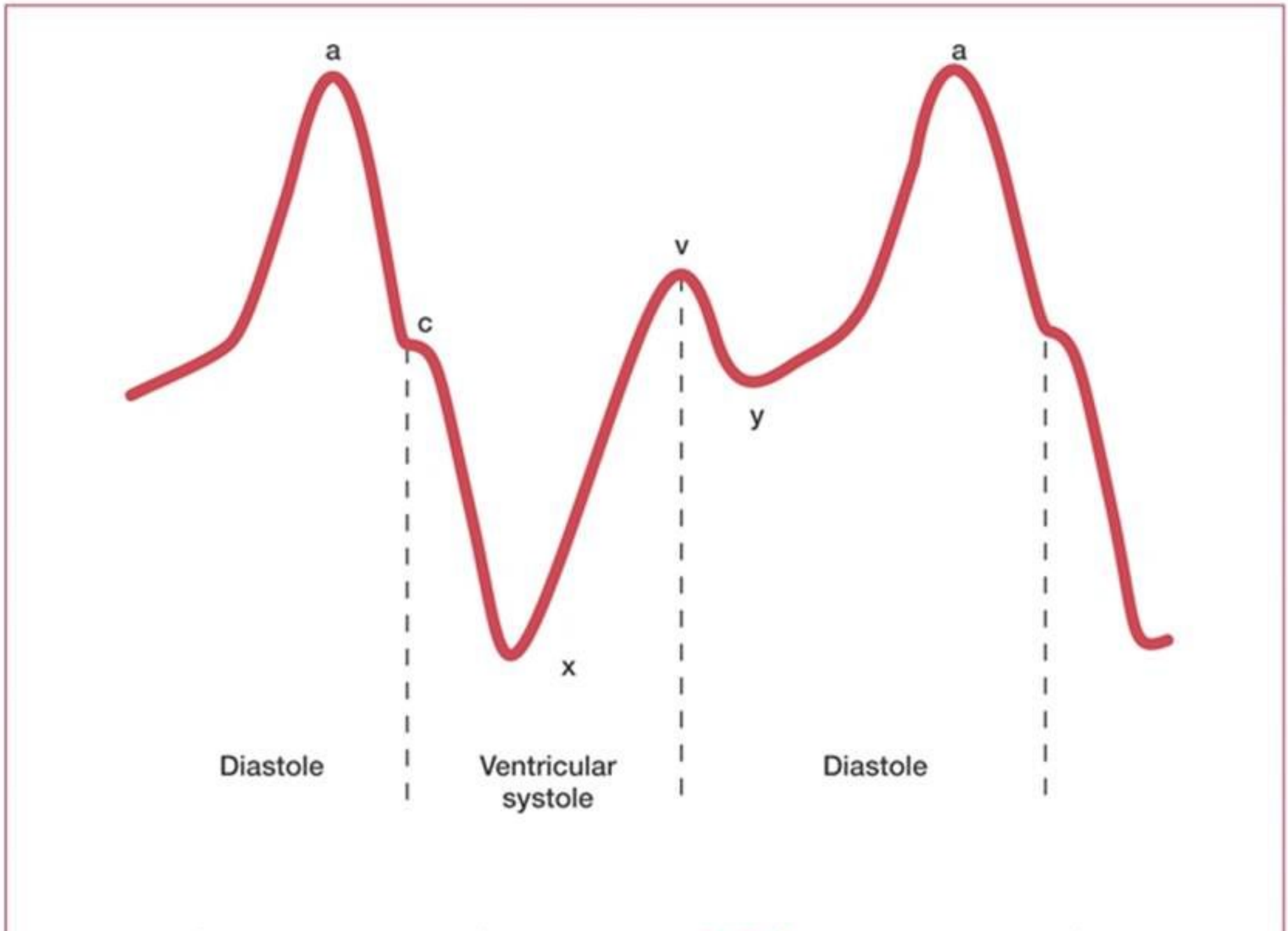
JVP in Congenital heart disease

S.Venkatesan MD DM(cardiology)
Professor of Medicine
Madras medical college
Chennai


"jugular vein"
JVP is virtual
CVP
"central pressure"


JVP waveform
right ventricle
"internal jugular"
right atrium
tricuspid valve




a
c
v
a
y
x
Diastole
Ventricular systole
Diastole

JVP methods in measuring

Right Internal jugular – Best

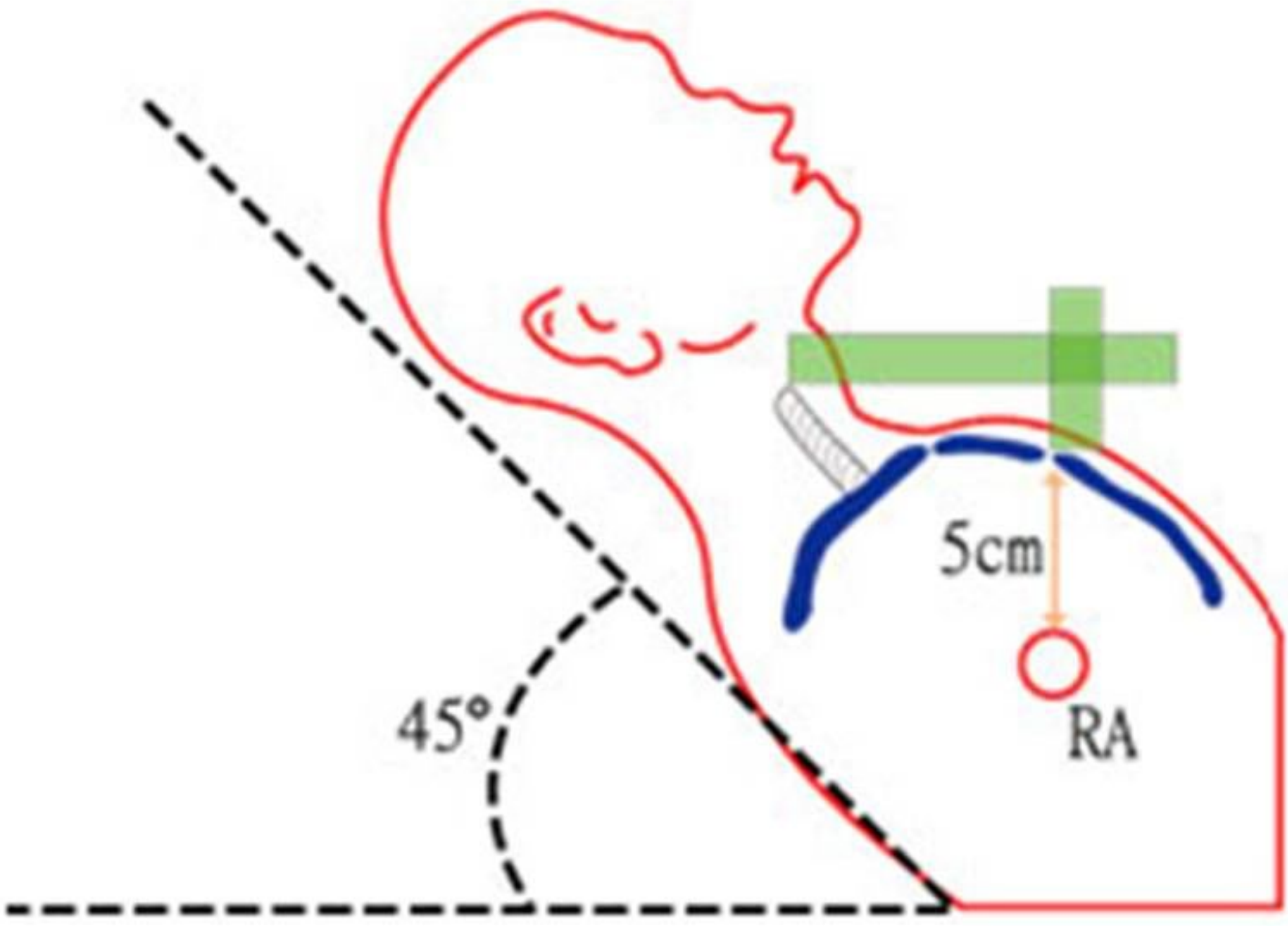
Supine posture

The angle is irrelevant as long as the top of the venous column is clearly seen.

It is the transmitted pulsations to the soft tissues and skin of neck

Highest point of pulsation

Vertical distance


5cm
RA
45°

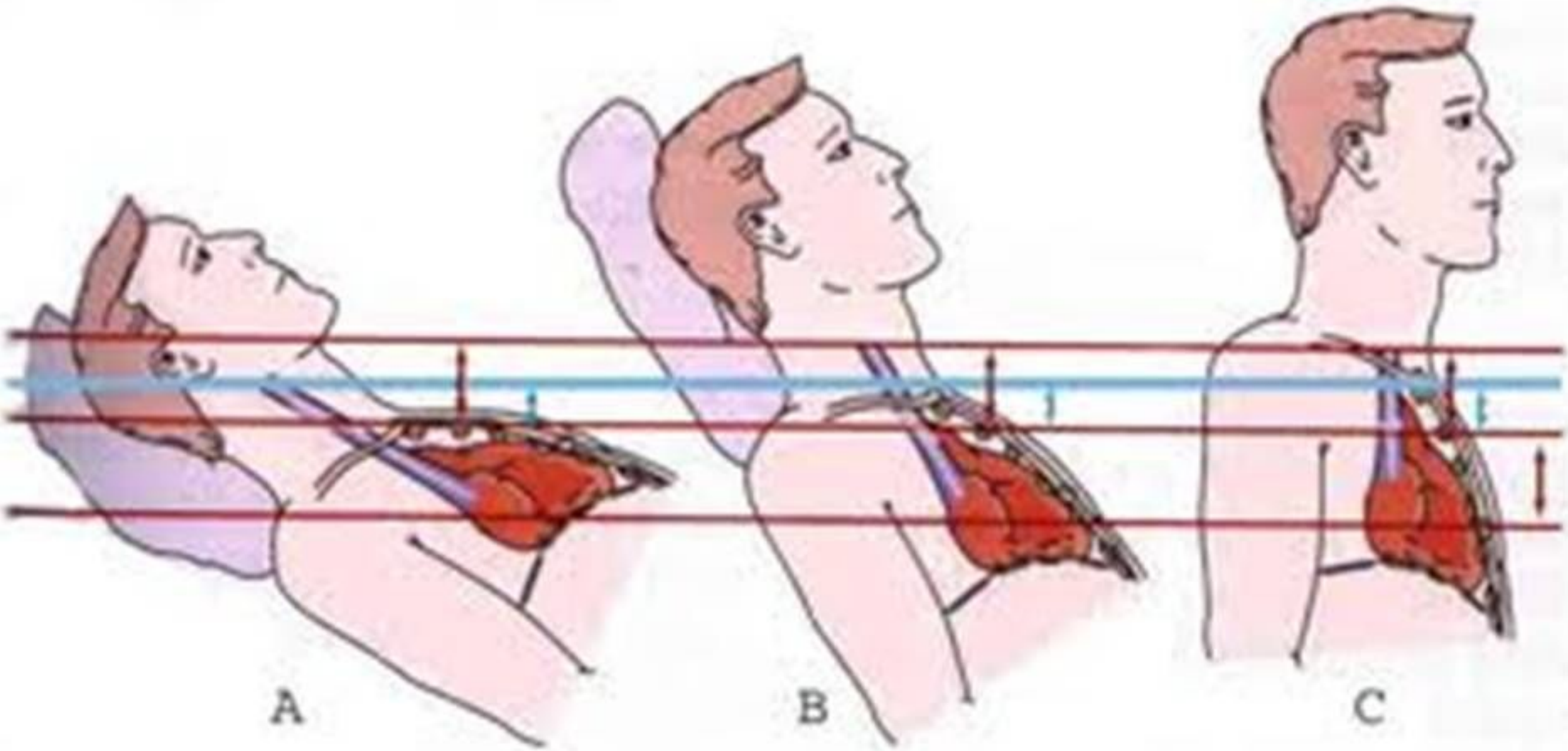
JVP not visible ?

Either too high or too low.

The position of the neck relative to the right atrium should be elevated or lowered accordingly.

In patients with extremely high central venous pressure, the waveform may be best observed with the patient sitting upright at 90°.

Ear lobe pulsation- Venous confluence


A
B
C

Certain rules

Usually descends are prominent

Among the positive wave **a** is prominent than **v**

JVP is not palpable (Except in hypertensive TRs)

External jugulars can be used for identifying pulsations
But not useful in arriving at mean pressure

JVP reflects RA or RV pressure or both ?

JVP reflects RA pressure throughout the cardiac cycle

Since RA and RV act as single chamber during diastole JVP also reflects RV pressure during diastole

If there is Tricuspid regurgitation JVP reflect RV Systolic function as well

“a” vs “v” wave

	A wave	V wave
Mechanism	**Active contractile**	**Passive filling**
Timing	**Presystole (S1)**	**End systole (S2)**
Height	**Tall**	**less tall**
Duration	**Brief**	**Sustained**
Morphology	**Flicker ,**	**Blunted**
Response To exertion	**Prominence noted**	**Not significant**

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*** Pathological situation these differences do not exist**

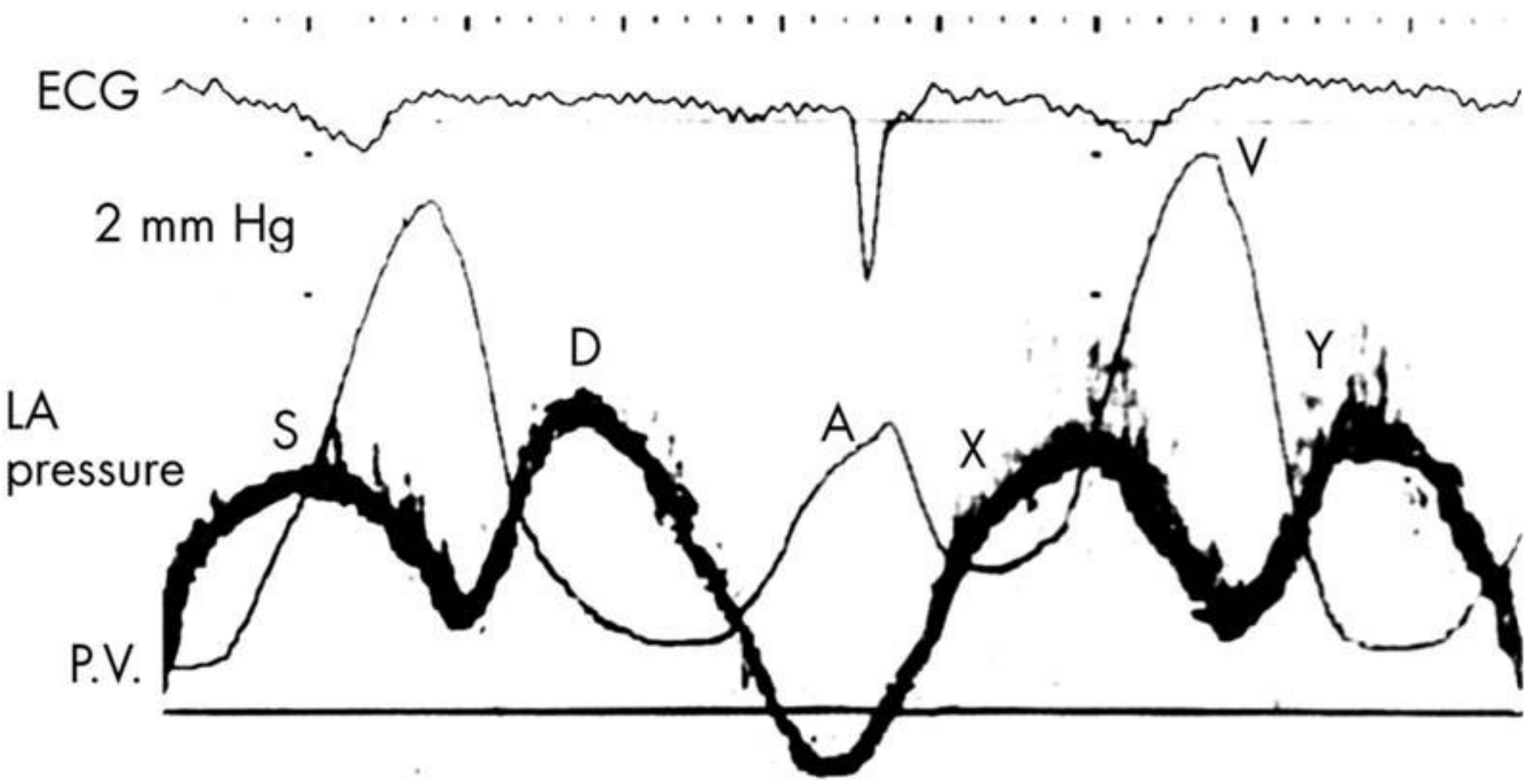
Mean pressure elevation & Wave forms

Prominent wave form alone without mean pressure elevaton indicate reduced compliance (VPS)

Elevated mean pressure and prominent waves means right heart failure

Both elevation and prominent wave forms indicate the pericardial /Restrictive physiology

Differential pressure profile of right and left atrium



Normal LA pressure curve with pulmonary venous tracing

Why LA and RA pressure forms vary ?

The left atrium is ***decompressed*** by relatively stiff pulmonary veins with a mean pressure of 8 mm hg

While the low pressure vena cava of RA ***dampen the right atrial v waves***

Left atrium is relatively **thick ,stiff , small** , less compliant chamber .

Right atrial volume is ***large*** (Can accommodate more volume without raising its pressure)

* Less complaint LA due to adjacent systemic ventricle

** *Thickness of RA -2mm, LA -3mm*

Determinants of a wave amplitude

- RA pressure
- RA/RV compliance
- RA –exit blocks
- RVOT blocks
- Integrity of IAS and IVS

Integrity of IAS and IVS

Tall a wave occur in

Valvular PS with Intact IVS

Tricuspid Atresia /Stenosis

These tall a wave persist even if there is a PFO

Tall a wave virtually rule out a large VSD

VSD never allows RV pressure to go beyond systemic

(ASD /PFO is a poor de -compressor . While large VSD effective de -compressor of RV)

-

Tall “v” waves

Non TR v waves

Increased RA *filling (Various sources - include Simple volume overload)*

Left atrialisation in ASD

MR with ASD

Gerbode VSD

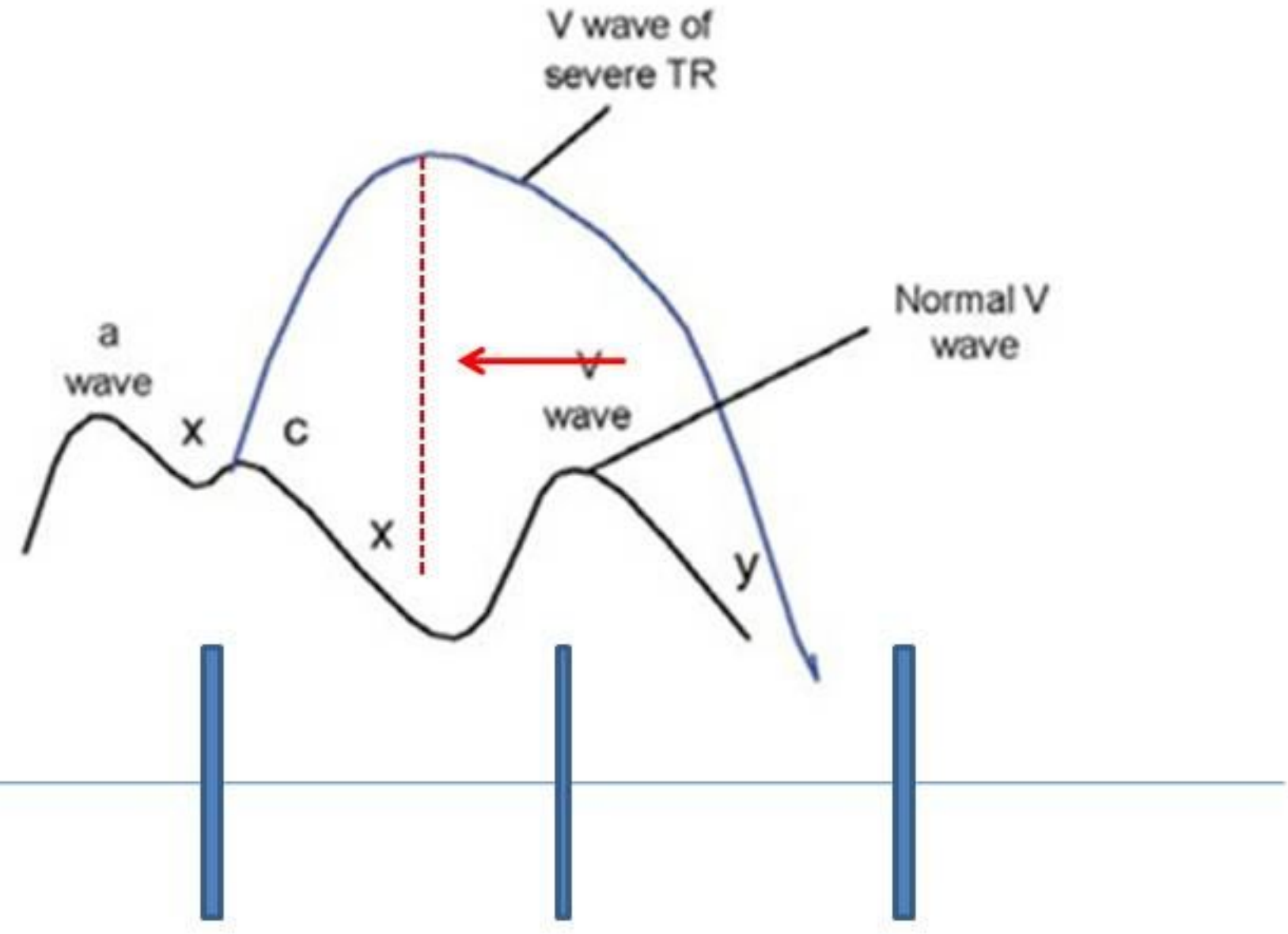
RSOV

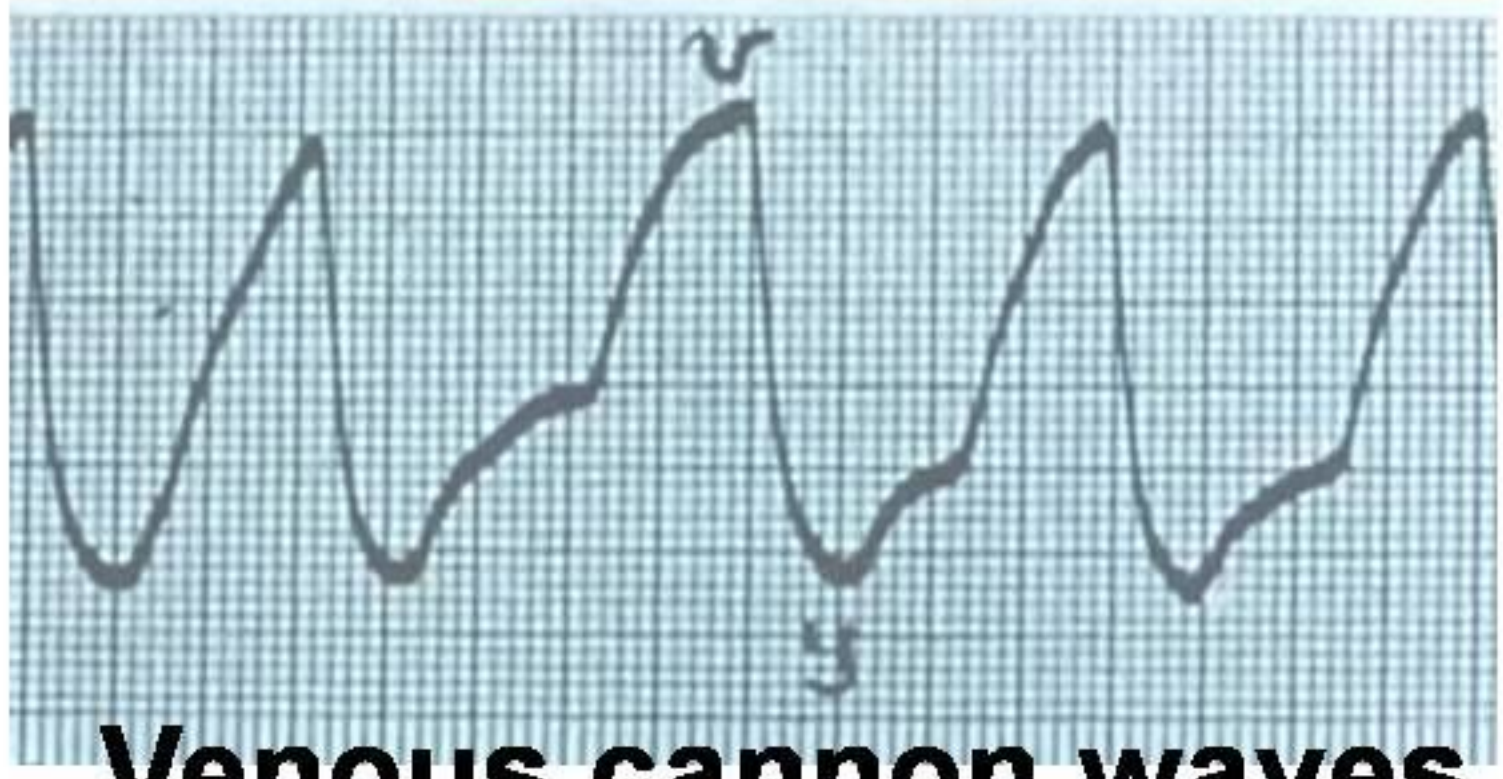
Coronary AV fistula into RA

V waves due to TR (Systolic CV waves)

RA filled by RV

Timing of organic V waves





Venous cannon waves

JVP clinical utility in congenital heart disease

Utility of JVP

Right heart disease

Left Heart disease

Less value !

JVP in

New born

Infant

Children

Adult

JVP in Acyanotic heart disease

- *Shunt lesions*
- *Obstructive lesions*

JVP in cyanotic heart disease

- *Eisenmenger syndrome*
- *Reduced blood flow*
- *Increased Pulmonary blood flow*

Most often JVP in CHD

Is normal or inconspicuous

s

JVP in ASD

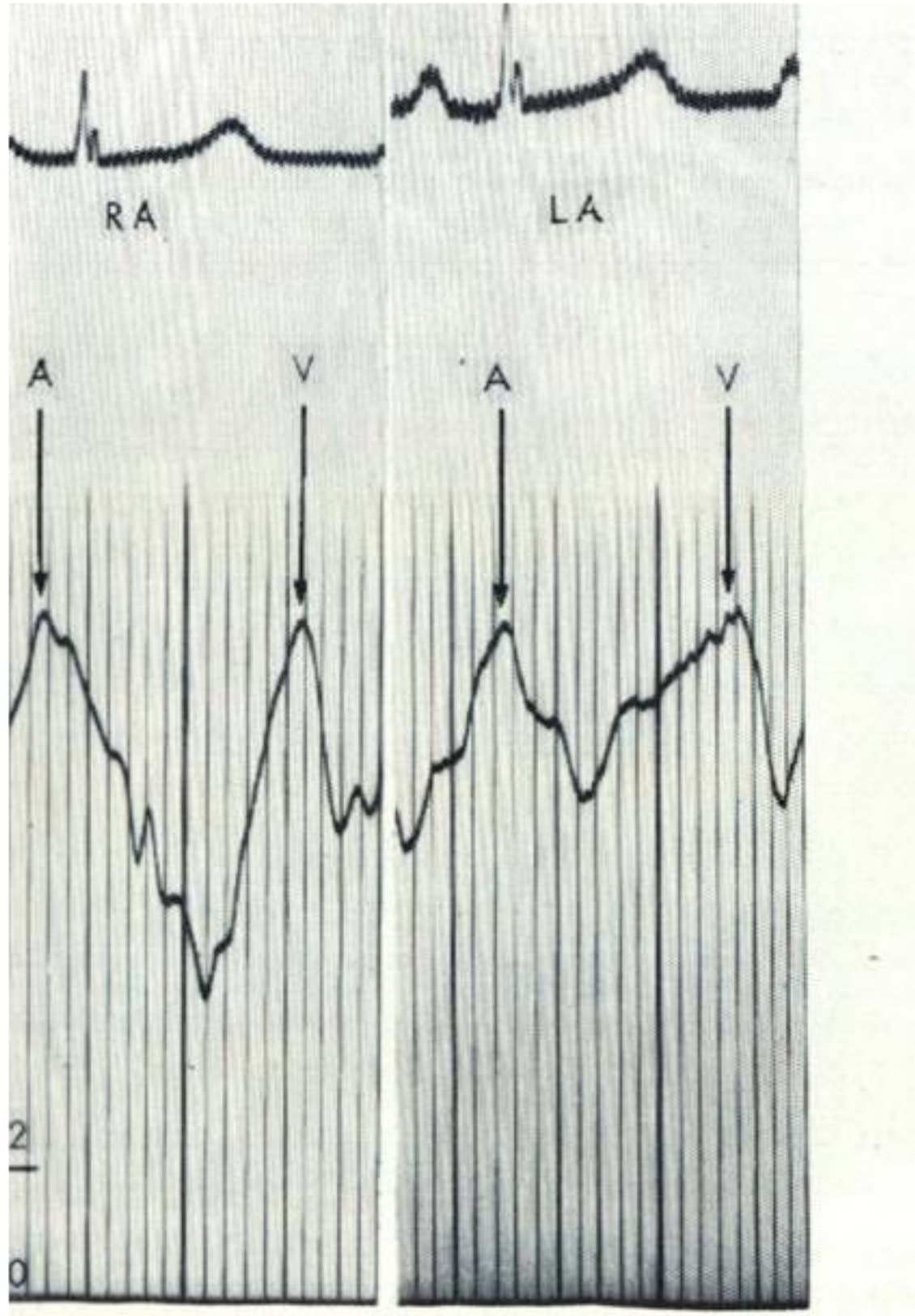
Ostium secundum

Ostium primum

Common atrium

ASD with VPS

Left Atrialisation of JVP



JVP in ASD

a and v equal

a > v

- PAH
- PS
- Lutembacher

v>a

Ostium primum

JVP in TAPVC

Similar to ASD

A and V equalize

A can be giant if ASD is restrictive

JVP

VSD

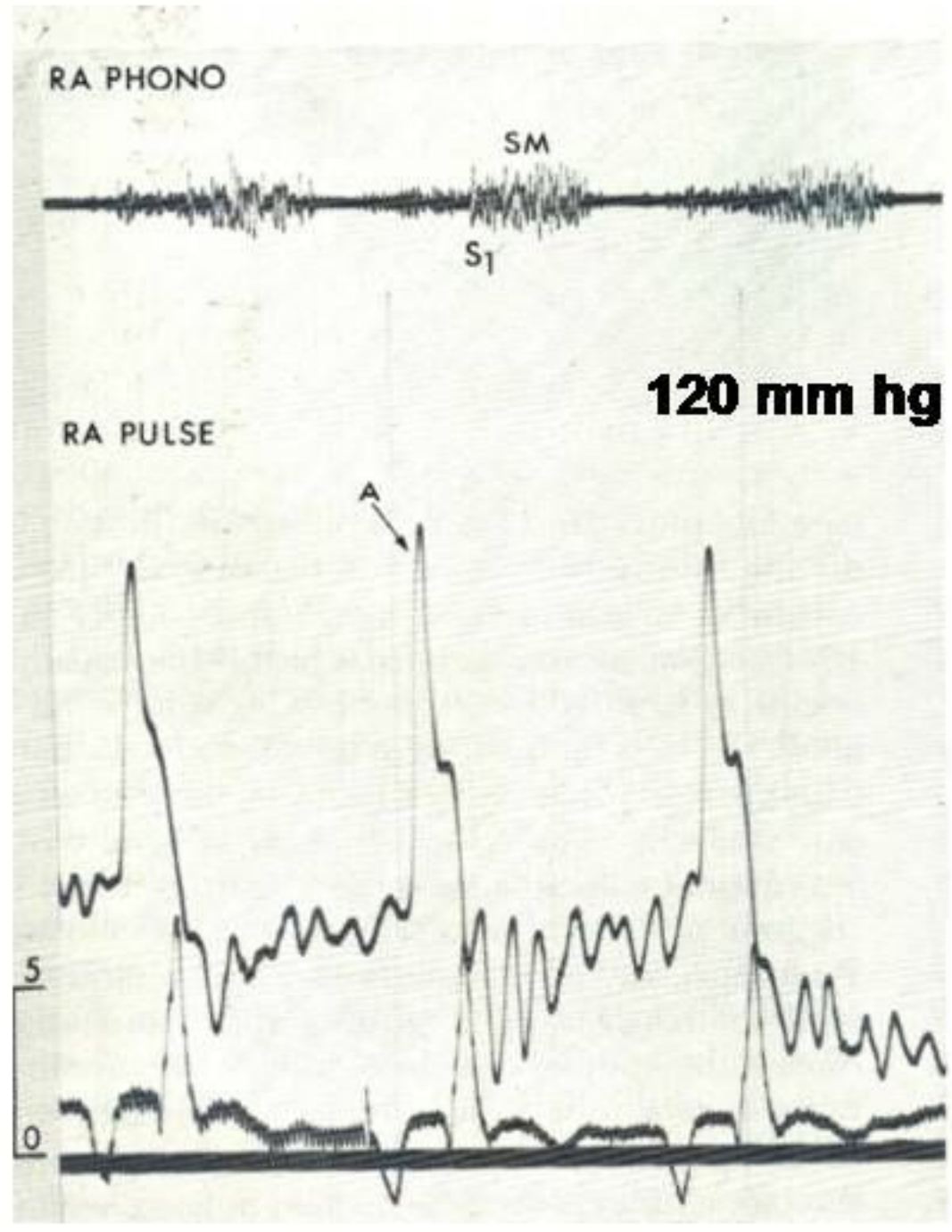
PDA

Without pulmonary hypertension not diagnostic

Valvular pulmonary stenosis

Compliance of the RV and RV Pressure that determine a wave

Onset of TR elevates V wave



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JVP in cyanotic heart disease

Eisenmenger

Fallot physiology

Eisenmenger syndrome

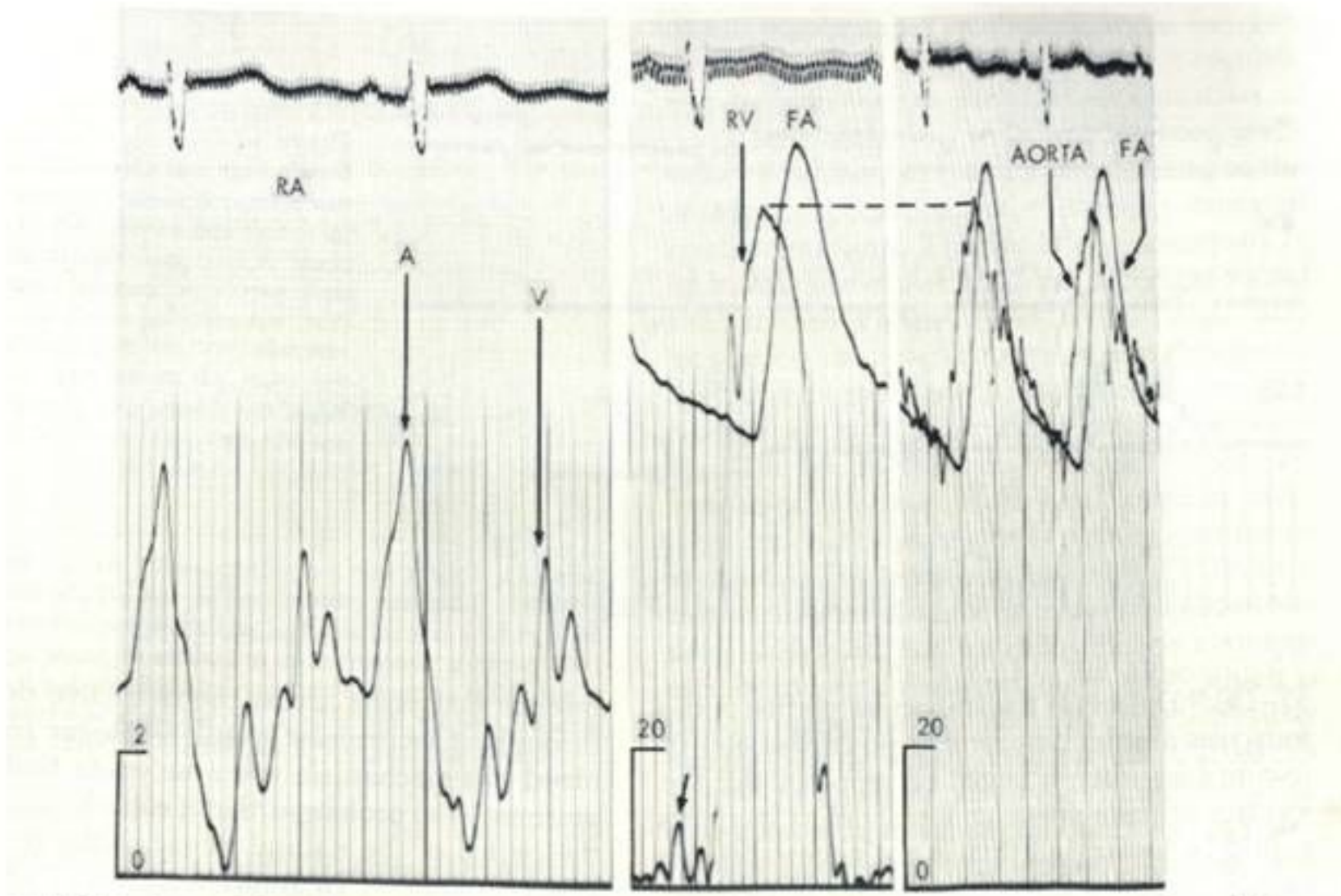
	ASD	VSD	PDA
Mean pressure	Increased	increased	increased
JVP	a + +	a -	a +
Supra systemic RV pressure	Yes	No	Can be yes

VSD RV pressure can never exceed LV pressure so a waves are not conspicuous

PDA even though supra systemic pressure can occur theoretically the RV is decompressed by the reversing ductal flow

Hence in Eisenmenger if a waves are prominent it must be ASD

Eisenmenger VSD



e 17–13. Tracings from an 11 year old male with a nonrestrictive perimembranous ventricular septal defect and Eisen-er physiology. The right atrial (RA) pressure pulse is relatively unimpressive, with an A wave that is only slightly increased. ystolic pressure is identical in the right ventricle (RV) and aorta. (FA = femoral artery.)

A large a wave in JVP

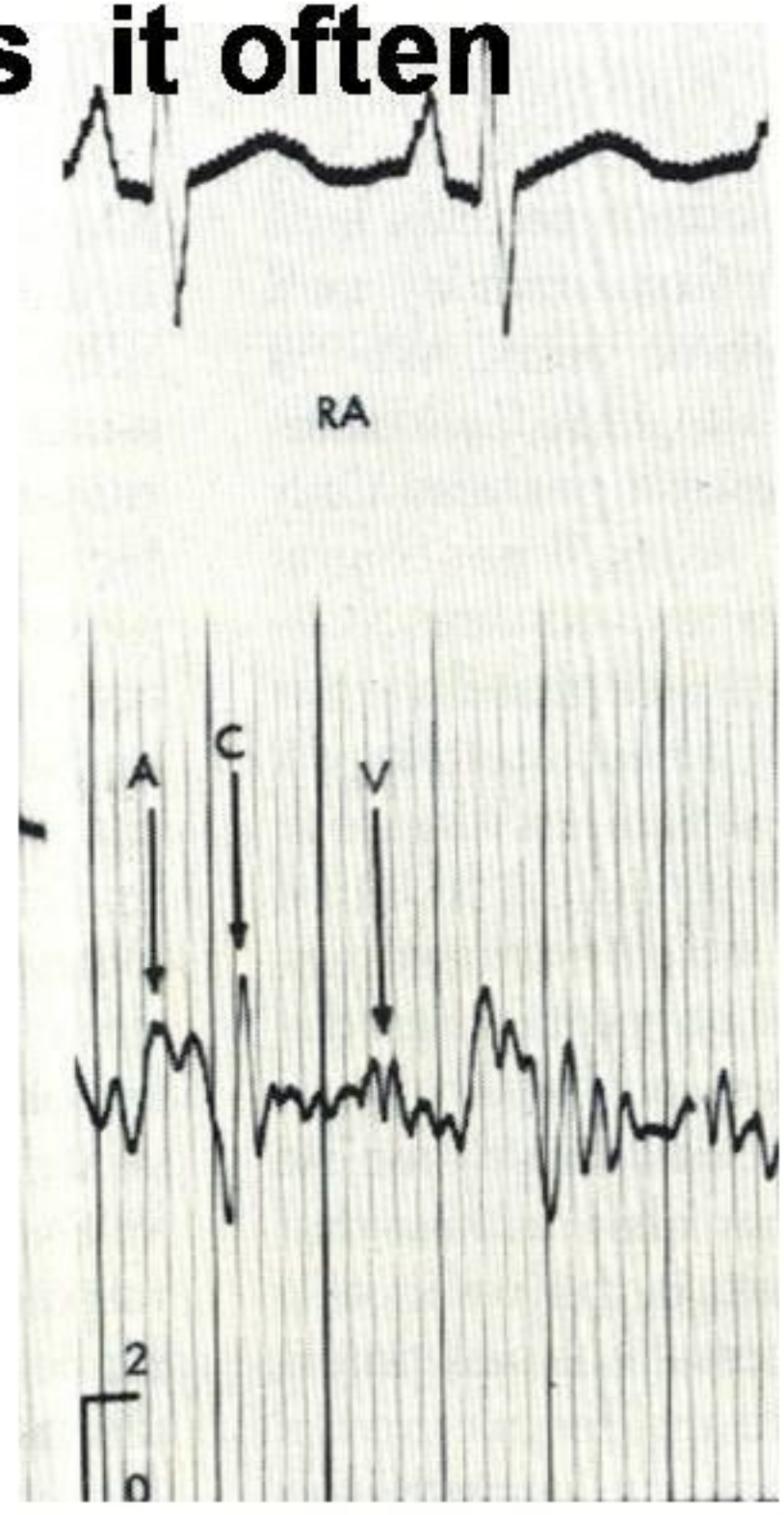
Is it RVOT obstruction or is it pulmonary hypertension ?

Pulmonary HT mean pressure is elevated

V waves will also be prominent (Mostly as TR is accompanied)

May be difficult by looking at JVP per se

JVP in TOF why is it often normal ?



RV has inherent fetal Properties

Do not require atrial assistance

RV pressure is do not exceed systemic

Abnormal JVP in TOF

Prominent "a" in TOF

DCRV /DORV

Spontaneous closure of VSD

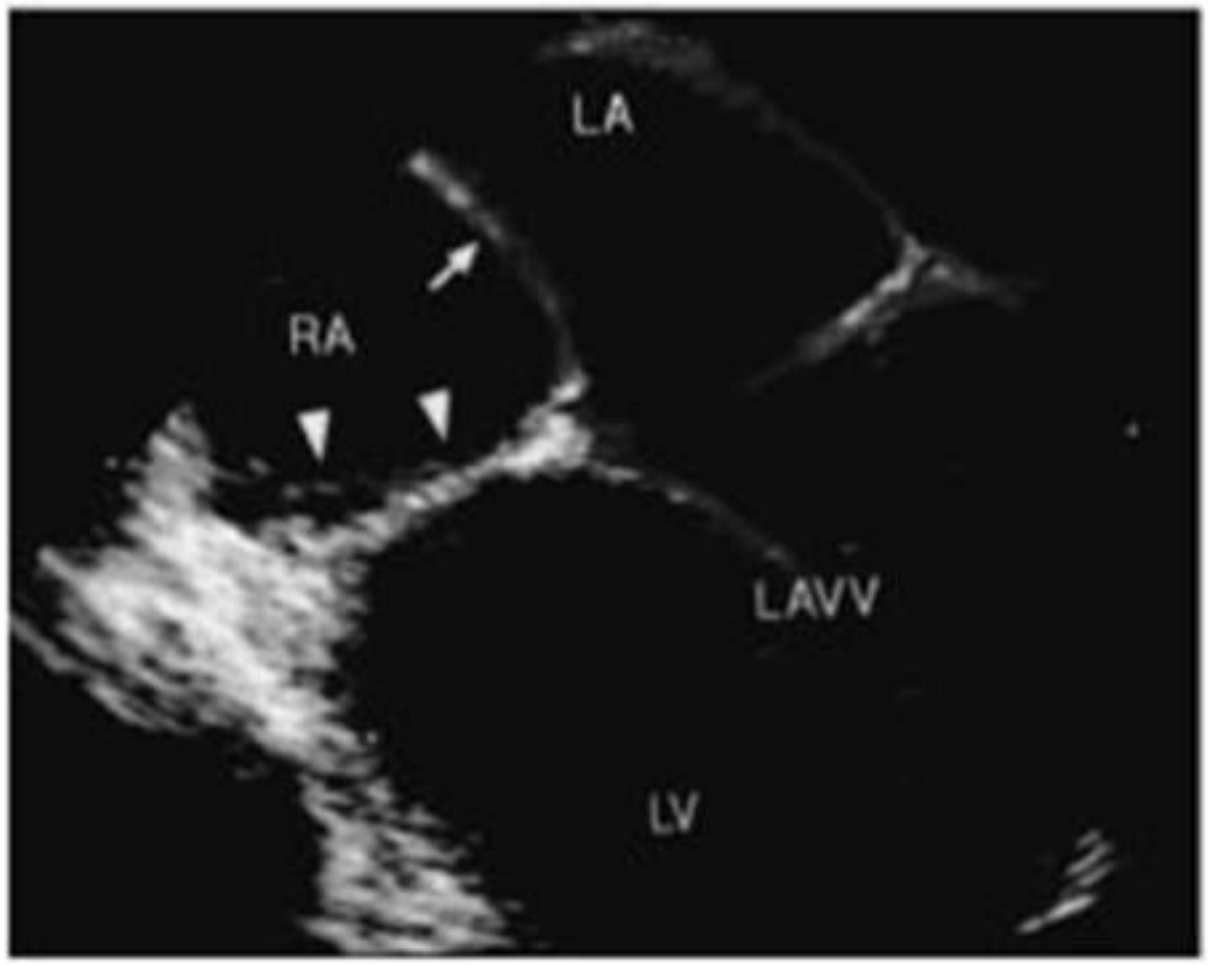
Mean pressure elevation /V waves

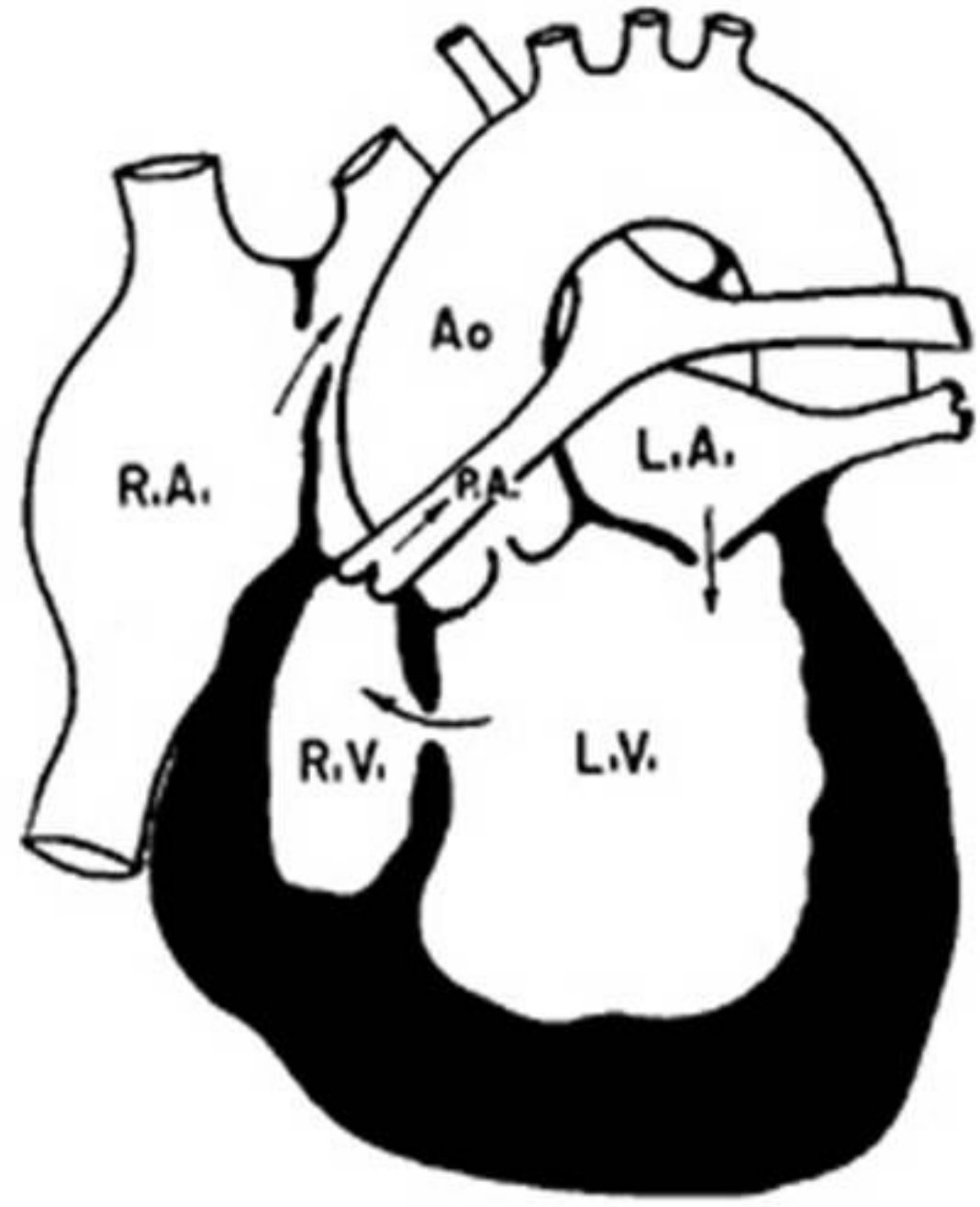
Cardiac failure

SHT (Adult TOF)

LVOT obstruction

JVP in tricuspid Atresia





JVP in tricuspid Atresia

Inter atrial communication

Restrictive — **Giant a waves**

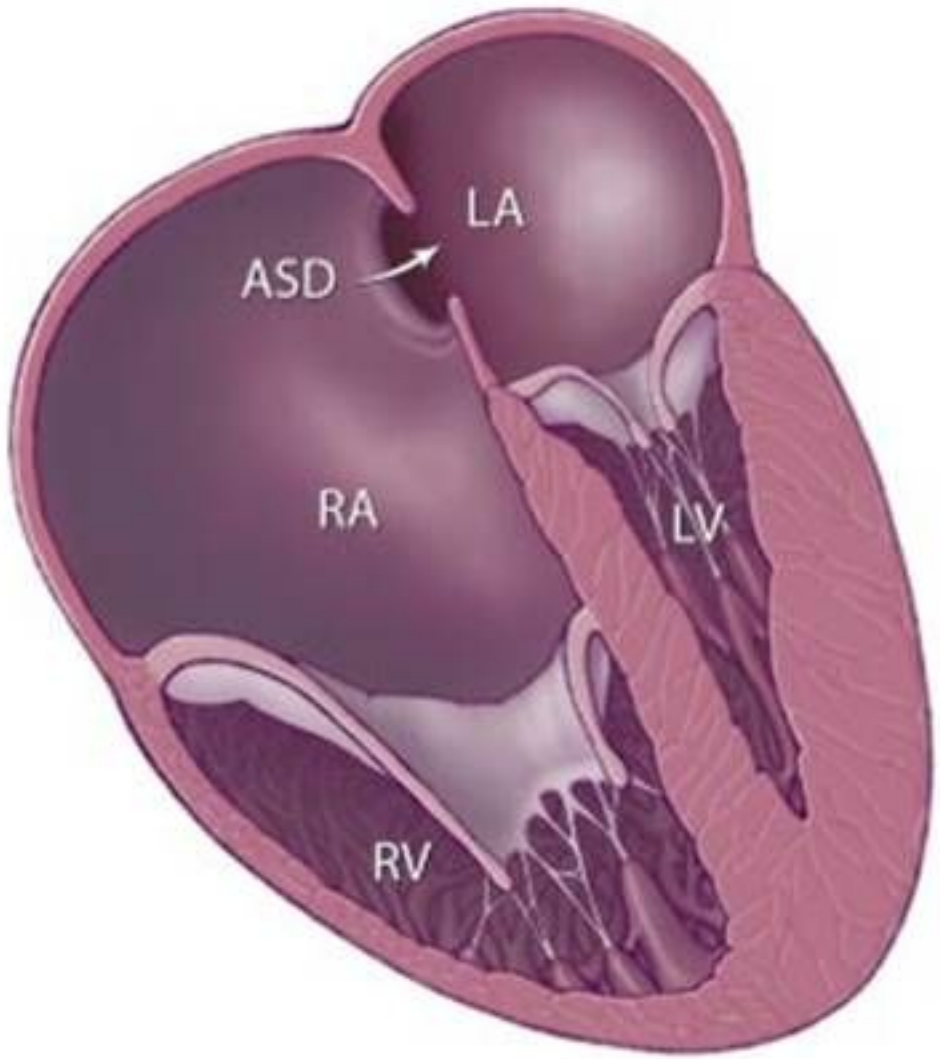
Non restrictive — **a may get dampened still tall**

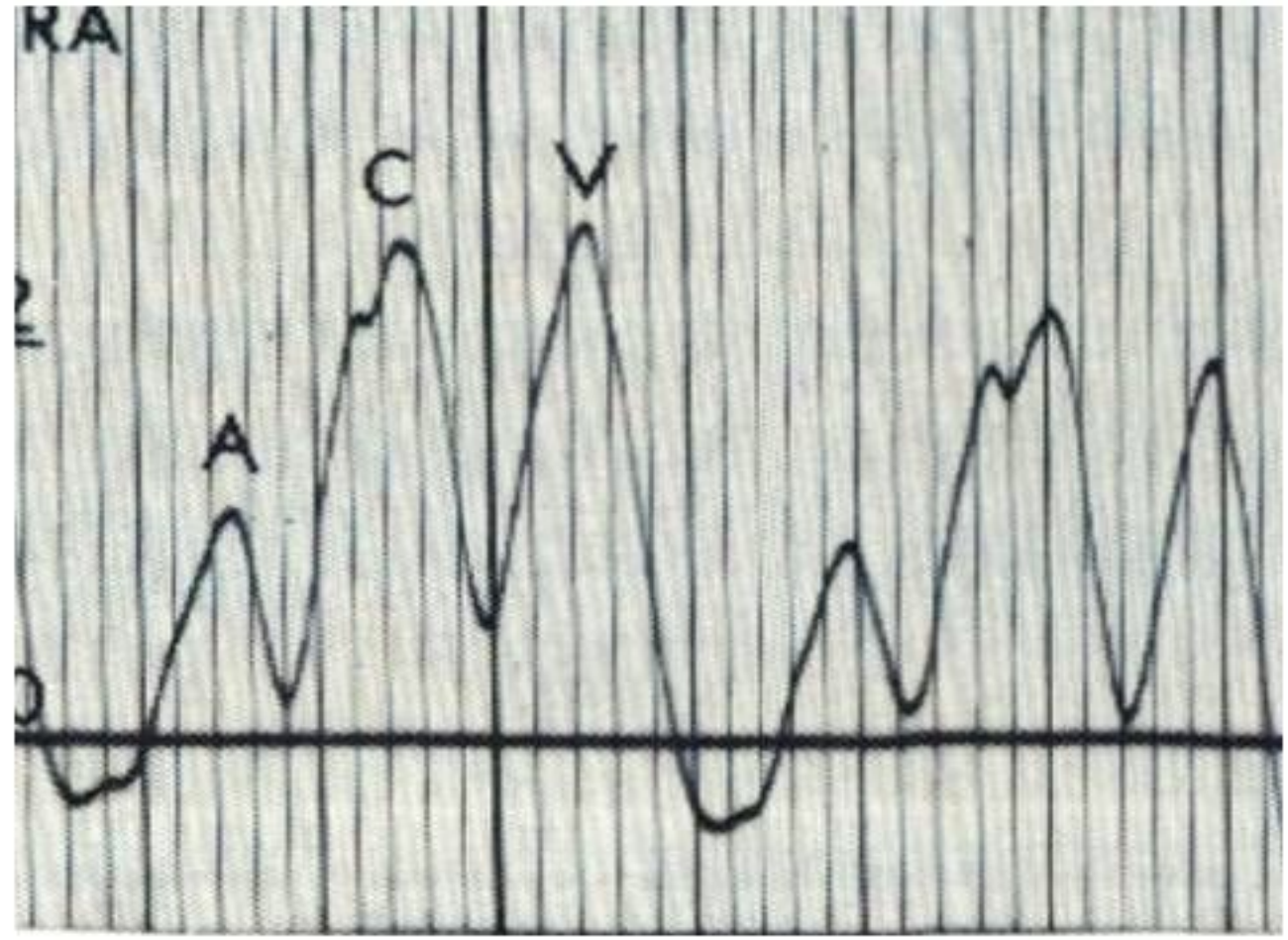
LV failure - With MR large V waves

VSD has little impact

ECG - JVP correlation : Giant A = Giant P wave

Ebstein anomaly



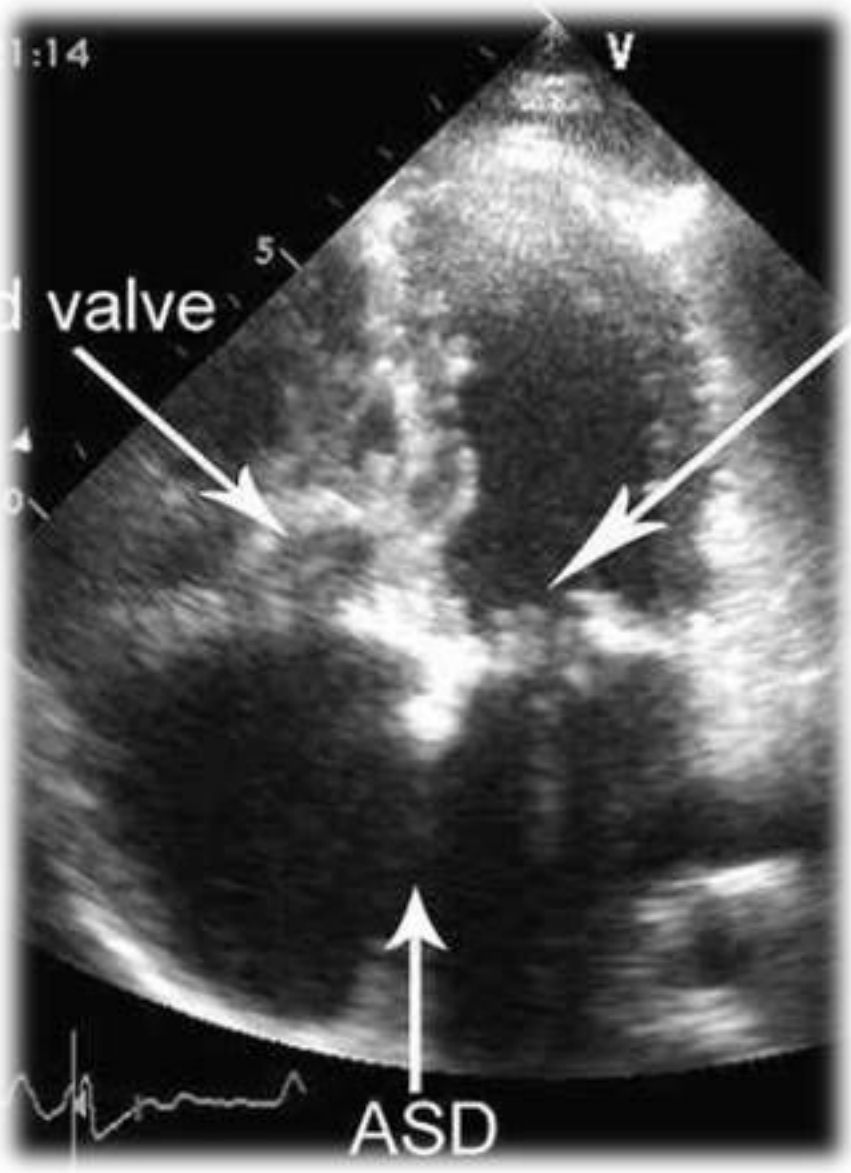


Near normal mean pressure

Diminutive a and v waves

C taller than a

JVP in Lutembacher syndrome



Mitral stenosis raises left atrial mean pressure and a waves

If there is large ASD
LA pressure is transmitted to RA

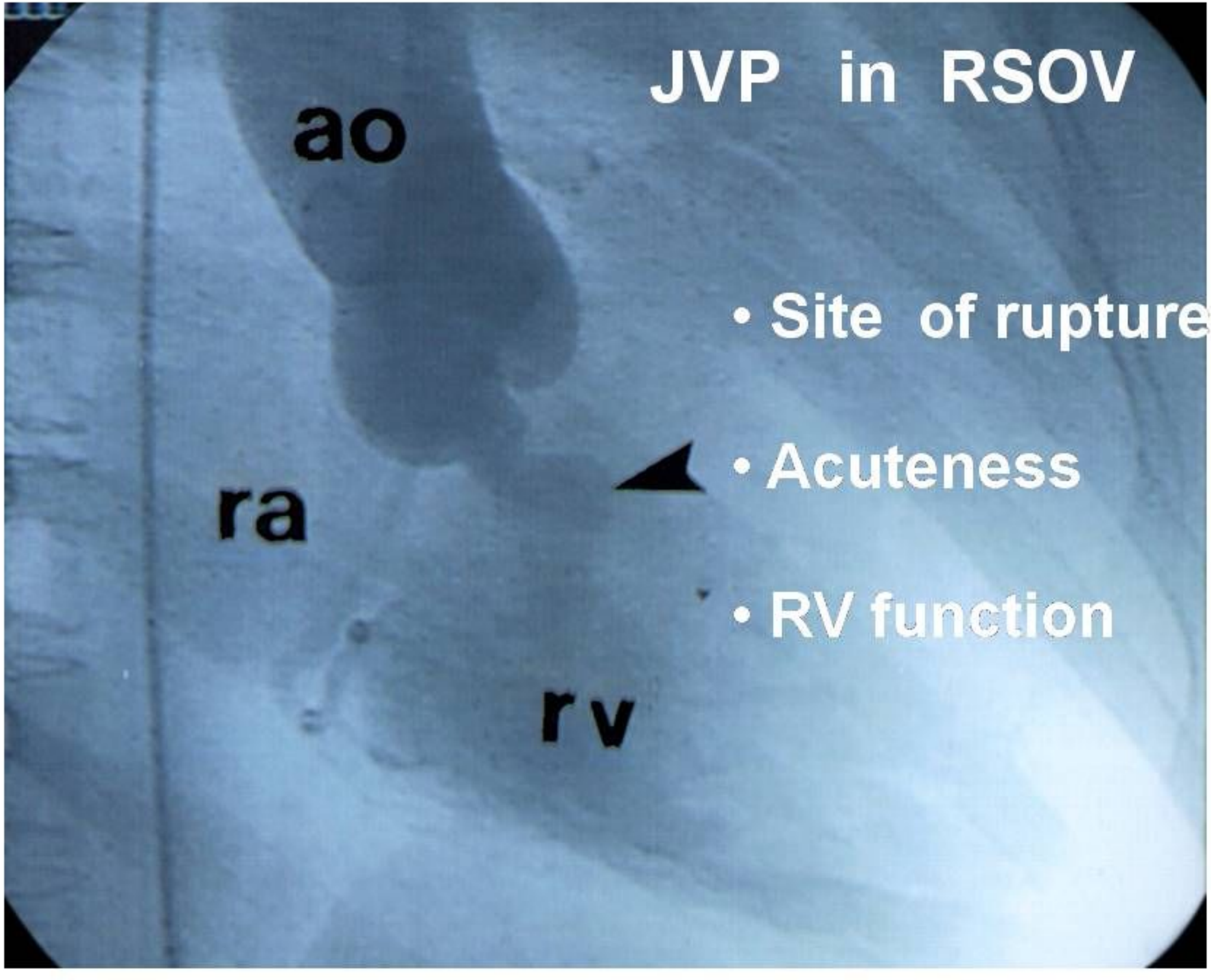
Hence prominent "a" with raised mean pressure

May indicate PHT with failure

Similarly MR will raise the RA "v" without TR

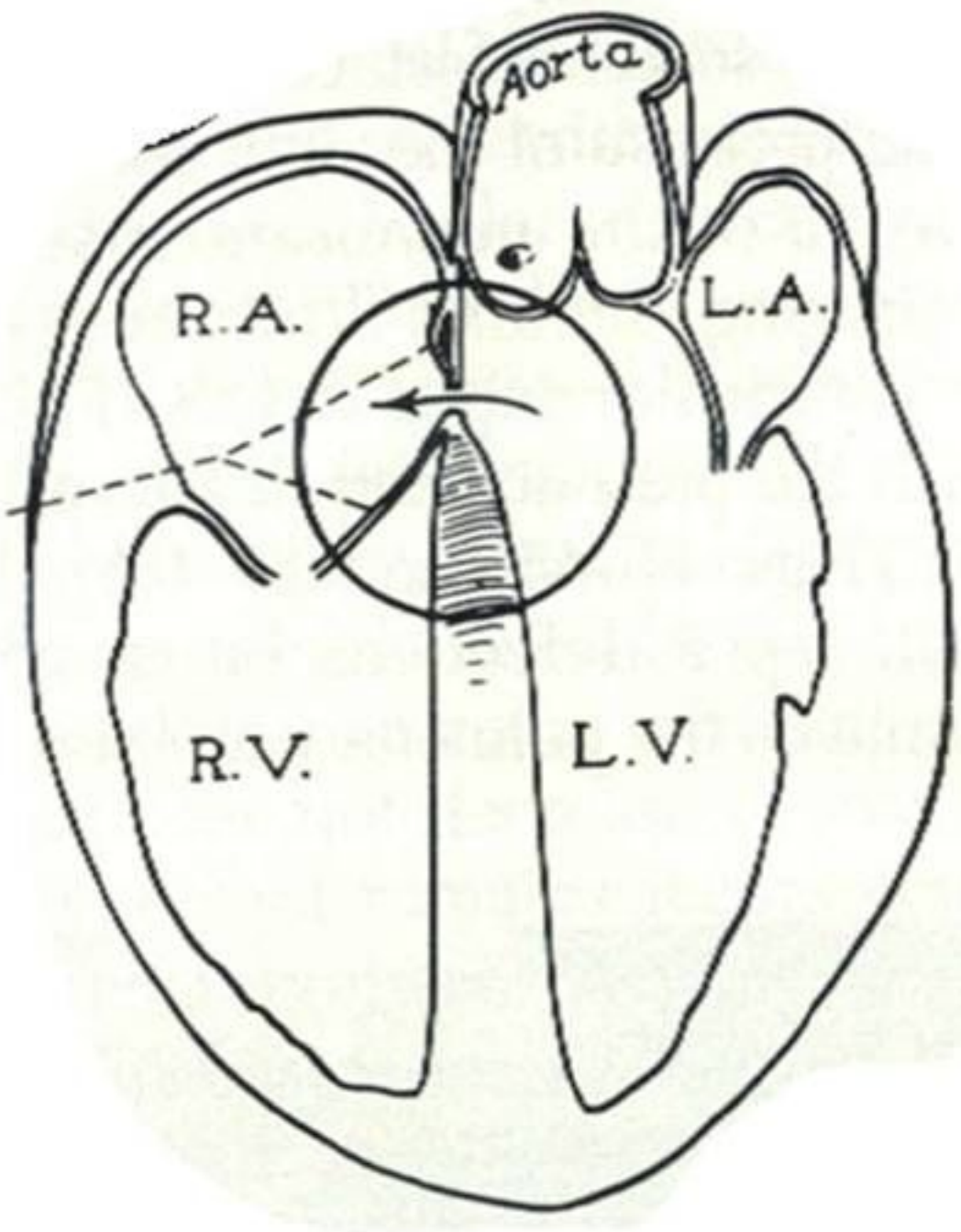
JVP in rare left to right shunts

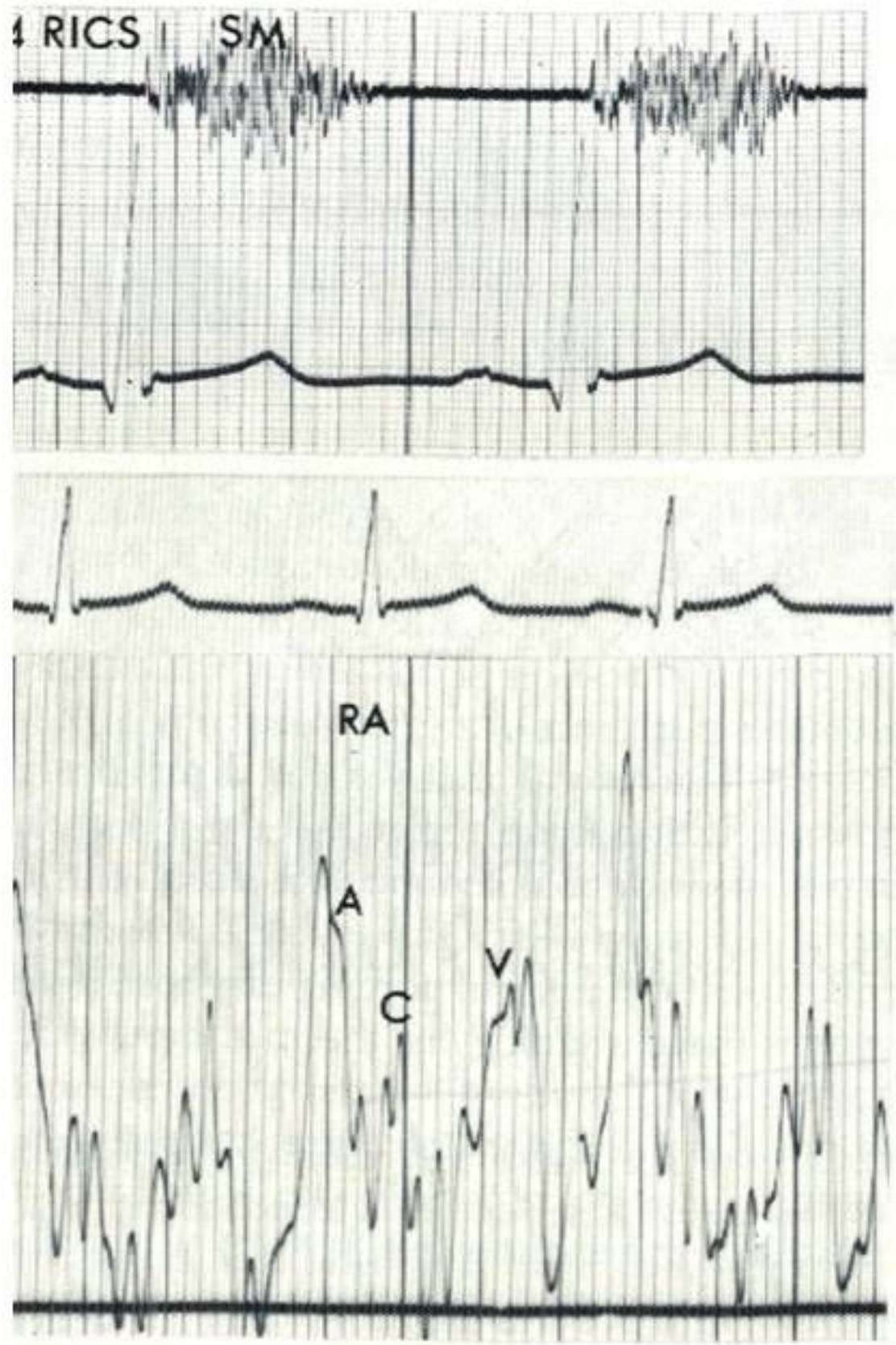
JVP in RSOV



- Site of rupture
- Acuteness
- RV function

Gerbode VSD





re 17–49. Tracings from a 17 year old male with a 2 left ventricular to right atrial shunt and normal pul- ary arterial pressure. The phonocardiogram shows a

JVP in cardiac arrhythmias

Cannon a waves

Regular

AVNRT

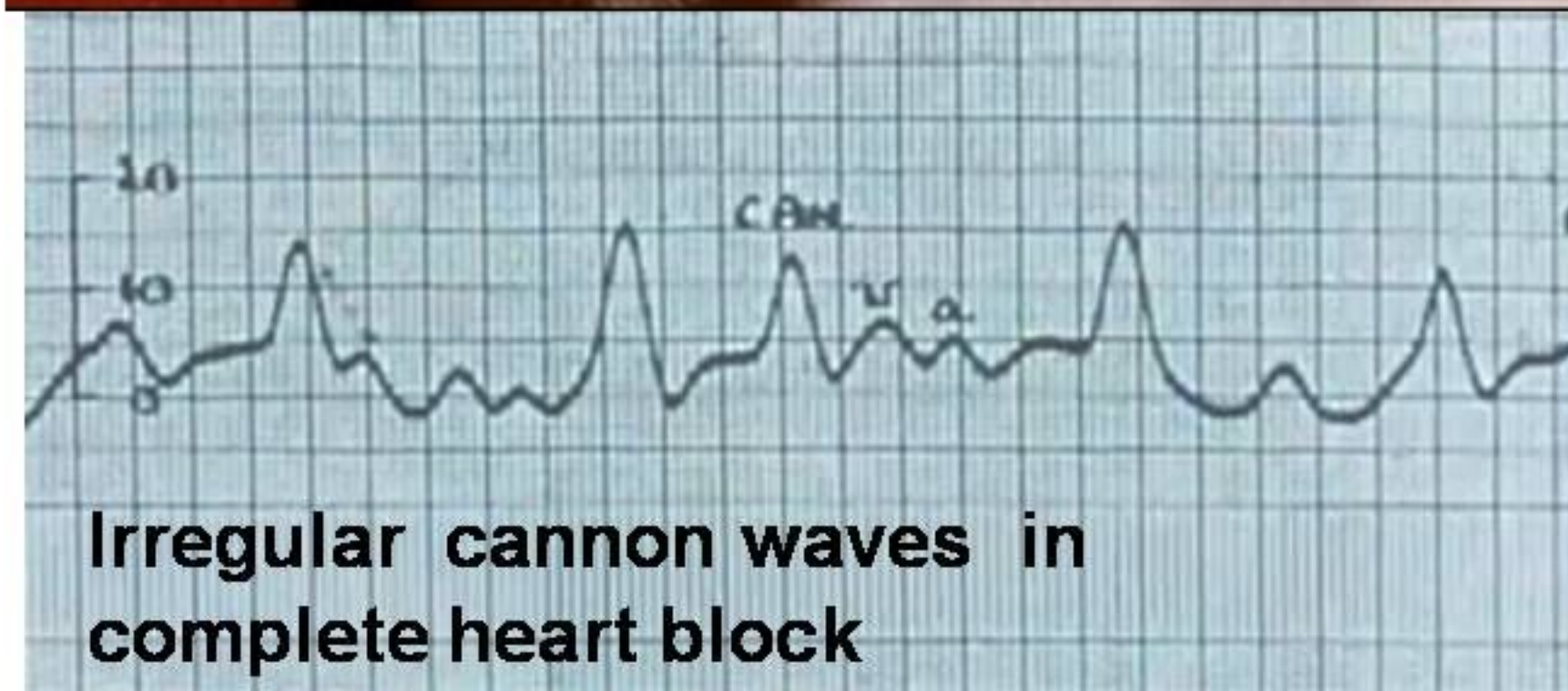
Irregular cannon

Complete heart block

VT

Regular cannon waves in AVNRT


CAN.



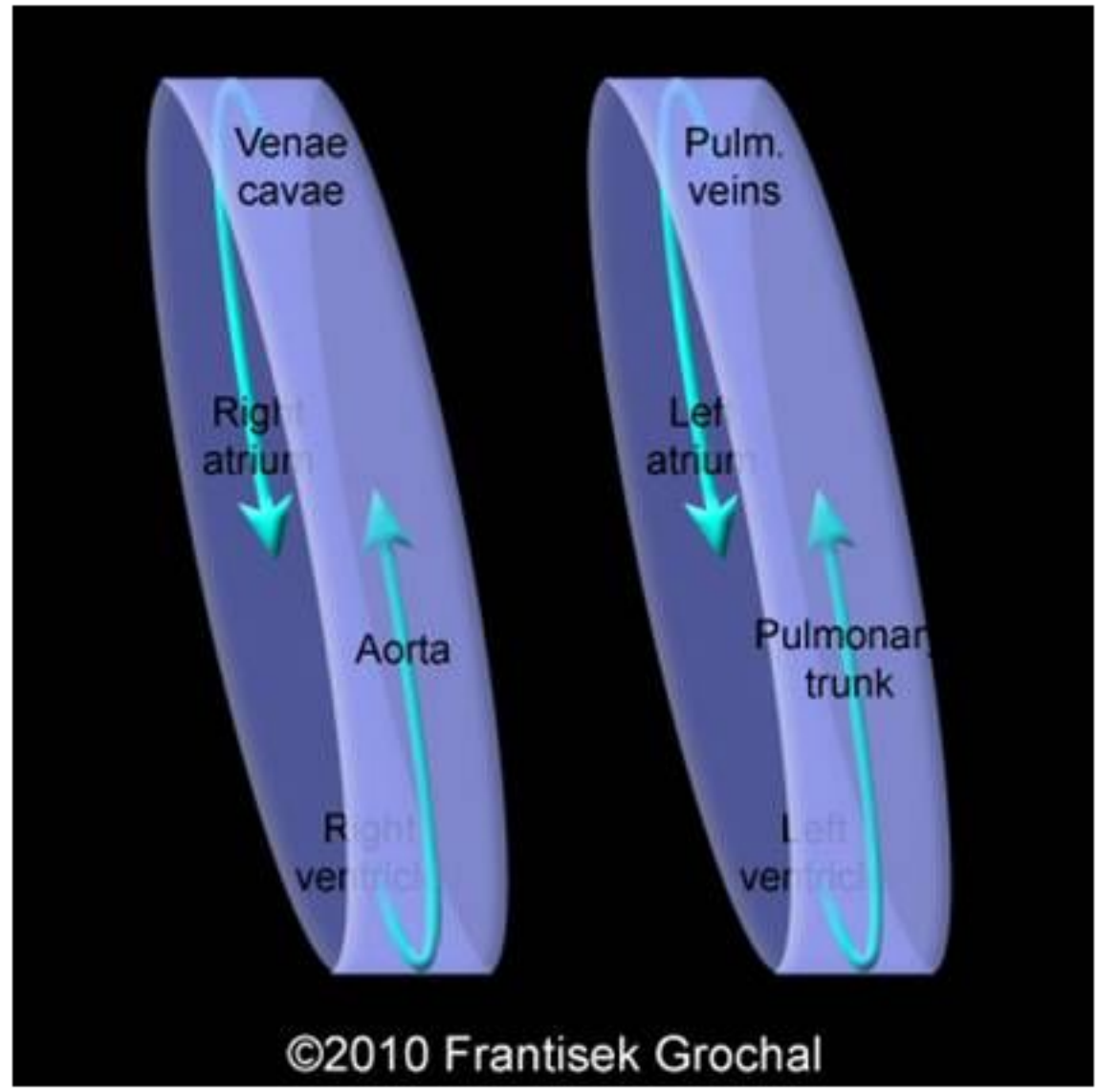
Irregular cannon waves in complete heart block

JVP in new born / Infancy

Impractical

Inappropriate ?

Right sided pressure in TGA



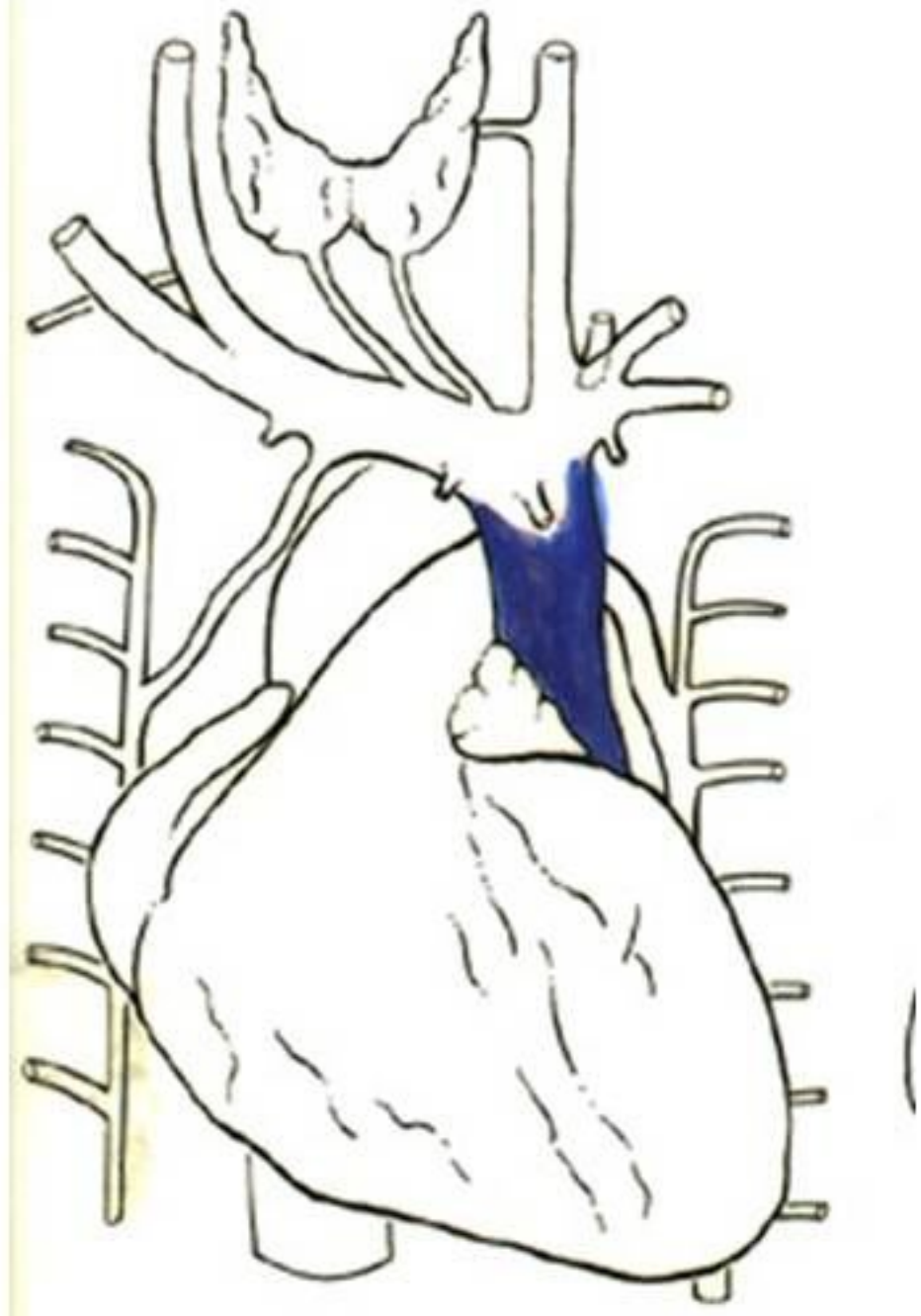
TGA Raised JVP in two different setting

No communication

Free communication

LSVC

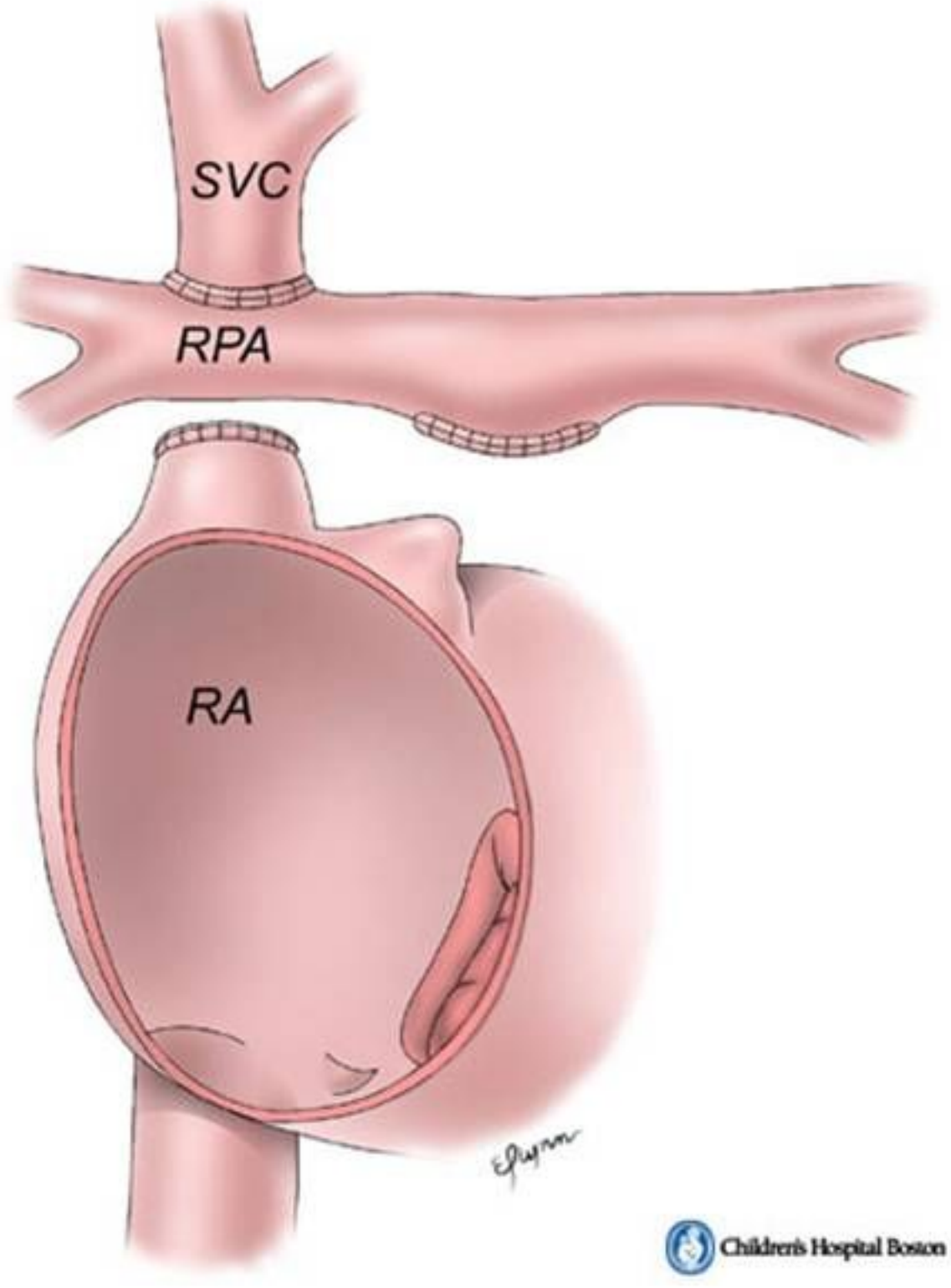
Connects RA through coronary sinus



Clinical diagnosis of persistent left superior vena cava by observation of jugular pulses

Simón Horwitz, M.D., José Esquivel A, M.D., Fause Attie, M.D., Eulo Lupi H, M.D., Jorge Espino-Vela, M.D.

JVP after RV isolation surgeries



JVP pulmonary arterialised

Non pulsatile

Mean pressure elevated

No "a" wave

Summary

JVP still has a important role in the diagnosis of CHD

It is the window to the right heart hemo–dynamics

JVP in CHD raises in two situations
.1. Obstruction to RA,RVOT .2. Severe pulmonary HT

CHD with reduced blood flow generally have small a waves . If prominent it rules out classical TOF .

CHD with increased blood flow and failure tend to have elevated mean pressure and prominent v wave

Thank you and best wishes