

# In the name of God the compassionate, the merciful



## Nothing to declere

No relationships, past or present, such as employment, consultancy, investments and stock ownership, funding for research, family relationship, etc.

**Echocardiographic findings in  
patients with right ventricle volume  
and pressure overload, a  
comparison study between two  
groups of pathologic right ventricle  
overload**

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# Introduction

- Once right ventricle was called the forgotten ventricle.
- RV complex shape complicates the objective assessment of RV systolic function by echocardiography.
- The normal RV is a crescent-shaped structure wrapped around the LV and is incompletely assessed in any single 2D view.
- Assessment of RV structure and function remains mostly qualitative and many clinicians rely on visual assessment of RV size and function.

- Reliable echo variables that are readily available will help clinicians to identify early RV dysfunction so that other diagnostic and therapeutic interventions can be promptly implemented.
- Recently TDI has been used to evaluate ventricular function
- The local rate of the wall deformation—strain rate—and the amount of deformation—strain—can be measured by processing regional myocardial velocity data.

# Patients and Method

# RV volume overload group

- 35 patients with unrepaired ASD/PAPVC, mean age=31±13 y , M/F=18/17.
- Inclusion criteria:
  - 1-Significant left to right shunt ( $QP/QS \geq 2$ )
  - 2-RVSP  $\leq 35$  mmHg.

# RV pressure overload group

- Pulmonary stenosis group, including 16 patients with mean age= $33\pm 17$ y, M/F=7/9
- Pulmonary hypertension group including 18 patients with mean age= $43\pm 12$ y, M/F=6/12.
- Inclusion criteria:  
RVSP $\geq$ 60 mmHg.



# Exclusion criteria

- Hemodynamically significant left-sided VHD(more than mild to moderate )
- LV systolic dysfunction(LVEF<50-55%)
- Any rhythm other than sinus rhythm
- Complete bundle branch block.
- Right-to-left shunt or Eisenmenger's complex.
- Poor echo view.

# Control groups

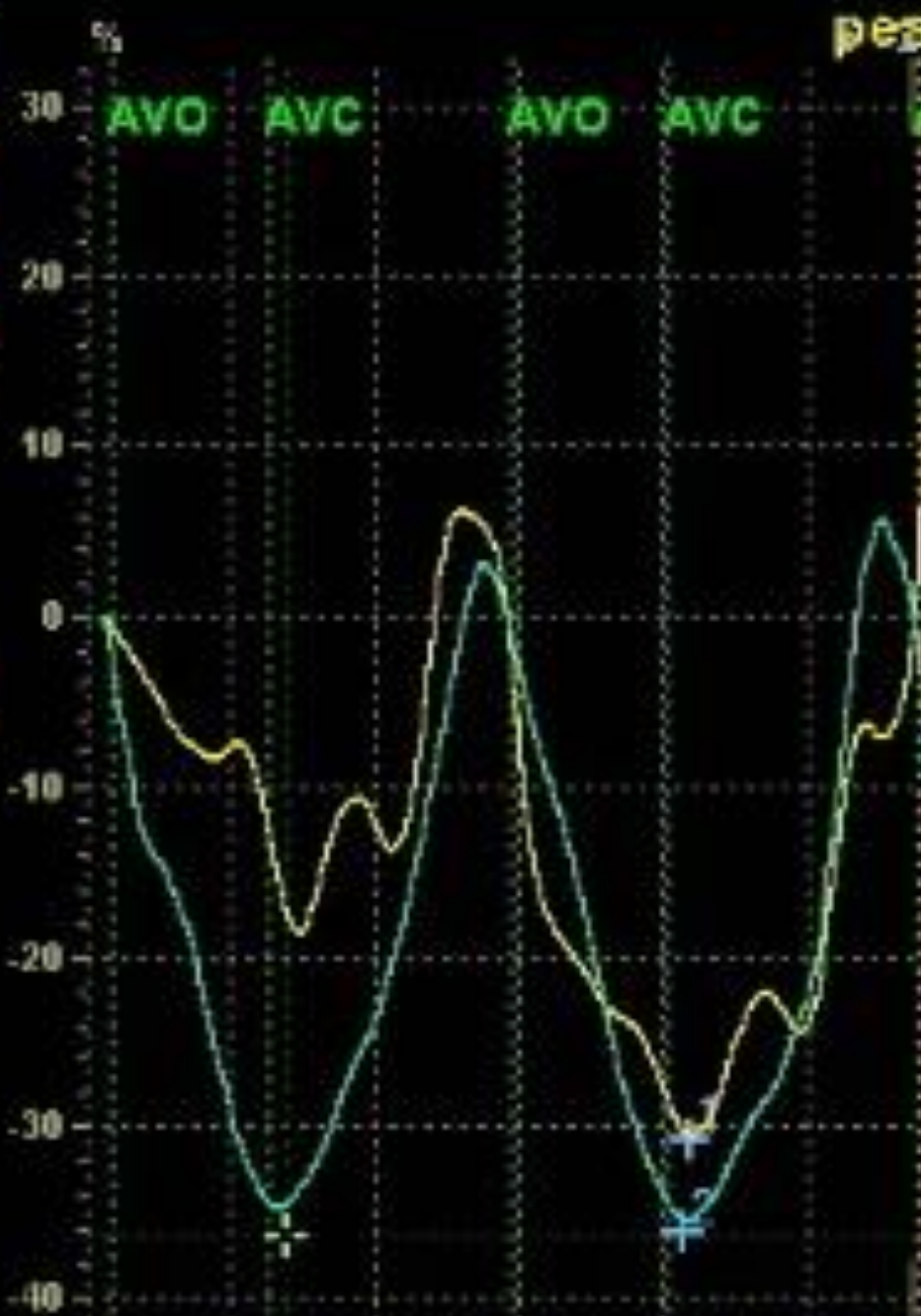
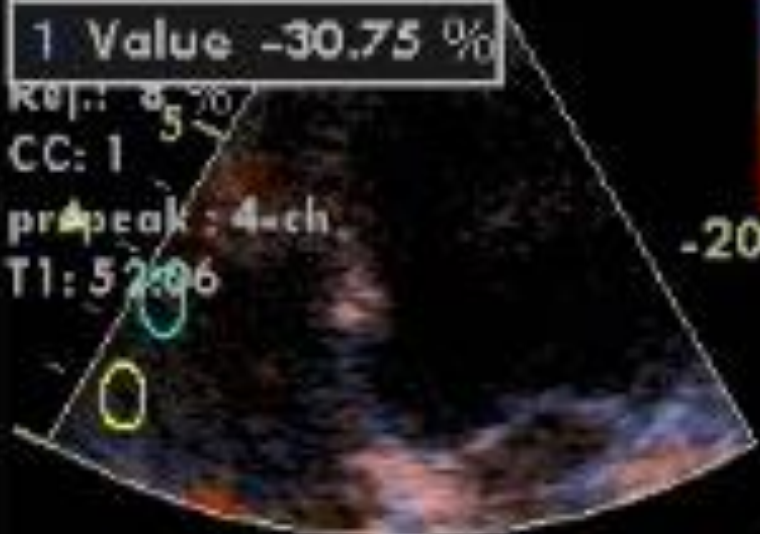
Three separate control groups (20 normal people for each group) matched by age and sex were considered.

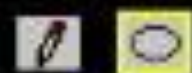
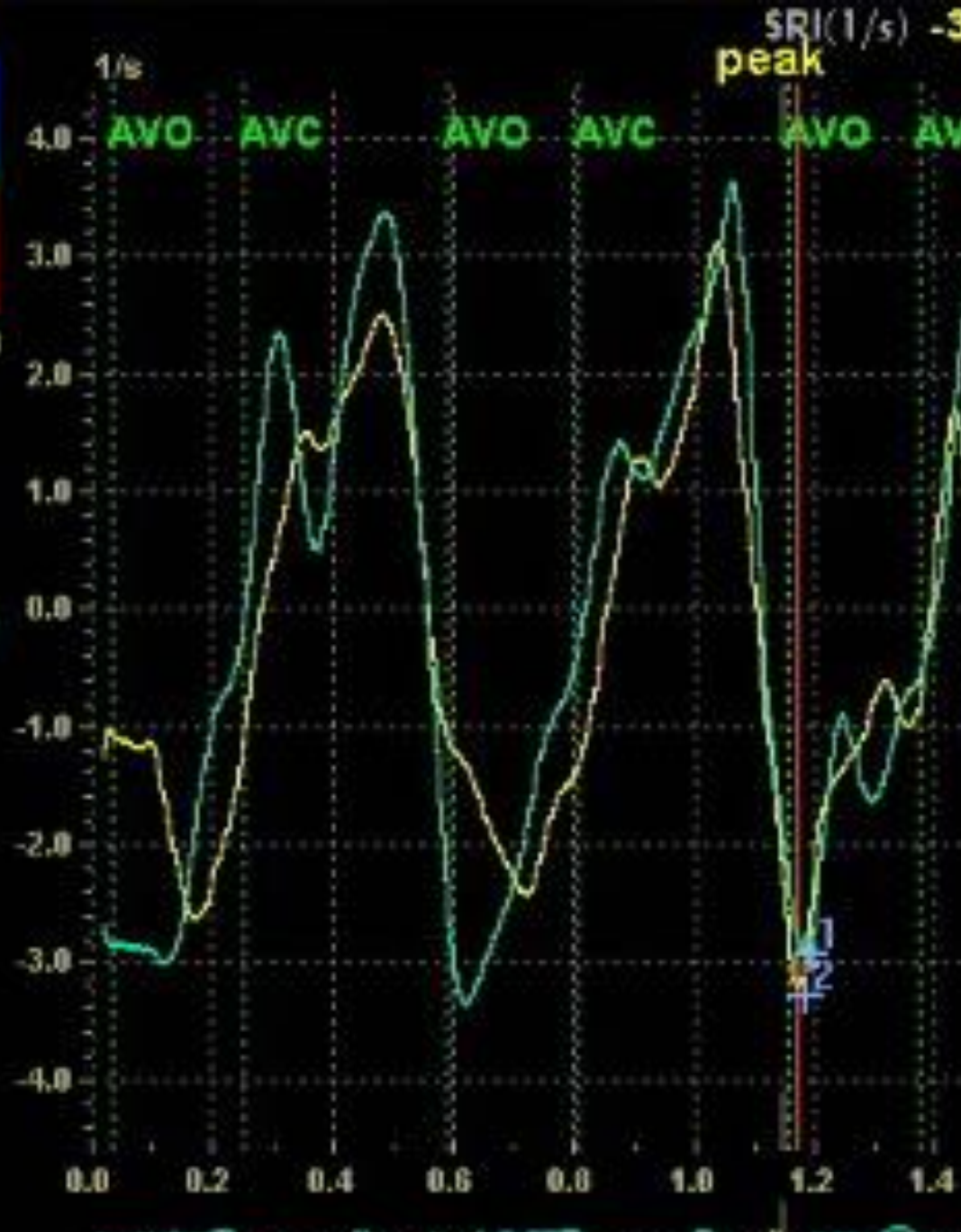
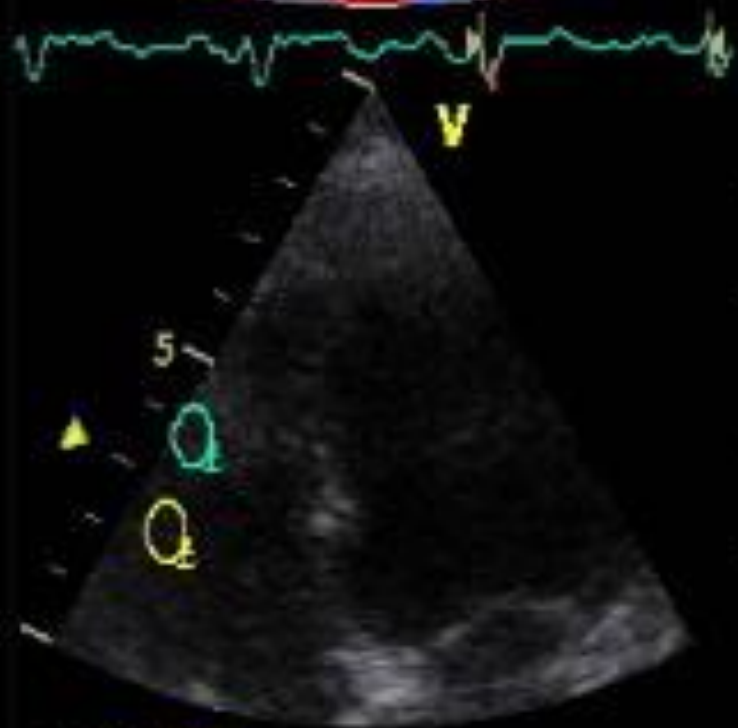
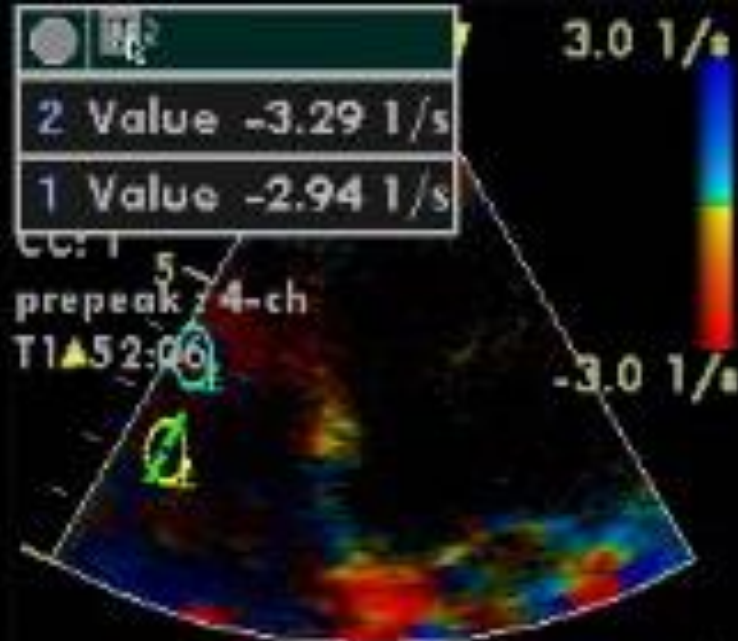
# Standard trans thoracic echocardiography

- All patients underwent standard echo, TDI and strain imaging with VIVID 7 echo system.
- LVEF: Simpson method.
- RVFAC(%): by formula
$$\frac{\text{RVED area} - \text{RVES area}}{\text{RVED area}} \times 100$$
- RVMPI (Tei index): by PW tissue Doppler from lateral TV annulus and by formula:  $\text{IVRT} + \text{IVCT} / \text{ET}$
- Systolic velocity, systolic and diastolic RV Strain and Strain rate, tissue Doppler based and from base and mid and apical levels.

●  $\frac{100}{c}$   
2 Value -36.20 %  
1 Value -30.75 %

Ref.: 8 %  
CC: 1  
pr peak : 4-ch  
T1: 52:06





# Results

- RV MPI in RV pressure overload group was more than RV MPI in RV volume overload group (0.55 versus 0.32,  $P < 0.001$ ).
- RV IVRT in RV pressure overload group was more than that in RV volume overload group. (84 versus 25,  $P < 0.001$ )
- RV FAC in RV pressure overload group was less than that in RV volume overload group ( $P = 0.035$ ).
- Strain & strain rate in RV free wall segments in RV pressure overload group were significantly lower than those in RV volume overload group ( $P < 0.001$ ).



## Basic characteristics and echo parameters of the three groups except TDI

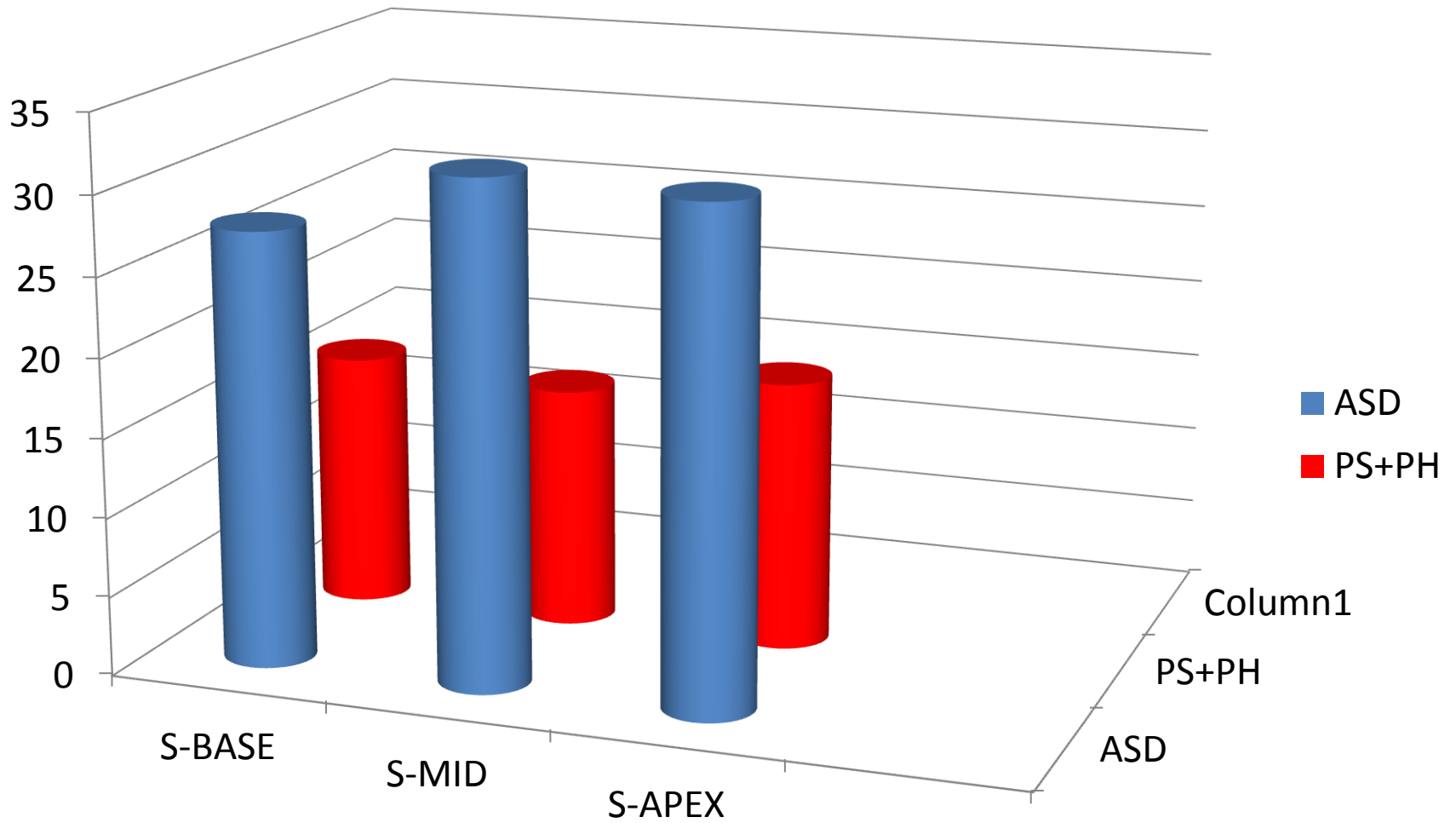
Parameters	ASD(n=35)	PS(n=16)	PH(n=18)
Age(yrs)	31±13	33±17	43±12
Male/Female	18/17	7/9	6/12
BSA	1.8±0.22	1.7±0.17	1.72±0.13
HR(beat/minute)	77±17	77±15	91±11
LVEF(%)	59±4.6	61±5	60±6
LA dimention (mm)	30±5	30±5	30±6
IVS(mm)	7.3±1	7.6±1	7.8±1
LVEDD(mm)	42±5	40±7	41±5
LVESD(mm)	27±5	24±6	25±4
QP/QS	2.77±0.73	-	-
RVD(mm)	43±6	37±7	43±8
RV thickness(mm)	4.2±0.7	9.5±3	9±2
RVSP(mmHg)	29±5	121±39	88±26
TAPSE(mm)	25±6	18±3	15±5
IVC(mm)	14±2	16±4	18±7



# Cases and Controls

Parameter	ASD	ASD control	PS	PS control	PH	PH control
Age(yrs)	31±13	32±6	33±17	34±6	43±12	43±10
Female(%)	48.6%	45%	56.3%	55%	66.6%	65%
BSA	1.8±0.22	1.7±0.16	1.7±0.17	1.8±0.19	1.72±0.13	1.8±0.22

Parameter	ASD	PS+PH	P value
LVEF(%)	58.75±4.59	60.75±5.50	0.101
RVSP(mmHg)	29.51±4.65	103.55±36.53	0.000
IVRTT(ms)	25.78±15.07	84.30±41.86	0.000
IVCTT(ms)	67.81±17.49	60.80±18.43	0.118
RVMPI	0.32±0.75	0.55±0.19	0.000
RVEDAREA(cm2)	29.91±7.02	22.65±6.47	0.000
RVESAREA(cm2)	19.55±19.07	14.18±5.78	0.119
RVFAC(%)	44±6	40±10	0.035
S-BASE(%)	-27.50±4.99	-16.13±8.57	0.000
S-MID(%)	-31.79±5.77	-15.30±6.70	0.000
S-APEX(%)	-31.38±5.46	-17.07±6.32	0.000
SR-BASE-S	-1.86±0.56	-0.96±0.52	0.000
SR-BASE-E	1.85±0.91	1.00±.58	0.000
SR-MID-S	-2.00±0.46	-0.82±0.25	0.000
SR-MID-E	2.27±1.03	1.18±0.83	0.000
SR-APEX-S	-2.00±0.48	-1.00±0.64	0.000
SR-APEX-E	2.32±1.01	1.17±0.88	0.000



S-BASE

S-MID

S-APEX

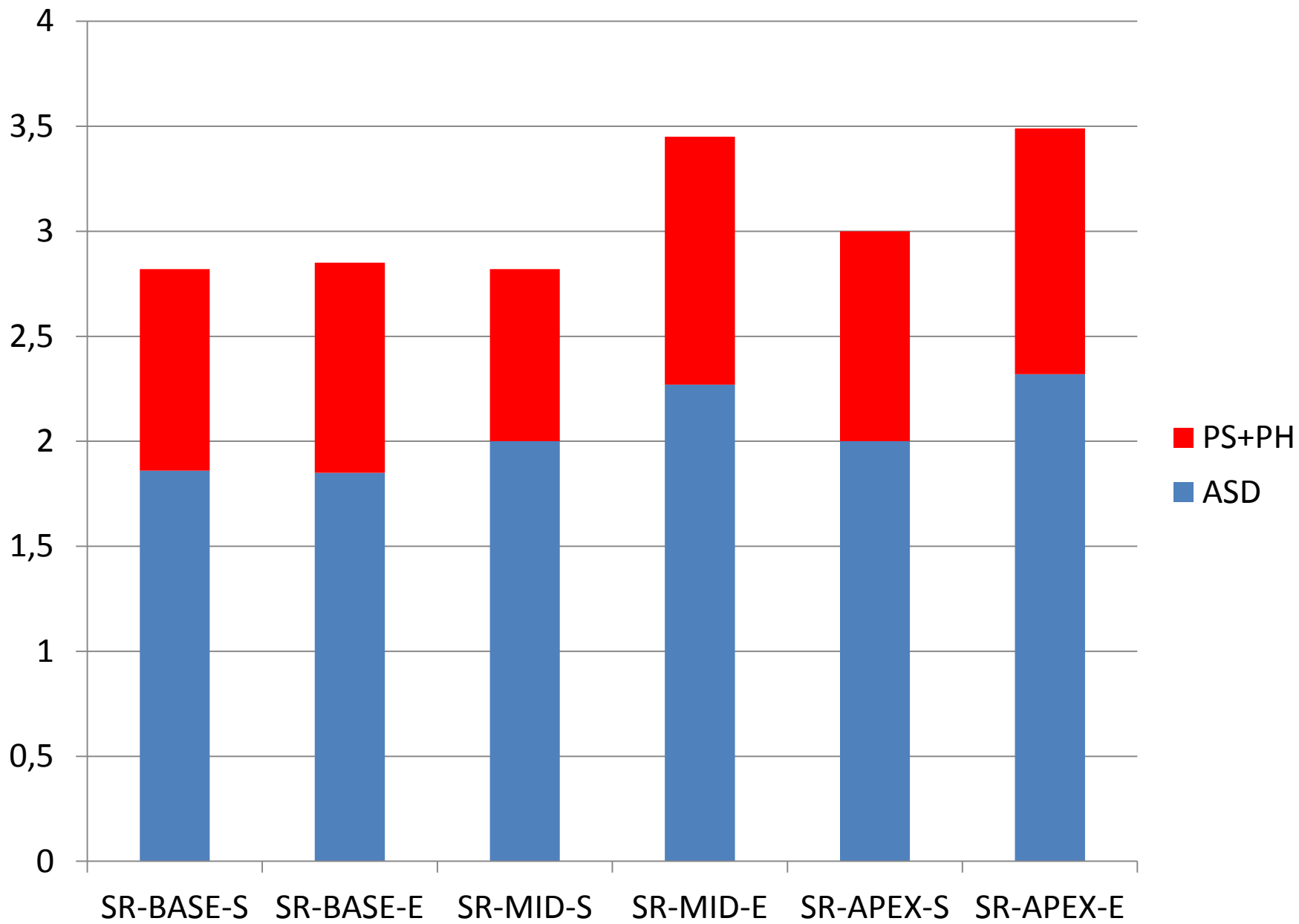
Column1

PS+PH

ASD

ASD

PS+PH



# Conclusion

*RV pressure overload is probably more harmful for RV than volume overload and using these parameters can be important in early diagnosing pulmonary artery hypertension to prevent progression to RV failure and also in patients with concomitant RV pressure and volume overload for distinguishing the dominant pathology.*

**THANK YOU FOR  
YOUR ATTENTION**

