

# Assessment of right ventricular diastolic function by tricuspid annular plane systolic excursion and its prognostic value in children with pulmonary arterial hypertension

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## Introduction

- Increased right atrial size and decreased right ventricular function have been shown to be associated with increased mortality in patients with PAH
- Impairment of right atrial function is an indicator of right ventricular diastolic dysfunction.
- Might occur prior to right ventricular systolic dysfunction.

## Aim

Right Atrial function as assessed by TAPSE during different phases of ventricular diastole influences survival in children with PAH.

## Methods

- Type of study-** retrospective with prospectively collected data.
- Basic criteria-** Children < 17 yrs with PAH and undergoing diagnostic cardiac catheterization and Echocardiogram
- Study period -** April 2010 to July 2019
- Inclusion Criteria-**

- Idiopathic or hereditary pulmonary arterial hypertension (IPAH)

- Post operative CHD with residual PAH

### Exclusion Criteria –

- Left heart disease and pulmonary vein stenosis.

- atrial septal defect or insufficient data

- Non sinus rhythm

- Insufficient data

### Clinical Worsening-

- Worsening of WHO functional class

- Initiation of parenteral prostanoid therapy,

- Potts shunt

- Death

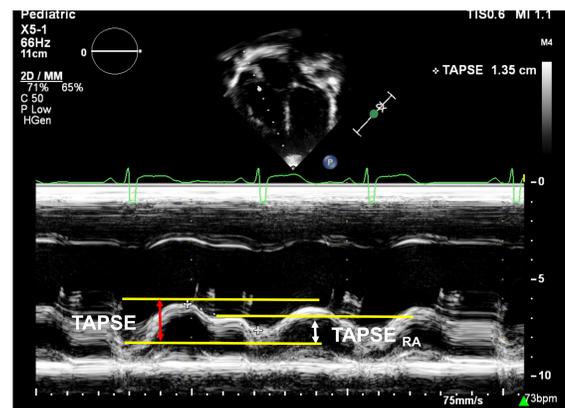
- Patient who expired after Potts shunt or after initiation of prostanoid therapy was considered as single worsening event.

## Cardiac Catheterization-

- The date of cardiac catheterization was considered as the date to recruit the patient in the study.
- Event free survival was described from the date of catheterization till occurrence of clinical worsening episode.
- Cath Hemodynamic data was collected.

## Echocardiographic Parameters

- Done using Philips IE33 system
- TAPSE was obtained in four chamber view using age appropriate probe at 75 mm/sec.
- The RV systolic and diastolic areas were traced at endocardium in apical 4 chamber view in accordance with established guidelines.
- The RV areas were indexed to body surface area
- Each variable was analyzed in 3 consecutive cardiac cycle and average value was obtained



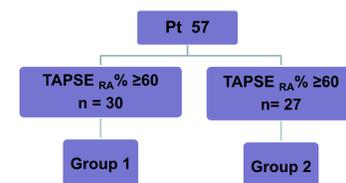
## Statistical Analysis

Statistical analysis: R project for statistical computing (R 3.3.1, 2016 Vienna, Austria)

## Results: Demographic data

Age (years)	3 (0.30 – 17)
Sex (male:female)	30:27
BSA (m <sup>2</sup> )	0.56 (0.2 – 1.8)
Total follow up (years)	3 (0.21 – 8.35)
Time to clinical worsening (years)	1.14 (0.03 – 6.14)
Time to death (years)	1.55 (0.88 – 4.95)

Etiology	Number (%)
Idiopathic PAH	16 (28.1%)
PAH post CHD repair	32 (56.2%)
PAH-CHD unoperated	3 (5.2%)
PAH-lung diseases	6 (10.5%)
Miscellaneous	16



Clinical parameters	TAPSE RA ≥ 60 Group 1	TAPSE RA < 60 Group 2	P value
Functional class	III (II-IV)	II (I-III)	0.06
Six minute walk test	126 (76-356)	268 (187-432)	0.02
Nt- PROBNP	678 ± 76	286 ± 45	0.01

## Echocardiographic correlation

Variable	TAPSE RA ≥ 60 Group 1	TAPSE RA < 60 Group 2	P value
RA FAC (%)	32 (10)	36 (12)	0.224
RV.max	14.95 (9.29)	15.30 (8.24)	0.879
RV.min	11.13 (7.90)	10.42 (6.49)	0.710
RV FAC (%)	29 (12)	35 (12)	0.055

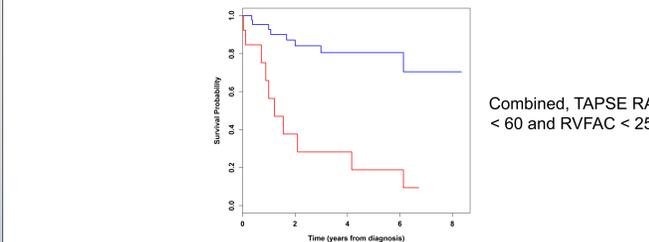
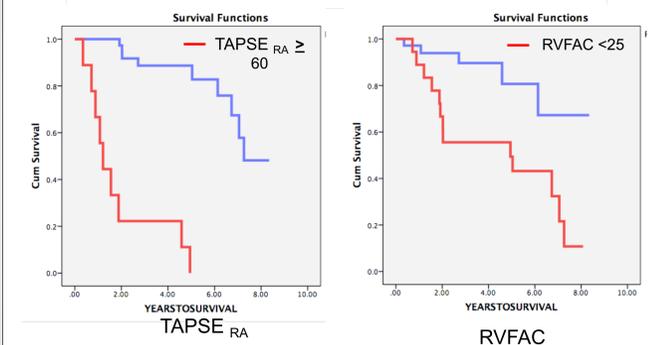
## Cardiac Cath Data

Variable	Group 1	Group 2	P value
RA.a wave	6.59 ± 3.30	7.29 ± 2.61	0.377
RA.v wave	5.07 ± 2.74	6.18 ± 2.78	0.13
RA.mean	4.69 ± 2.63	5.04 ± 2.15	0.58
PA.s	77.59 ± 29.80	55.21 ± 14.96	0.0008
PA.d	40.31 ± 19.00	24.61 ± 9.59	0.0002
PA.m	57.45 ± 22.14	38.57 ± 11.57	0.0002
Ao.m	60.00 ± 10.08	59.71 ± 10.05	0.915
Basal.PVRI	14.48 ± 7.75	8.05 ± 4.12	0.0003
Paci	0.91 ± 0.36	1.49 ± 0.91	0.003319

## Clinical worsening and mortality

- 18 events of clinical worsening were observed during the study
- 9 patients underwent POTTs shunt.
- 1 patient was started on inhaled iloprost.
- 8 expired

Parameter	Group 1 (n=30)	Group 2 (n=27)	P Value
Clinical worsening	13 (43%)	5 (18.5%)	<0.05
Mortality	8 (30%)	0	<0.05



## Conclusion and Discussion

- Pathological alteration of right atrial function occurs in children with PAH.
- Increased TAPSE RA at diagnosis is associated with poor short term outcomes.
- %TAPSE RA can be used as a marker of reliance on atrial contribution in maintaining cardiac output.
- Loss of this contribution can lead to clinical deterioration.
- Regular monitoring of %TAPSE RA can identify the subset of patients who are prone to clinical deterioration and thus need closer follow up and escalation of therapy.