האיגוד הישראלי לכירורגית לב וחזה
THE ISRAEL SOCIETY OF CARDIOTHORACIC SURGERY
האיגוד הקרדיולוגי בישראל
ISRAEL HEART SOCIETY
The 60th International Conference of the Israel Heart Society
in association with the Israel Society of Cardiothoracic Surgery
22-23 April 2013, ICC International Convention Center, Jerusalem

High Prevalence of Occult Left Heart Disease in Scleroderma-Pulmonary Hypertension

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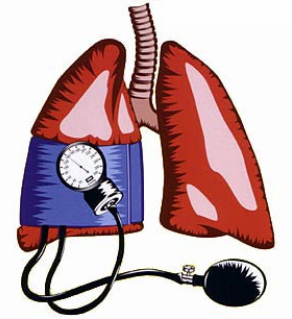
Conflicts of interests

- None for all authors

Introduction

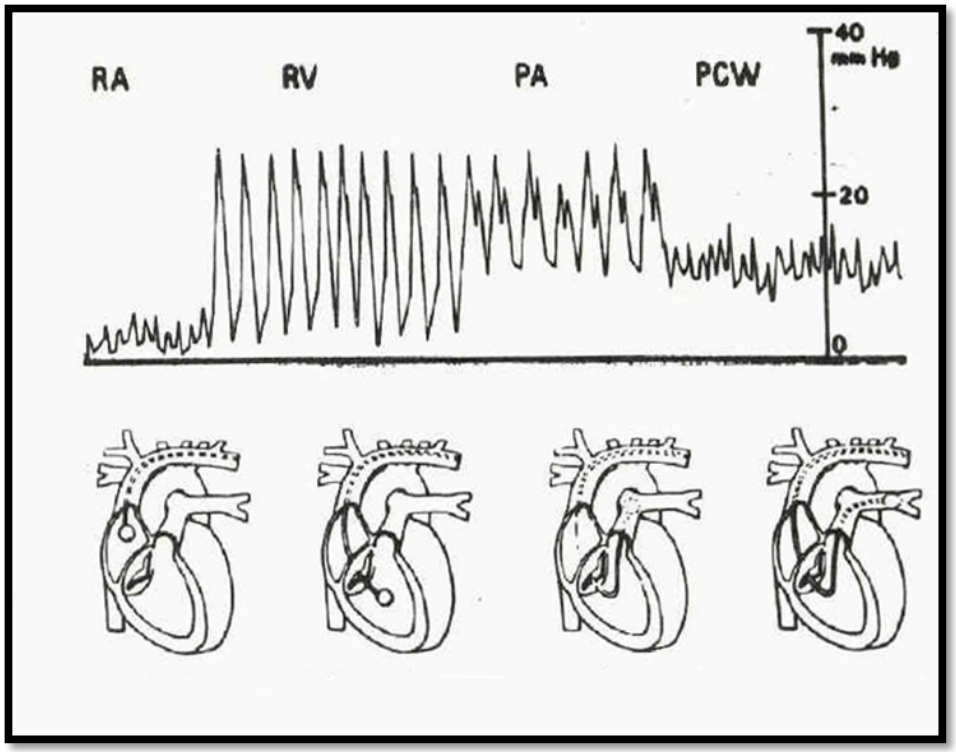


- The association between scleroderma (SCL) and Pulmonary Hypertension (PH) is well established

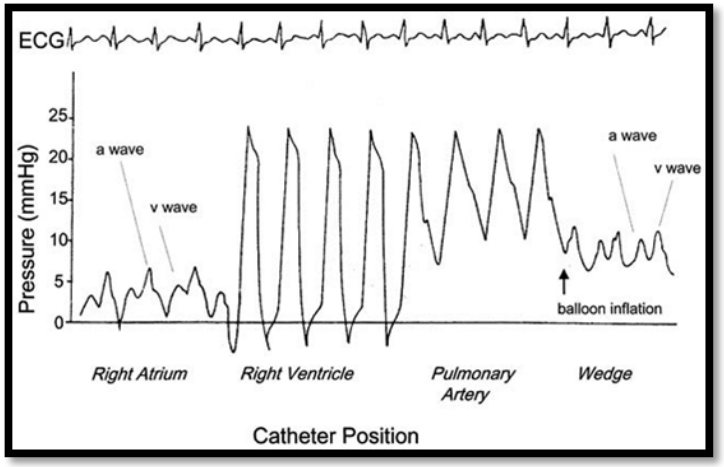
- It may be caused by:
  - precapillary microvascular narrowing resulting in pulmonary arterial hypertension (PAH)
  - pulmonary parenchymal disease
  - veno-occlusive disease
  - postcapillary pulmonary venous hypertension (PVH) from left heart dysfunction
  - **combinations of these abnormalities**

Introduction

- The pulmonary vasodilator drugs - deleterious effects/ ineffective if administered to patients with PVH or lung disease
- Right heart catheterization (RHC) is essential for accurate diagnosis of all patients with suspected PH
- Typically, differentiation between PAH and PVH is based on the pulmonary arterial wedge pressure (PAWP) ≤15mmHg being the current criterion for diagnosing PAH



Introduction



- It has been previously reported that in patients with PH, the PAWP and LVEDP are frequently discordant. PAH may be inappropriately diagnosed in some cases

- Some patients with left ventricular diastolic dysfunction may have normal resting LVEDP, but will show an abnormal increase in LVEDP in response to intravenous fluid loading

- Given that scleroderma is frequently associated with myocardial fibrosis and diastolic dysfunction, it is of great importance to identify these abnormalities

Introduction

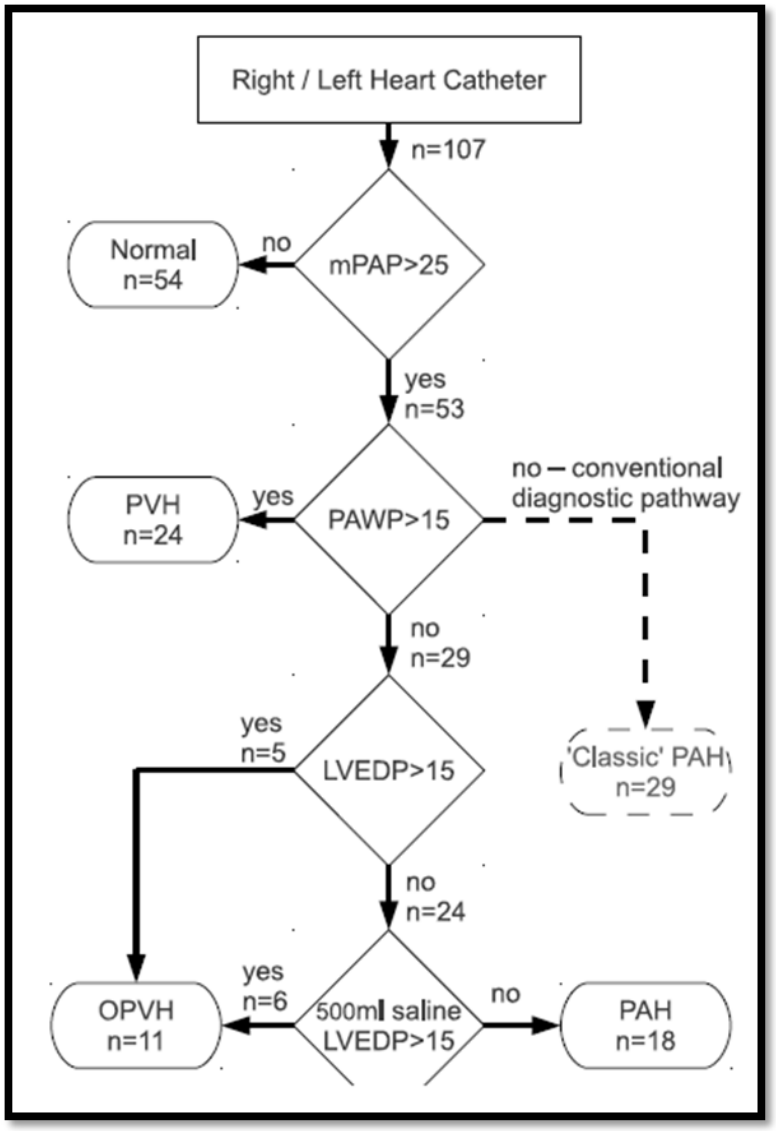
- The proportion of scleroderma patients suspected of having PAH but in reality having occult PVH is unknown

- We therefore
  - investigated the prevalence of discordance between PAWP and LVEDP in the SCL population
  - studied the frequency of occult PVH as assessed by the saline challenge
  - examined the epidemiological factors and echocardiographic correlates of this phenomenon.

Methods

- All SCL patients referred for diagnostic right and left cardiac catheterizations at our center between 1 May 2007 to 31 May 2011

- Investigation due to:
  - unexplained dyspnea
  - increased PAP on echocardiography (>40 mmHg)
  - unexplained low DLCO (<60%)



Methods

- Exclusions criteria
  - Mitral valve disease
  - CTEPH
  - Decreased lung volumes (TLC<60%)
  - Documented honeycomb changes
- None of the patients were on any therapies for PH

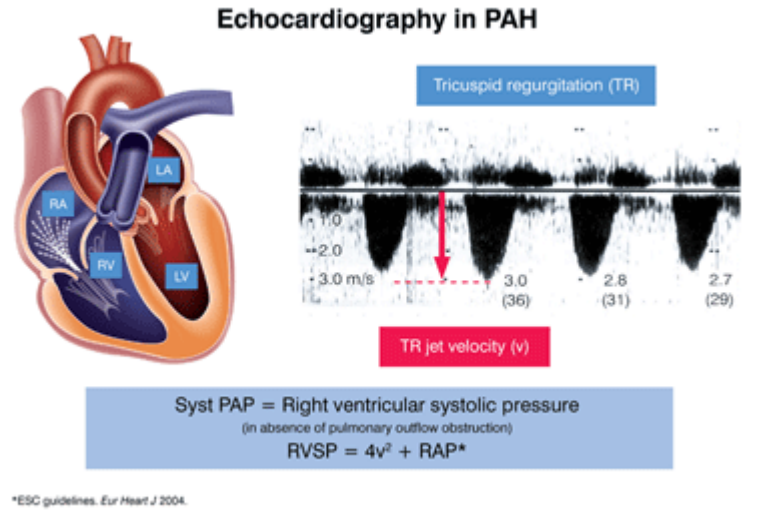
Methods

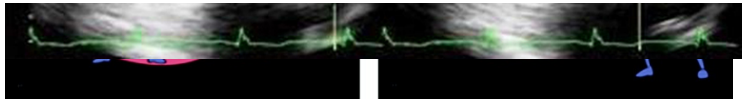
- All patients - right and left cardiac catheterization and coronary angiography

- Patients with resting PH (defined as mean PAP >25mmHg) but with low PAWP and LVEDP (≤15mmHg) were then given an infusion of 500ml of pre-warmed 0.9% saline solution over 5 - 10 minutes, followed by re-measurement of all right and left heart hemodynamic parameters after the end of the infusion

Methods

- Echocardiographic parameters
  - LA dimension (reflection of chronic left atrial pressure, and of the left ventricular filling pressure in the absence of mitral disease)
  - E/e' (most reliable echocardiographic index of LVEDP in hemodyamically stable patients in sinus rhythm)
  - E/A
  - LV ejection fraction
  - myocardial performance index
  - SPAP





Results- baseline characteristics

	Normal	PVH	Occult PVH	PAH
N	54	24	11(5 +6)	18
Age	61 (9)	64 (9)	66 (6)	59 (14)
Female %	85	88	64	94
SCL limited/diffuse %	70/30	83/17	55/45	72/28
Hypertension %	38	47	27	45
DLCO (%predicted)	61	56	36	32
WHO class I-IV %	13/54/33/0	13/4/75/8	0/36/55/9	0/28/44/28

Results – hemodynamic data at rest

	Normal	PVH	Occult PVH	PAH
RA pressure (mmHg)	6	12	11	9
Mean PAP (mmHg)	18	40	35	44
PAWP (mmHg)	10	20	12	8
LVEDP (mmHg)	13	18	15	9
CO (L/min)	5.7	4.9	5.1	3.8
CI (L/min/m^2)	3.5	3.0	2.8	2.4
PVR (wood unit)	1.5	5.2	5.3	10.1
Coronary disease %	35	33	30	15

Results – hemodynamic data after fluid challenge

	Normal	PVH	Occult PVH	PAH
RA pressure (mmHg)	-	-	15	12
Mean PAP (mmHg)	-	-	38	48
PAWP (mmHg)	-	-	17	12
LVEDP (mmHg)	-	-	21	12
CO (L/min)	-	-	5.6	4.1

Echocardiographic parameters from patients, performed median 26 days of right heart catheterization

	Normal	PVH	Occult PVH	PAH
LA dimension (mm)	35	36	38	30
LVEF (%)	62	58	60	58
E/e' ratio	8.6	15	13	9.1
E/e' >15	2	6	3	1
RV-MPI	0.4	0.5	0.4	0.7
S'	12.3	9.7	10.4	8.9
Estimated sPAP	39	60	55	86

Conclusions

- PVH had high prevalence in our SCL-PH population
- Distinguishing PAH from PVH with only PAWP may result in some PVH patients being misclassified as having PAH
- Using LVEDP as the ’gold-standard’ arbiter of left heart disease is appropriate from the physiological standpoint

Conclusions

- This potential mis-classification of PVH as PAH may in part explain the relatively poor outcomes of SCL-associated PAH patients in clinical trials of PAH therapy

- At best, this phenomenon might explain some of the “nonresponders” to PAH therapy in those studies

Thank you