Ascending aorta dilatation in primary aldosteronism: a new deleterious consequence of aldosterone excess.

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Introduction

Primary hyperaldosteronism (PHA) features a higher prevalence of cardiovascular events and renal complications as compared with essential hypertension. This is mostly due to aldosterone excess. In a limited number of animal models, the potential impact of aldosterone excess on aorta has already been investigated and results suggest a detrimental effect. However, such hypothesis has not yet been confirmed in human subjects. A very little number of case reports on aortic dissection in primary hyperaldosteronism may support it.

Objective

To highlight a potential role of aldosterone excess in ascending aorta dilatation, by presenting prevalence of ascending aorta dilatation in primary hyperaldosteronism subjects as compared with hypertensive controls.

Subjects and hormonal assessement

Cases: Consecutive PHA patients (by adenoma/hyperplasias) in whom adrenal surgery had not yet been performed were selected. Hypercortisolism had been excluded according to Endocrine Society Guidelines. Pheochromocytoma had been ruled out by assaying cathecolamines and metanephrines. PHA had been diagnosed through Aldosterone-to-Renin-Ratio after two hours of upright position and confirmatory Captopril Challenge test. The cut-off ratio used to detect PHA in both 2hARR and CCT was 30 and discontinuation of interfering drugs was applied according to published Guidelines on primary aldosteronism.

Controls: Consecutive hypertensive patients were selected. The inclusion criteria were: treatment with at least one anti-hypertensive drug. The exclusion criteria were PHA, hypercortisolism and pheochromocytoma, which had already been ruled out at the first access to the Endocrinology Unit by means of the same protocol used for PHA, as described before. This group is therefore identified with 'NS', non secreting. Patients with known aortic bicuspid valve or connective tissue disorder such as Marfan syndrome were not present.

Adrenal CT protocol

unenhanced scan; * arterial phase (45 secs after the i.v. injection of iodinate contrast medium); * venous phase (60 secs after the injection); * delayed examination after 15 mins

Echocardiogram. All echocardiograms were performed at S. Orsola-Malpighi Hospital with the same ultrasound equipment. Echocardiograms evaluated both myocardium and ascending thoracic aorta morphology and dimensions. Ascending aorta dilatation was defined as an aortic root diameter ≥ 38 mm and/or a tubular ascending aorta diameter ≥ 37 mm.

Clinical and anamnestic data at the date of echocardiogram

	PHA			*NS*			*PHA vs NS* P Value			*Sex* P Value	
	All **(N=47)**	***Males*** **(N=27)**	***Females*** **(N=20)**	***All*** **(N=45)**	***Males*** **(N=21)**	***Females*** **(N=24)**	***All***	***M***	***F***	***PHA***	***NS***
Age (yr)	(53.83 ± 12.35)/47	(56.56 ± 12.18)/27	(50.15 ± 11.90)/20	(59.20 ±15.59)/45	(57.81 ±17.90)/21	(60.42 ±13.54)/24	**0.02**	0.46	**0.01**	0.12	0.73
Anthropometric data ***											
▪ BMI – kg/m²	(27.95±3.90)/46	(28.16±3.61)/26	(27.69±4.34)/20	(27.94±4.52)/45	(27.06±4.44)/21	(28.70±4.55)/24	0.94	0.35	0.60	0.76	0.26
▪ BSA – m²	(1.96±0.24)/46	(2.09±0.20)/26	(1.79±0.18)/20	(1.86±0.21)/45	(1.96±0.21)/21	(1.78±0.18)/24	**0.05**	**0.04**	0.74	**<0.01**	**<0.01**
Duration of hypertension – yr	(12.18±9.81)/45	(13.00±10.02)/25	(11.15±9.70)/20	(8.03±7.68)/44	(8.45±7.10)/20	(7.69±8.27)/24	**0.04**	0.13	0.13	0.55	0.33
Smoking history▫ – no./total no. (%)	18/44 (40.9%)	12/25 (48%)	6/19 (31.6%)	16/42 (38.1%)	7/20 (35%)	9/22 (40.9%)	0.83	0.55	0.75	0.36	0.76
Dyslipidemia°* – no./total no. (%)	10/46 (21.7%)	7/26 (26.9%)	3/20 (15.0%)	12/41 (29.3%)	8/21 (38.1%)	4/20 (20%)	0.47	0.53	1.00	0.48	0.31

Echocardiographic parameters and current therapy

	All **(N=47)**	**Males** **(N=27)**	***Females*** ***(N=20)***	***All*** ***(N=45)***	***Males*** ***(N=21)***	***Females*** ***(N=24)***	***All***	***M***	***F***	***PHA***	***NS***
Echocardiographic parameters											
▪ Hypertensive cardiomyopathy – no. (%)	26/47 (55.3%)	21/27 (77.8%)	5/20 (25%)	21/45 (46.7%)	10/21 (47.6%)	11/24 (45.8%)	0.53	**0.04**	0.21	**<0.01**	1.00
▪ Aortic root diameter– mm	(35.50±4.99)/34	(37.86±4.29)/21	(31.69±3.50)/13	(32.49±4.01)/32	(34.10±3.12)/17	(30.67±4.22)/15	**0.01**	**<0.01**	0.44	**<0.01**	**0.01**
▪ Aortic root diameter/BSA – mm/m²	(18.02±2.13)/34	(18.16±2.01)/21	(18.55±2.08)/13	(17.57±2.53)/32	(17.66±2.32)/17	(17.51±2.83)/15	0.20	0.40	0.34	0.79	0.69
▪ Ascending aorta diameter – mm	(35.35±5.80)/40	(37.58±5.20)/24	(32.00±5.10)/16	(32.51±4.89)/33	(34.43±5.45)/16	(30.71±3.58)/17	**0.01**	**0.02**	0.58	**<0.01**	0.08
▪ Ascending aorta diameter/BSA – mm/m²	(18.15±2.49)/39	(18.29±2.23)/23	(18.20±2.88)/16	(17.49±2.86)/33	(17.67±3.55)/16	(17.31±2.14)/17	0.10	0.20	0.49	0.55	0.77
▪ Ejection fraction – %	(65.40±6.02)/47	(65.19±5.36)/27	(65.70±6.94)/20	(64.52±6.10)/42	(65.56±5.65)/19	(63.67±6.45)/23	0.32	0.96	0.20	0.46	0.63
▪ Aortic root and/or ascending aorta dilatation****	17/47 (36.2%)	14/27 (51.85%)	3/20 (15%)	5/45 (11.1%)	4/21 (19.05%)	1/24 (4.2%)	**<0.01**	**0.03**	0.32	**0.01**	0.17

Univariate analysis. Estimates for *Ascending aorta diameter* adjusted for 4 covariates

Factor	Coefficient [95%CI]	*P Value*
Hyperaldosteronism*	2.831±1.013	***0.007***
Covariate		
Age (n)**	0.335±0.000	***0.004***
BSA**	0.346±2.385	***0.002***
Duration of hypertension (n)**	0.035±1.997	*0.760*
Sex*	2.253±1.089	***0.042***

*Effect estimate by ANCOVA; **Beta of regression; (n)=normalized variable

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Conclusions

These preliminary data showed that :
- PHA was independentely associated to ascending aortic dilatation, together with age, BSA and sex
- Duration of hypertension had no effect
- All PHA patients must be screened with echocardiogram in basal conditions and during follow up