

Perturbed sympatho-vagal balance in Turner syndrome – relation to aortic dilation

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1 Background

The relation between sympatho-vagal balance and aortic dilation in Turner Syndrome (TS) is unresolved. Therefore, the aim of the present study was to prospectively assess heart rate variability (HRV) and its relation to aortic dimensions.

2 Methods

Women with TS (n=91, aged 37.4±10.4 years) were examined thrice (mean follow-up of 4.7±0.5 years). Healthy controls (n=64, aged 39.4±12.1 years) were examined once. HRV measured by short-term spectral analysis (supine-standing). Low frequency (LF) and High frequency (HF) power were determined and the coefficient of component variation of LF and HF calculated (CCVLF /CCVHF) to account for an impact of mean RR. Aortic dimensions were measured at nine positions using 3D, non-contrast and free-breathing cardiovascular-MRI

3 Results

The changes in vagal activity (CCVHF) and sympatho-vagal balance (LF:HF-ratio) was diminished in TS compared to controls (p<0.001). In TS, CCVHF was lower while supine (p=0.053) and higher while standing (p=0.03) compared to controls. Aortic diameter was inversely correlated with CCVLF (r-average=-0.342 and -0.393, supine and standing; p<0.05) and CCVHF (r-average=-0.424 and -0.332, supine and standing; p<0.05) in controls. Same degree of correlation was present in TS with respect to CCVHF (r-average=-0.342 and -0.314; p<0.05). Changes in aortic diameter did not correlate with any measures of HRV. Prospectively there were no changes in HRV.

Tables below

Only individuals without diabetes, complete heart rate variability measurements and no antihypertensive drugs were included.

CCVLF (ln) and CCVHF (ln) are the natural logarithmic function of the Coefficient of component variation (square root of power/mean RR) low and high frequency respectively. "r" is Pearson's correlation coefficient. "p" is the p-value (level of significance p <0.05).

Only individuals without diabetes, with complete heart rate variability measurements and no antihypertensive drugs were included

Controls

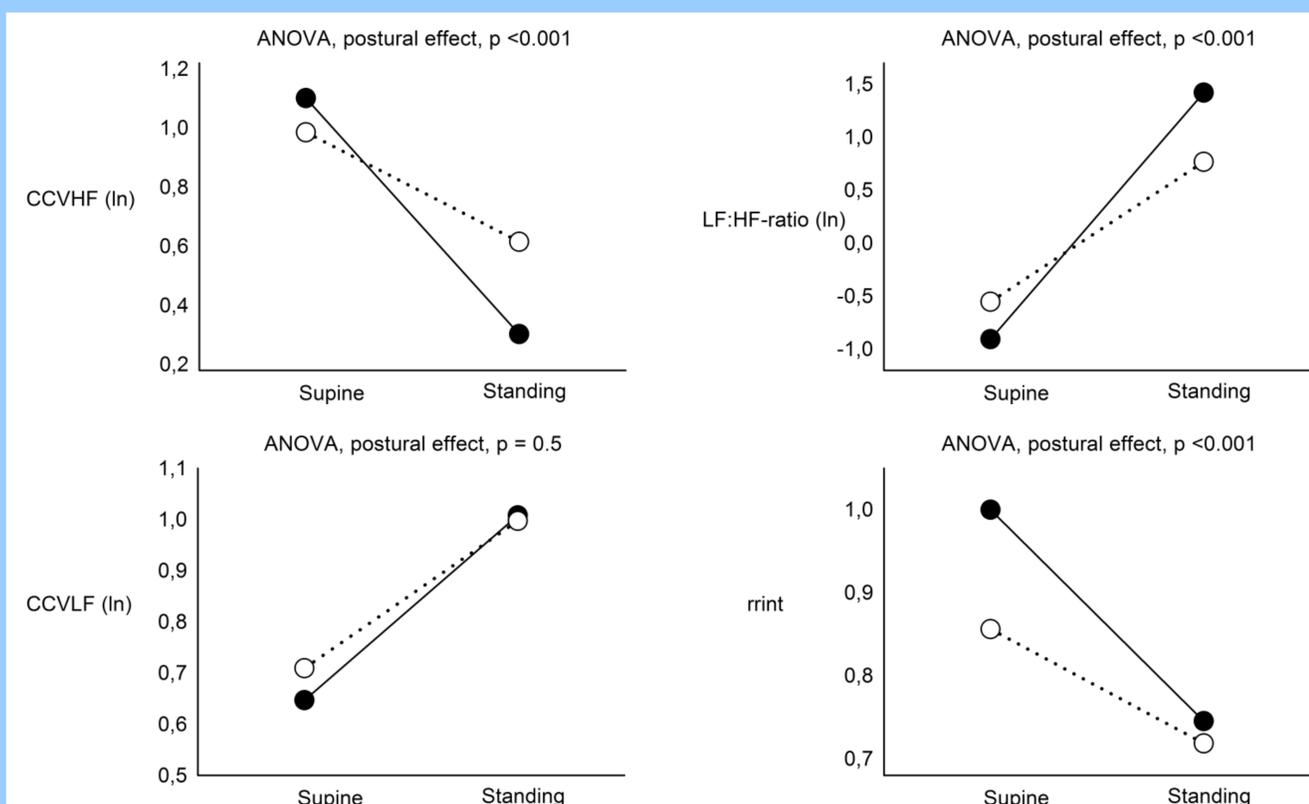
	CCVLF (ln)				CCVHF (ln)			
	Supine		Standing		Supine		Standing	
	r	p	r	p	r	p	r	p
P1	-0.109	0.4	-0.312	0.01	-0.129	0.3	-0.143	0.3
P2	-0.138	0.3	-0.401	0.001	-0.211	0.10	-0.146	0.3
P3	-0.264	0.04	-0.431	0.000	-0.393	0.001	-0.315	0.01
P4	-0.332	0.02	-0.394	0.004	-0.456	0.001	-0.376	0.006
P5	-0.354	0.006	-0.418	0.001	-0.502	0.000	-0.351	0.006
P6	-0.407	0.001	-0.391	0.002	-0.479	0.000	-0.288	0.02
P7	-0.348	0.005	-0.394	0.001	-0.371	0.003	-0.165	0.2
P8	-0.349	0.005	-0.402	0.001	-0.343	0.006	-0.185	0.1

4 Conclusion

A perturbed sympatho-vagal balance is present in TS explained by a decreased vagal activity in the supine position and increased vagal activity in the standing position. CCVHF correlate with aortic diameter in both groups, however no relation was found with changes in aortic diameter over time.

Turner syndrome

	CCVLF (ln)				CCVHF (ln)			
	Supine		Standing		Supine		Standing	
	r	p	r	p	r	p	r	p
P1	-0.189	0.1	-0.124	0.3	-0.293	0.02	-0.307	0.02
P2	-0.188	0.2	-0.196	0.1	-0.355	0.01	-0.361	0.005
P3	-0.183	0.2	-0.167	0.2	-0.306	0.02	-0.272	0.04
P4	-0.234	0.1	-0.264	0.08	-0.303	0.046	-0.241	0.1
P5	-0.255	0.05	-0.292	0.02	-0.365	0.004	-0.242	0.06
P6	-0.347	0.007	-0.393	0.002	-0.386	0.003	-0.330	0.01
P7	-0.192	0.1	-0.153	0.2	-0.316	0.01	-0.284	0.03
P8	-0.201	0.1	-0.145	0.3	-0.411	0.001	-0.328	0.01



Analysis of variance (ANOVA) in Turner syndrome (dashed line, open circles) versus controls (solid line, filled circles) for the interaction term "Position (supine-standing) * status (Turner syndrome or control)". Depicting individuals without diabetes, not taking antihypertensive drugs and with complete heart rate variability measurements.

Coefficient of component variation (square root of power/mean RR) of high frequency (CCVHF), Coefficient of component variation of low frequency (CCVLF), Reciprocal of heart rate per second (rrint), Ratio of low and high frequency (LF:HF-ratio).