The Difference of Left Ventricular Diastolic Function between Asymptomatic and Symptomatic Patients with Moderate to Severe Aortic Stenosis

박성지, 박승우, 장성아, 최진오, 이상철, 오재건

Division of Cardiovascular Disease
Cardiac Imaging Center, Cardiovascular Center,
Samsung Medical Center

2010 춘계심장학회

Background

Background

- **Aortic stenosis is a disorder of the heart characterized by fixed LV outflow tract obstruction, LV remodeling, and progressive diastolic dysfunction.**

- **Many of the clinical and pathologic features of AS results from diastolic dysfunction.**

Background

- **Although impaired diastolic function is common in AS, little is known about the effect of diastolic dysfunction in presence of symptom.**

Background

- **Asymptomatic patients with moderate AS have impaired LV systolic function as measured by reduced peak systolic tissue velocity and strain.**

  Steine *et al. Am J Cardiol 2008;102:897-901*

- **In patients with mild to moderate asymptomatic AS, TDI measures of diastolic dysfunction are abnormal and relate2d to the severity of AS.**

  Jassal *et al. J Am Soc Echocardiogr 2008;21:1023-1027*

The Difference of Left Ventricular Diastolic Function between Asymptomatic and Symptomatic Patients with Moderate to Severe Aortic Stenosis

Aim

to investigate the difference of LV diastolic function between asymptomatic and symptomatic patients with moderate to severe Aortic stenosis

Methods

Study Design

- We retrospectively reviewed the clinical and echocardiographic data that were prospectively collected moderate to severe AS from 2003 to 2009.

  (n=1,055: men 559: age 66.8±12.4 yrs)

- Exclusion criteria

  - Significant other valvular disease

  - EF <50%

 - IHD

Study Design

- **Symptomatic AS**

  : Presence of symptoms at baseline

  Exertional dyspnea

  Angina

  Syncope

  Presyncope

Echocardiographic measurements

- **M-mode, 2D, Doppler parameters**

- **Anatomic measurement were made according to ASE guideline.**

- **AS severity**
    - **Mean aortic valve gradient (mmHg)**
    - **AVA (cm^2)**
    - **Peak AV jet velocity (m/sec)**

Aortic Stenosis - Severity

	Vmax (m/s)	Mean PG (mmHg)	AVA (cm^2)	LVOT/AV TVI ratio
Mild	< 3.0	< 25	1.5-2.0	> 0.5
Moderate	3.0-4.0	30-40	1.0-1.5	0.25-0.5
Severe	> 4.0	> 40	< 1.0	< 0.25
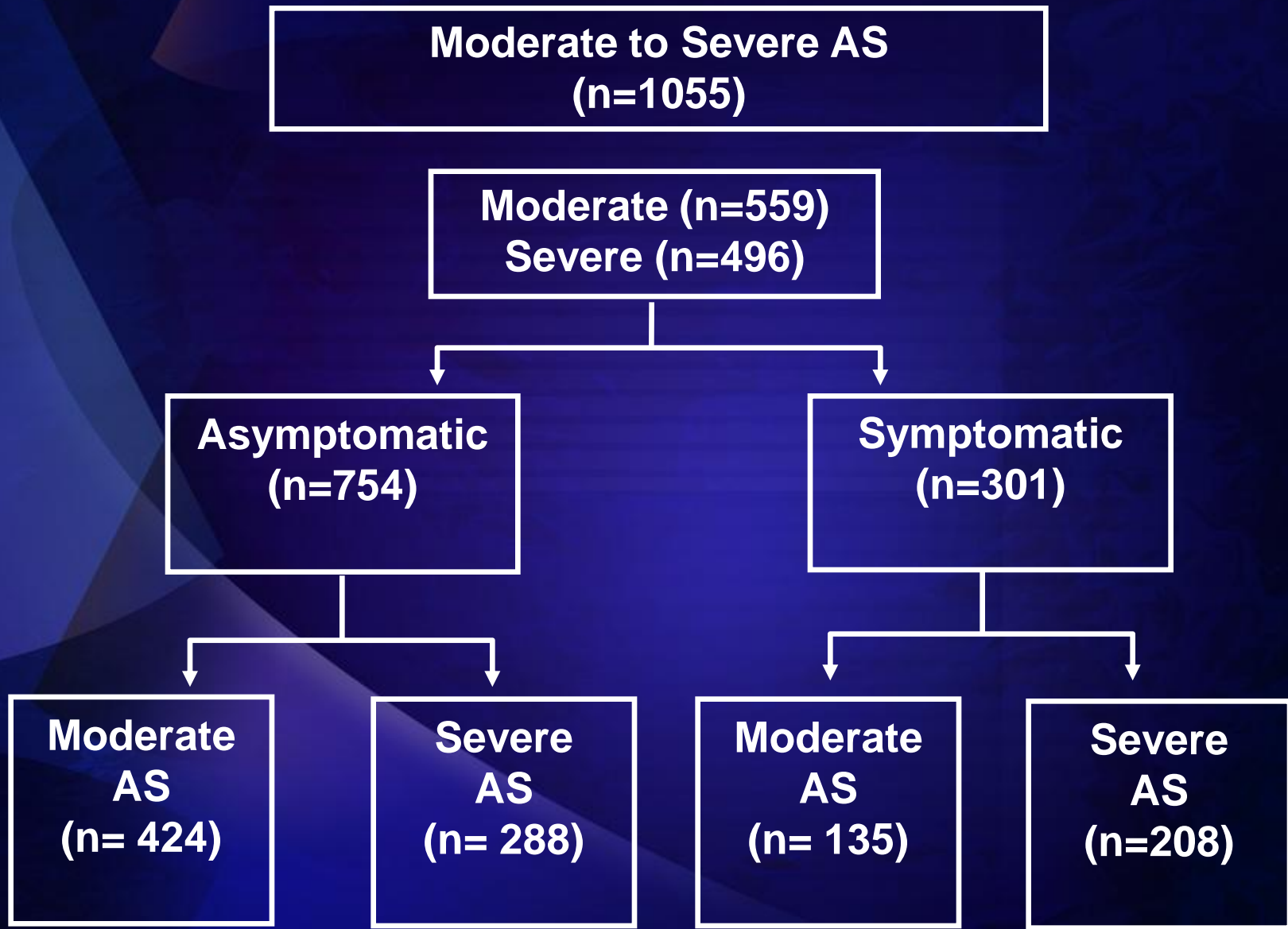
Results

Results
Clinical Characteristics

	Asymptomatic (n=712)	Symptomatic (n=343)	P
Age, year	65.9±12.8	68.9±10.8	.001
Gender, Male	402(56.5%)	191(55.7%)	.81
BMI, cm/kg^2	24.8±3.7	23.7±3.4	.70
SBP (mmHg)	137.5±22.9	135.7±25.9	.86
DBP (mmHg)	76.1±13.3	75.7±14.1	.69
HR (b.p.m)	74±13.4	73.6±13.1	.91
Smoking, %	143(20)	80(23.4)	.75
Hypertension, %	421(59.4)	216(63)	.58
DM, %	206(29)	113(33)	.51
Hyperchol., %	178(25)	106(31)	.56

Results
Clinical Parameters

	Asymptomatic (n=754)	Symptomatic (n=343)	P
T. Chol	178.1±44.8	168.8±32.7	.48
LDL- Chol	113±37.2	107.2±34.2	.52
HDL-Chol	47.5±14.8	46±12.6	.87
TG	269.1±253	256±81	.54
Glucose	123.9±38.2	127.5±26.0	.59
Calcium	9.0±0.6	8.6±0.5	.76
Uric acid	5.7±1.4	5.9±1.5	.88
Creatinine	1.1±0.3	0.96±0.19	.66

Results
Echocardiographic parameters (1)

	Asymptomatic (n=754)	Symptomatic (n=343)	P
LVIDd, mm	51.7±5.7	51.9±6.1	.51
LVIDs, mm	30.5±4.8	30.7±5.2	.58
IVSd, mm	10.7±2.5	11.2±2.2	.01
LVPWd, mm	10.3±1.9	10.9±1.8	<.001
LA, mm	42.6±7.5	44.2±8.4	.001
Aorta, mm	32.9±4.6	32.8±4.9	.75
RWT	0.41±0.09	0.43±0.11	.001
LVMI, g/m^2	158.3±52.8	171.6±48.9	<.001
LVEF, %	64.9±6.5	64.7±6.9	.70
LAVI, cc/m^2	45.7±24.6	53.9±22.1	.07

Results
Echocardiographic parameters (2)

	Asymptomatic (n=754)	Symptomatic (n=343)	*P*
E velocity, m/s	0.84±0.39	1.13±0.58	<.001
A velocity, m/s	1.09±0.98	1.07±0.37	.91
E/A ratio	0.91±0.56	0.99±0.56	.03
DT (ms)	290.9±159	312.2±160	.06
E'$_{septal}$, m/s	0.057±0.018	0.052±0.018	<.001
E/E'$_{septal}$ ratio	14.9±7.1	22.2±12.02	<.001

Results
Echocardiographic parameters (3)

	Asymptomatic (n=754)	Symptomatic (n=343)	*P*
Peak AV velocity, m/s	4.09±0.77	4.4±0.85	<0.001
Mean Pr. Gr., mmHg	39.4±16.9	47.4±19.7	<0.001
AVA, cm^2	0.96±0.28	0.84±0.25	<0.001

Results

	Univariate Analysis		Multivariate Analysis	
	P	HR (95% CI)	P	HR (95% CI)
age	.001	1.018(1.007-1.029)	.006	1.022(1.006-1.037)
RWT	<.001	2.208(1.374-3.386)	NS	
LVMI	.001	1.005(1.002-1.008)	NS	
LA	.001	1.027(1.01-1.044)	NS	
E	<.001	3.379(2.544-4.488)	NS	
E/A	.035	1.301(1.019-1.662)	NS	
E'	<.001	1.17(1.089-1.044)	NS	
E/E'	<.001	1.09(1.07-1.11)	<.001	1.086(1.064-1.108)
Vmax	<.001	1.762(1.492-2.082)	<.001	1.559(1.268-1.915)
mean PG	<.001	1.024(1.017-1.031)	NS	
AVA	<.001	0.189(0.112-0.32)	NS	

Summary

1. In symptomatic AS group, age was older, E/E'sep was higher, RWT and LVMI were higher than asymptomatic AS group.

2. In multivariate analysis, age, E/E', and peak AV velocity are independent predictor.

Conclusions

- **Symptomatic patients with moderate to severe AS have impaired LV relaxation and increased LV filling pressure compared with asymptomatic AS patients.**

- **These results underline the importance of diastolic dysfunction as a severity index in patients with AS.**