

## 도플러 심초음파도상 Restrictive Pattern의 임상적 양상

배장호 · 김기식 · 한창엽 · 한성욱 · 현대우  
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= Abstract =

### Clinical Status in Patients Who Show Restrictive Pattern on Doppler Transmitral Flow Pattern

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**Background :** Restrictive pattern on Doppler transmitral flow pattern represent reduced left ventricular compliance and associated with poor prognosis in patients with systolic dysfunction due to congestive heart failure or myocardial infarction. Although there are many clinical evaluation about clinical significance of restrictive transmitral flow pattern, investigation about what kinds of disease reveal the characteristic restrictive transmitral flow pattern and significance according to criteria of restrictive transmitral flow pattern is few. Therefore, we have analyzed patients with restrictive transmitral flow pattern in order to evaluate clinical diagnosis and clinical significance according to criteria of restrictive transmitral flow pattern.

**Methods :** The study population consisted of 229 patients (male 129 patients, female 102 patients, mean age 40.6 years old) who show E/A ratio  $>2$  on Doppler echocardiography from september 1994 to april 1996. We have reviewed the medical records of that patients.

**Results :**

1) In case of patients more than 2 at E/A ratio, we found that subjects not related with cardiovascular diseases were 76 persons (33.2%), valvular heart disease 75 patients (32.3%), ischemic heart disease 25 patients (10.9%), cardiomyopathy 16 patients (6.9%). Among valvular heart disease, mitral regurgitation was most frequently observed (44.5%). In these patients, patients with left ventricular systolic dysfunction were 60 patients (26.2%).

2) Patients more than 2 at E/A ratio and less than 150msec at deceleration time of E wave were 126 patients (55.0%). In these patients, we found that valvular heart disease was also most frequently observed (49 patients, 38.8%), subjects not related with cardiovascular diseases 30



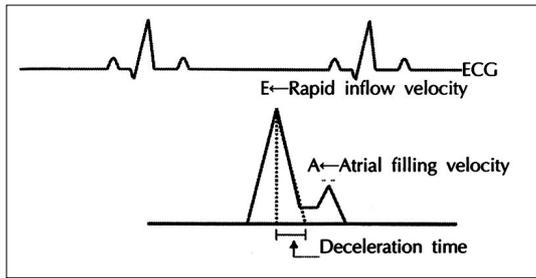


Fig. 1. Schematic diagram of peak E velocity, peak A velocity and deceleration time(DT) of E wave on Doppler transmitral flow pattern.

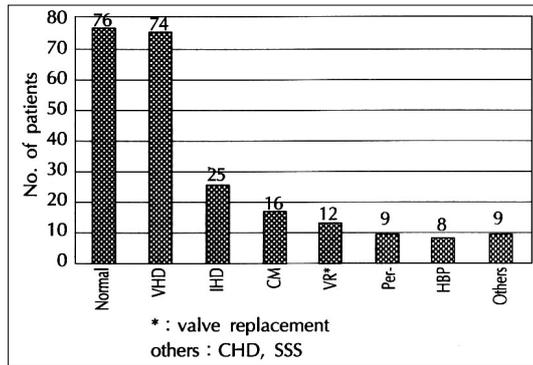


Fig. 2. Clinical status in patients with E/A ratio > 2. VHD : valvular heart disease, IHD : ischemic heart disease, CM : cardiomyopathy, HBP : hypertension, CHD : congenital heart disease, SSS : sick sinus syndrome.

parasternal long axis view  
Teichholz<sup>13)</sup>  
Volume = (7.0/(2.4 + D)) × D<sup>3</sup>, D =  
E/A ratio (150msec) ...  
E/A ratio ...

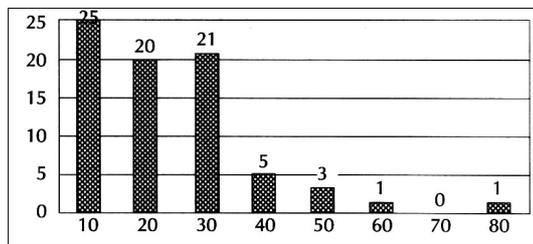


Fig. 3. Age distribution of population who shows insignificant restrictive pattern mitral flow velocity(n = 76).

결 과  
E/A ratio 2.56 ± 0.65  
DT(msec) 150.24 ± 42.71msec,  
55.31 ± 12.74% (Table 1).

1) E/A ratio > 2  
E/A ratio > 2

Table 1. Echocardiographic variables in patients with E/A > 2

Variable	Mean ± SD
E Vmax(m/sec)	1.09 ± 0.28(0.55 - 2.39)
A Vmax(m/sec)	0.44 ± 0.12(0.11 - 1.0)
E/A ratio	2.56 ± 0.65(2.00 - 6.95)
DT(msec)	150.24 ± 42.71(45 - 295)
LVDs(cm)	3.62 ± 1.05(1.57 - 7.54)
LVDd(cm)	5.41 ± 0.92(3.51 - 8.98)
EF(%)	55.31 ± 12.74(15 - 87)

DT : deceleration time, LVDs : endsystolic left ventricular dimension, LVDd : enddiastolic left ventricular dimension, EF : ejection fraction

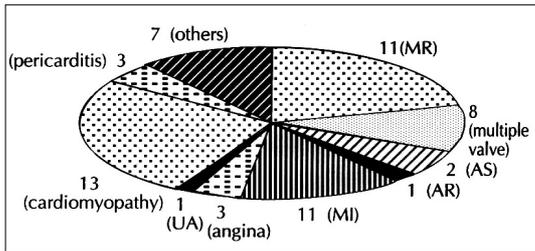
E/A ratio > 2  
76 (33.2%)  
74 (32.3%),  
25 (10.9%), 16 (6.9%),  
12 (5.2%), 9 (3.9%),  
3 (1.3%)  
(Fig. 2).

E/A ratio > 2  
76 (87%)  
10 (25.7%), 20 (44.6%), 30 (44.6%), 40 (25.7%),  
5 (6.8%), 2 (2.7%),  
14 (18.9%)  
(Table 2).

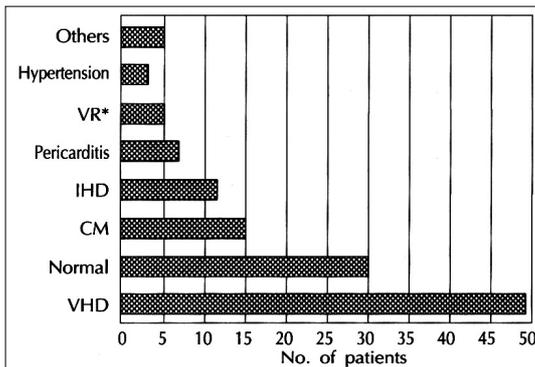
E/A ratio > 2  
229  
55%  
60 26.2%

**Table 2.** Valvular heart disease in patients with E/A > 2

Disease	No. of patients
Mitral regurgitation	33(44.6%)
Multiple valvular disease	19(25.7%)
Aortic regurgitation	5( 6.8%)
Aortic stenosis	2( 2.7%)
Tricuspid regurgitation	14(18.9%)
Pulmonic stenosis	1( 1.4%)
Total	74(100%)



**Fig. 4.** Clinical status in patients with E/A ratio >2 and EF <55%.  
n = 60/229 (26.2%), VHD : ss, IHD : 15



**Fig. 5.** Clinical status in patients with E/A >2 and DT <150msec.  
n = 126/229(55.02%), \* : valve replacement, others : CHD, SSS

가 74 39%

가 22 (14%)

15 (10%) (Fig. 4).

2) E/A >2, E <150msec

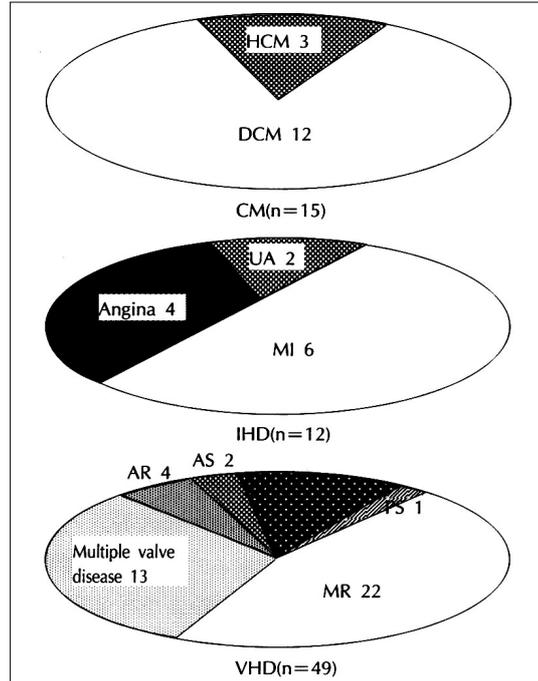
, E/A 가 2 E

150msec 126 (55.0%)

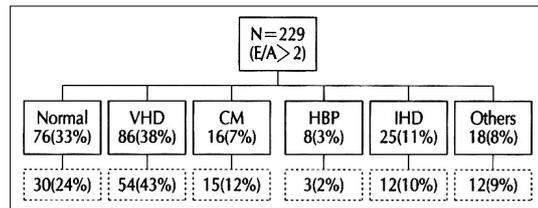
49 (38.8%)

가 가 가

30 (23.8%), 15 (11.9%),



**Fig. 6.** Clinical status in patients with E/A ratio >2 and ET 150msec.



**Fig. 7.** Clinical status according to criteria of restrictive transmitral Doppler velocity pattern.  
□ : E/A>2, ▨ : E/A>2 and DT of E wave<150 msec

12 (9.5%), 7 (5.6%),

가 5 (4.0%), 3 (2.3%),

가 3 (2.3%)

가 2 (1.6%) (Fig. 5).

E/A E

가 가 229

76 (33%) 126 30 (23.8%)

22 가 ,

12 가

6 가 (Fig. 6).

126 , 가 가 , 가  
 39 (31.0%) , 가 , 59% 가 가  
 41% . , 7,18,20) ,  
 . 가 가 , 21) .  
 고 안 가 가 22,23) ,  
 가 가 가 7) .  
 가 가 가 , ,  
 , 2 가 , , ,  
 14) . , , , ,  
 15-17) Klein .  
 15) E/A .  
 Fujii 24) , .  
 가 E/A ,  
 가 , 가 가 가  
 가 , 가 가  
 18) E 가 , 가  
 가 , 가 가  
 가 가 E/A E 85%, 25) .  
 15% 가  
 19) .  
 가 , 1) ,  
 , 2) , 3) ,  
 가 , 4) , 5) ,  
 , 7) E 가  
 , 7) . , ,

E/A 2 가  
 가  
 1). , 가 76 10 , 20  
 가 30 가 66 . Vande Werf <sup>32)</sup>  
 , E (left ventricular mass) 가  
 tips) E 가 (leaflet 가  
 E/A 가 2 <sup>33)</sup>  
<sup>15)</sup> Appleton <sup>7)</sup>  
<sup>26)</sup> 55 90msec,  
 60 115msec,  
 ( , 40 100msec, E/A 1.0 2.5 150  
 ) 240msec ,  
<sup>27-29)</sup> 가  
 76  
 ,  
 E 가 <sup>7)</sup> 가  
 가 가 A 가  
<sup>34)</sup> 가 60 70  
 가 가 <sup>30)</sup> , A 10% <sup>35)</sup>  
 가  
 가 (5 10ml/kg) 가  
 .  
<sup>1)</sup> 가  
 가  
 76 가 E 가 , 가  
 가 가 E 가  
 가 가  
 가 <sup>26)</sup>  
 E/A >2, E  
 가 , E (<150msec)  
 가 A 가 가 E/A 가  
<sup>28)</sup> . Pearson <sup>31)</sup> 40 가



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