

대동맥 판막질환환자에게서 혈역학적 특징 및 관상동맥 혈류 양상과의 관계 - 혈관내 Doppler Wire를 이용한 연구 -

고종훈 · 김한수 · 탁승제 · 김동진 · 신준한 · 최병일

Phasic Coronary Artery Flow Profiles in Patients with Aortic Valve Disease

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ABSTRACT

Background : The previous reports have demonstrated that coronary artery flow profiles might change in patients with aortic valve disease. Our objective was to assess phasic coronary artery flow and velocity characteristics and coronary flow reserve in patients with severe aortic valve disease. **Method** : We studied six patients (4 men and 2 women, mean age 61.3 ± 6.3 years) with aortic regurgitation and seven patients (3 men and 4 women, mean age 66.3 ± 10.3 years) with aortic stenosis. Coronary flow velocity was measured at the proximal portion of left anterior descending artery with 0.014-inch Doppler tipped guide wire and intracoronary injection of adenosine. Nineteen patients (11 men and 8 women, mean age 52 ± 9.8 years) with normal coronary artery were served as normal control. **Result** : The velocity-time integral of systolic coronary flow (SPVi) was significantly higher in patient with severe aortic regurgitation than control (21.1 ± 5 vs 9.4 ± 3.1 , $p < 0.05$, respectively) and ratio of diastolic to systolic the velocity-time integrals (DSiR) was significantly lower in patient with severe aortic regurgitation than control subject (1.5 ± 0.5 vs 3.7 ± 0.8 $p < 0.05$, respectively). Patients with severe aortic stenosis had significantly higher velocity-time integral of diastolic coronary flow (DPVi) than control subject (17 ± 9.7 vs 8.8 ± 3.0 $p < 0.05$, respectively) and slightly higher DSiR than control subject (4.0 ± 2.5 vs 3.7 ± 0.8 $p > 0.05$, respectively). Coronary flow reserve was significantly decreased in patient with aortic valve disease compared with control subject (2.1 ± 0.8 vs 3.2 ± 0.4 $p < 0.05$, respectively). **Conclusion** : Coronary flow reserve decreased significantly in patients with AR and with AS compared with normal control. Coronary blood flow profiles in patients with AR was characterized by systolic flow predominance and reduced diastolic flow whereas patients with AS was a tendency toward decreased systolic flow and increased diastolic flow. (Korean Circulation J 1998;28(10):1691-1699)

KEY WORDS : Phasic coronary artery flow profile · Coronary flow reserve.

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서론	LVOT width 0.6	AR jet area/LVOT area ratio가
Doppler guide wire가		가
가	가	0.75
	cm ²	peak CW velocity가 4.5 m/s
, syndrome X		, mean pressure Gradient가 50 mmHg
Doppler catheter - tip	관상동맥의 조영술	Seldinger
	7Fr Judkin	Phi -
	lips	monoplane or biplane cineangiography
가	90	
		60%
가		
0.014 - inch Doppler tipped wire(15 MHz)	관상동맥 혈류 예비력(coronary flow reserve)의 측정	3Fr (Infusion Catheter,
	COOK, Blooming, IN) 7Fr	
대상 및 방법	0.014 (Flo -	wire ; Cardiometrics, Mountain View, CA)
대 상	(baseline flow) adenosine	
1995 6 1997 6	(maximal hyperemic flow)	
	13 18 24 mcg,	
가 7 (: =4 : 3,	8 12 mcg adenosine	
: 66.5±9),	5 cc	
=3 : 3, : 61±5)	(coronary flow reserve)	
19 (: =10 : 9, : 52.6		
±9)	관상동맥 혈류속도 양상의 측정	
	0.014	
가		15 MHz
parasternal long short axis AR jet width/	pulse Doppler velocimeter	soft ware

ADPV(average diastolic peak velocity), ASPV(average systolic peak velocity), DSVR(diastolic to systolic velocity ratio), SPVi(systolic peak velocitytime integral), DPVi(diastolic peak velocity - time integral), DSIR(diastolic to systolic velocity - time integral ratio)

통계처리

SPSS(window) paired Student t - test . p - value가 0.05

연구결과

대상환자의 임상적 특성

19 가 10 가 9
52 ± 9
6 가 4 가 2
51 ± 5 7 가 4
가 3 66 ± 9
(p<0.05),
(p<0.05).

Table 1. Baseline clinical characteristics and echocardiographic findings

	Control (n=19)	AR (n=6)	AS (n=7)
Age	52 ± 9	61 ± 5	66 ± 9
HR (beat/min)	68 ± 6	87 ± 9*	94 ± 9*
SBP (mmHg)	123 ± 13	144 ± 14*	154 ± 14*
DBP (mmHg)	7 ± 19	66 ± 10	96 ± 13 [†]
LVDd (mm)	48 ± 4	58 ± 10*	52 ± 7
IVSDd (mm)	10 ± 1	12 ± 2*	13 ± 2*
PWTd	10 ± 1	12 ± 2*	12 ± 3*
EF (%)	70 ± 6	63 ± 9	59 ± 9
LVMI (g/m ²)	111 ± 14	191 ± 61*	181 ± 56*

LVDd : LV istolic dimension, IVSDd : intraseptal diastolic dimension, PWTd : posterior wall diastolic thickness

*p<0.05 vs control, [†]p<0.05 vs AR

가
(p<0.05)
가 (p>0.05)
(Table 1).

관상동맥 혈류예비력(coronary flow reserve)의 측정

14 ±
4.7 cm/sec,
17 ± 2.6 cm/sec, 27 ± 3 cm/sec
가 (p<0.05),
Adenosine
43.3 ± 9.3 cm/sec
38 ± 9cm/sec ;
50 ± 14cm/sec
(p>0.05)(Fig. 1).

3.2 ± 0.4
2.1
± 056 ; 2.2 ± 05
(p<0.01)

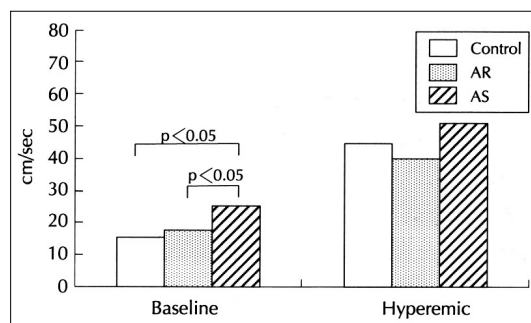


Fig. 1. Coronary average peak velocity. Baseline average peak velocity was higher in the patients with aortic valve disease than in the control group.

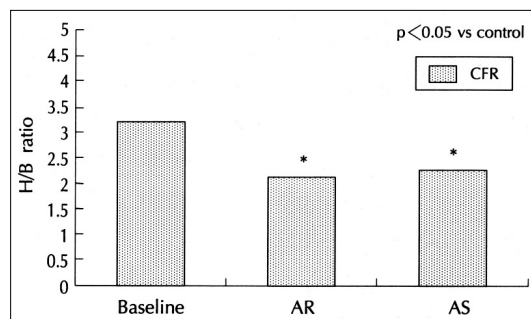


Fig. 2. Coronary blood flow reserve (CFR) markedly decreased in patients with severe AR and AS.

가 (p<0.05)(Fig. 2). city rate, DSVR)가 가 (p>0.05).
 (SPVi)
 관상동맥의 혈류 양상의 변화 가 (2.6±0.9 cm/min ; 6.4±1.4
 Doppler velocity signal cm/min, p<0.05)
 (DPVi)
 (diastolic to systolic velocity rate, DSVR)가 가 (p>0.05).
 (1.9±0.6 ; (diastolic to systolic velocity - time int -
 1.2±0.5, p<0.05), egral ratio, DSVi)
 (diastolic to systolic velo - (3.7±0.8 ; 1.5±0.4, p<0.05)(Table 2)

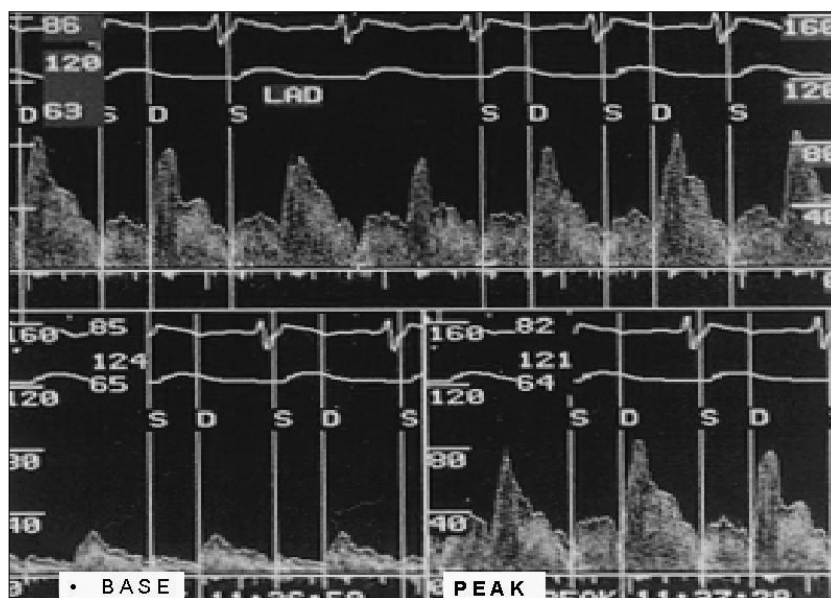


Fig. 3. The coronary blood flow velocity waveform is characterized by diastolic predominance in control group. BASE ; resting PEAK ; after administration of adenosine.

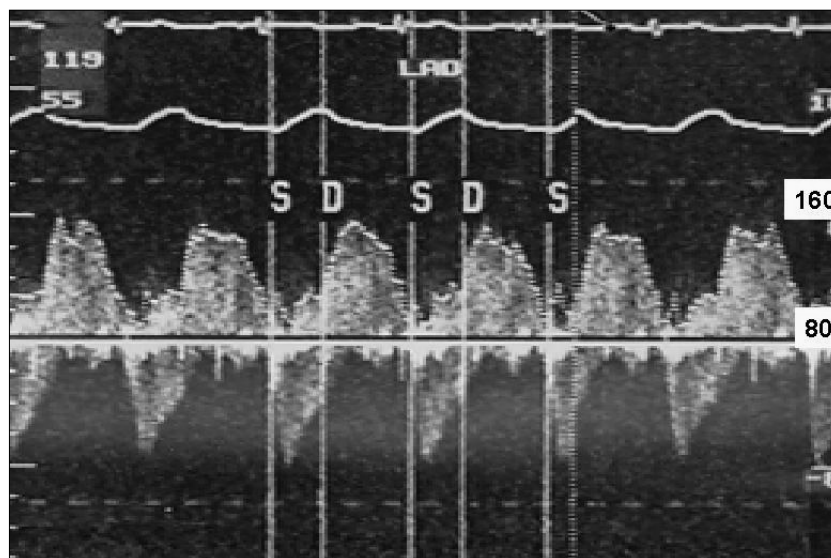


Fig. 4. The coronary waveforms were characterized by a decreased systolic flow with a first-half systolic reverse flow and slowly increasing of diastolic flow in patients with severe AS.

(Figs. 3, 4 and 5).

DSVR 가 (r=0.75, p<0.05), (r=0.28, p>0.05)(Fig. 6), (pressure gradient) 가 (p>0.05).

eries) 가 (muscular ca - pillary arterioles) 가 가 가

고 찰

(subepicardial art -

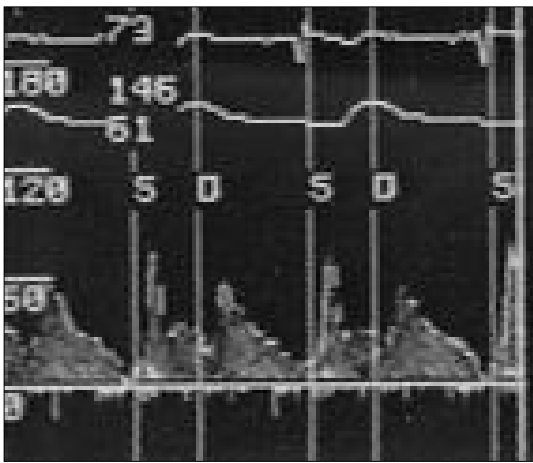


Fig. 5. The coronary velocity waveforms were characterized marked augmentation of systolic blood flow and lesser enhancement of diastolic blood flow in patients with severe AR.

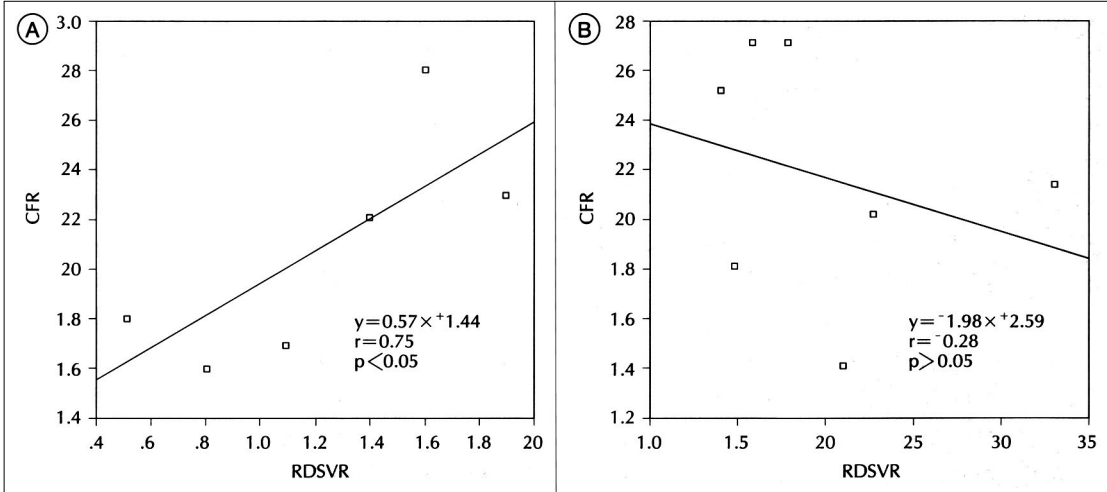


Fig. 6. Graphs showing relations between the ratio of the resting diastolic to systolic peak velocity (DSVR) and coronary flow reserve (CFR). A : AR, B : AS.

electromagnetic flowmeter
11 8 Chilian²¹⁾
(extravascular comp -
ression force)
(retrograde flow)
가 , Minorue¹⁴⁾ 26
가 16 가¹³⁾
(ratio of diastolic to systolic ve -
lociyy - time integrals, DSVR)
(1.58 ± 0.1 vs 3.32 ± 0.3)
가⁸⁾
가 가
 3.7 ± 0.8
 1.5 ± 0.4
(Fig. 5).
Matsuo¹³⁾
(systolic and diastolic
velocity ratio : DSVR) 가
가 가
가 가
Doppler guide wire
가
가 가
Doppler tip catheter & Doppler tip guide wire
가 가
Doppler frequency shift)
(coronary perfusion pressure)
¹⁴⁾
Shuzo¹⁶⁾
erine
adenosine papav -
(Doppler frequency shift)
가 (extravascular compression
force)가
Takashi¹⁸⁾ 6
22 - 24)27)
가 가 가
, Minoru¹⁴⁾
가 가
가 (extravascular compress -
ion force) 가 가
가

가 가 가 가

(perfusion pressure)

가 가 가 가

가 , 가

18)19)

Abbas ¹⁾ 3.51 ± 0.27

1,20 ± 0.05

연구의 제한점

3.2 ± 0.4 2.1 ±

0.5

2.2 ± 0.5

Minoru ¹⁴⁾ Doppler tip guide wire 가

(Aortic regurgitant frac - tion) , 가 가

요 약

(r = 0.28, p < 0.05).

Minoru ¹⁴⁾ 연구배경

Doppler catheter - tip

(LVOT)

(retr -

ograde flow) 가

(impaired coronary vasodilator capacity) 가

(LVOT) 0.014 - inch Doppler ti -

pped wire(15 MHz)

대상 및 방법

가

가 13

가 7 , 6 .

19 .

가 ,

0.014

(coronary flow

reserve) , soft ware

(diast -

olic to systolic velocity - time integral ratio ; DSVR)

결 과

1)

14 ± 4.7 cm/sec,

17 ± 2.6 ; 27 ± 3 cm/sec

가 (p<0.05)

43.3

± 9.3 cm/sec

38 ± 9 ; 50 ± 14 cm/sec

2)

3.2 ± 0.4

2.1 ± 0.56 ; 2.2 ± 0.5

(p<

0.01)

가 (p<0.05).

3)

(SPVi)

가 (2.6 ± 0.9 cm/min ; 6.4 ± 1.4 cm/min,

p<0.05) DSIR

(3.7 ± 0.8 ; 1.5 ± 0.4, p<0.05).

(DPVi) DSIR

가 (p>0.05).

4)

DSVR

가 (r =

0.75, p<0.05),

(r = 0.28, p>0.05).

결 론

가

가

가

가

가

중심 단어 :

1997

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