

변이형 협심증 환자에서 운동유발성 관동맥 연축의 유형과 임상 양상과의 관계

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= Abstract =

Patterns of Exercise-induced Coronary Spasm in Patients with Variant Angina : Results, Correlation with Clinical Features

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Background : Exercise-induced coronary spasm is occasionally recognized in patients with variant angina, but the patterns of exercise-induced coronary spasm and its relation to clinical features are still not clear.

Methods : Eight consecutive patients with variant angina without significant stenosis of the coronary artery performed serial treadmill exercise tests during early morning, late morning, and in the afternoon. The subjects repeated the tests after administration of atropine and doxazosin or phentolamine.

Results : (Upon drug administration), anginal episodes with ST-segment changes (elevation 5, depression 1) Occurred repeatedly in 6 of the 8 patients during early morning ; the episodes occurred in only 2 patients during the afternoon exercise test. Four patients showed exercise-induced angina and ST-segment changes during early morning but not in the afternoon, and 2 of them showed mild episodes of exercise-induced angina and ST-segment changes during late morning. Three of the four patients had the characteristic clinical history of angina in early morning during usual activities but not during daytime activities despite the activities being more strenuous. Another 2 patients showed both exercise-induced ST-segment elevation and angina in early morning and afternoon, and they had the characteristic history of more episodes at night and in early morning but only occasionally in the daytime with or without relation to activity. One of the two patients showed intermittent ST-segment elevation during the exercise test. The other two patients had exercise-induced episodes neither in the early morning nor in the afternoon; they had a characteristic history of episodes only at night during sleep but never in the early morning nor in the daytime.

Atropine did not suppress the exercise-induced angina in 4 of 5 patients studied. Doxazosin or phentolamine suppressed the exercise-induced episodes in 3 of 5 patients studied but aggravated spontaneous episodes in 3 patients.

Conclusion : These data suggest that there's possibility of presence of different patterns of exercise-induced coronary spasm, which may be induced by different mechanisms from those in spontaneous episodes in patients with variant angina.

KEY WORDS : Variant angina · Exercise-induced coronary spasm · Clinical feature.

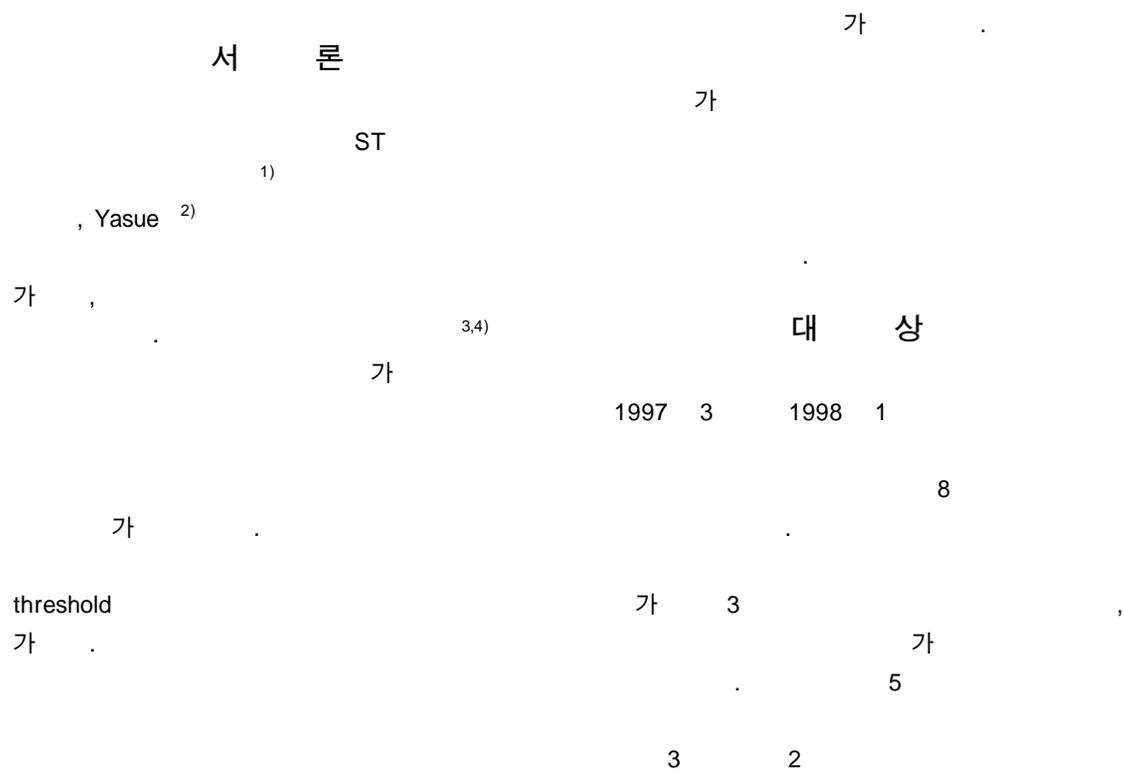


Table 1. Clinical and angiographic findings of 8 patients with variant angina studied

No	Age / Sex	Angina			Coronary Angiography	
		Episodes Time	Type	Angina Frequency	Baseline	Spasm (Erg. or spont.)
1	59/M	Early, late morning	R ± E	7/wk	20% LAD	LAD
2	68/M	Early morning ± late morning	E	0.5 - 1/wk	10% LCX	LCX
3	39/M	Early morning	E	0.5/wk	10% LAD	ECG#
4	54/M	Early morning	E	0.5/wk	Normal	LAD
5	53/M	Night	R	2/day	10% RCA	ECG#
6	51/M	Night but anytime	R+E	> 10/day	40% RCA, 10% LAD	LAD, RCA*
7	57/M	Night but anytime	R	> 10/day	10% RCA	LCX, RCA*
8	49/M	Night ± morning	R	3/wk	10% RCA	ECG#

E, exertion ; R, rest ; LAD, left anterior descending artery ; LCX, left circumflex artery ; *, spontaneous spasm ; #, ergonovine-induced spasm was demonstrated by ECG

3, 1, 2, 가, 2, 3, 5, 8) ST 가 ST 2mm 가 ST J 80msec 1mm 1mm

1. 운동부하검사
Marquette Case 15
, Bruce protocol

(1, 2, 4) (6, 7) , ST II, V₁ V₅ 가 ST ST 2mm 가 ST J 80msec 1mm 1mm

2. 약물반응 검사

atropine 0.04mg/kg phentolamine 10mg doxazosin 2mg 5 (Table 1).

방 법

ST doxazosin

24

결 과

(6, 7) 1. 운동부하검사 6 8 6/8 (6 8) (4 6) ST (5 , 1) , 2/8 (9) ST 5/6 atropine - (phentolamine - ergonovine ST mine doxazosin) . 6 3 (Table 2). 5 6 , doxazosin 3

Table 2. Results of repeated treadmill exercise tests in 8 patients with variant angina

No	Early morning(6 : 00 - 8 : 00)			Late morning(9 : 00 - 12 : 00)			Afternoon(4 : 00 - 6 : 00)		
	Leads ST	Time (min)	End point	Leads ST	Time (min)	End point	Leads ST	Time (min)	End point
1	V ₁₋₅	8 : 34	Angina	None	11 : 36	Fatigue	None	12 : 03	Fatigue
	V ₁₋₅	12 : 10	Angina	, ,F	12 : 00	angina			
2	V ₄₋₆ , , ,F	9 : 14	Angina	V ₅₋₆	12 : 17	Angina	None	12 : 18	Fatigue
	None	12 : 56	Fatigue						
3 [†]	V ₂₋₆	4 : 35	Angina				None	10 : 16	Fatigue
	None	5 : 08	Angina						
4 [#]	V ₁₋₅	3 : 19	Angina	None	9 : 42	Dizziness	None	12 : 17	Fatigue
	V ₁₋₅	6 : 28	Angina						
5 [#]	None	12 : 03	Fatigue				, ,F,V ₅	13 : 40	Fatigue
6	, ,F	9 : 56	Angina	V ₁₋₅ , , ,F	8 : 52	Angina	V ₁₋₆ , , ,F	7 : 07	Angina
7	, ,F	3 : 29	Angina				, ,F	7 : 00	Angina
	V ₅₋₆	6 : 21	Angina						
8	None	9 : 00	Fatigue	None	10 : 41	Fatigue	None	12 : 36	Fatigue
	None	10 : 00	Fatigue						
+Rate	9/14(64%)	10/14(71)	3/6(50)	3/6(50)	3/8(38)	2/8(25)			

[†], case with Q wave in V₁₋₃ on baseline ECG ; [#], case with LVH on baseline ECG ; ↑, elevation ; ↓, depression ; △ ST, ST segment change

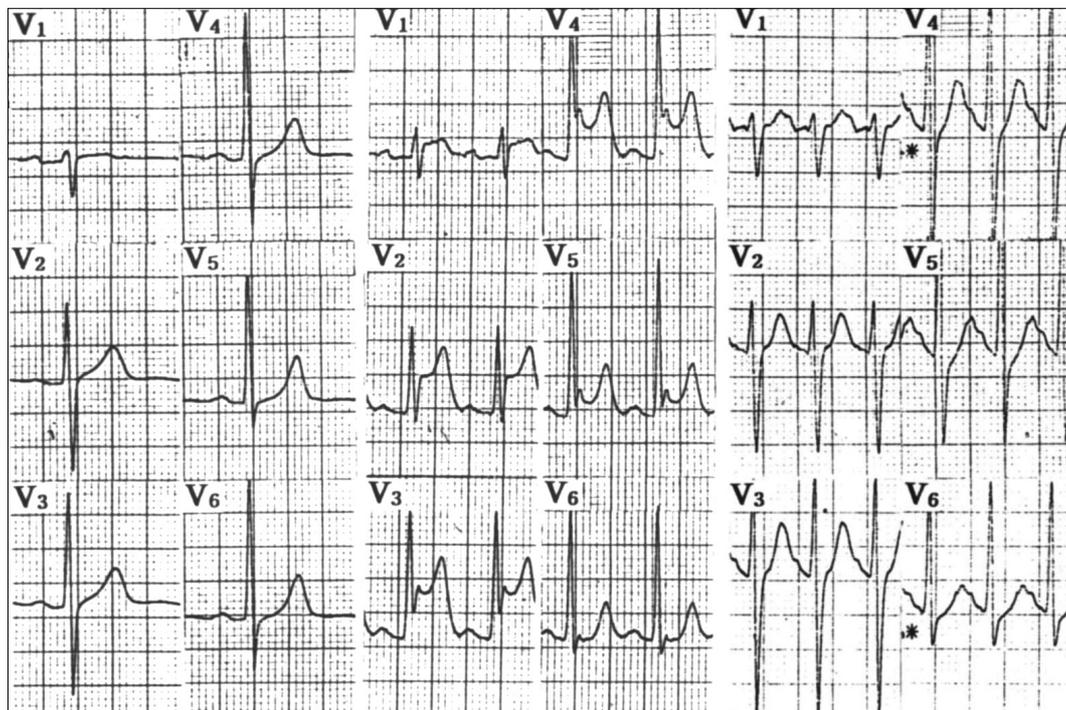


Fig. 1. Treadmill exercise test in patient 1. Treadmill exercise induced the attack associated with ST-segment elevation in precordial leads in the early morning, but not in the afternoon of the same day, although the level of exercise was higher in the afternoon than in the morning.

3, 4) 6 4 (1, 2, ST 6
 ST
 (Fig. 1), 2 (6, 7) (Fig. 2).
 가 ST 가
 가 4

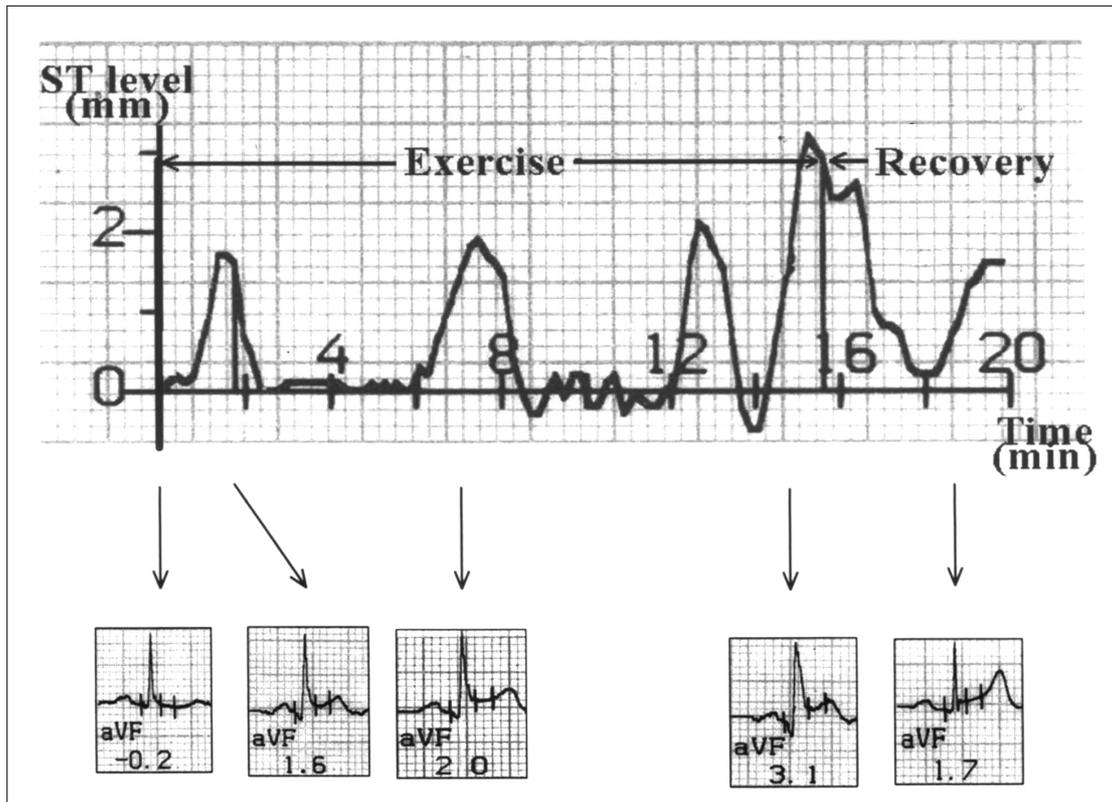


Fig. 2. Sequential ST-segment trend and ECG(aVF) changes during treadmill exercise test in patient 6.

Table 3. The effects of atropine and α -blockers on exercise-induced coronary spasm in patients with variant angina

No	Atropine			α -blockers			
	Leads ST	Time (min)	End point	Drug	Leads ST	Time (min)	End point
1	V ₁₋₄	9 : 41	Angina	Doxazosin	None	12 : 11	Fatigue
2	None	11 : 17	Angina [#]	Doxazosin	None	12 : 34	Fatigue*
	None	12 : 56	Fatigue	Doxazosin	None	11 : 38	Fatigue
3	None	7 : 15	Angina	Phentolamine	None	5 : 15	Angina
4				Doxazosin	None	12 : 28	Dyspnea*
5							
6	V ₁₋₆	7 : 00	Angina	Phentolamine	V ₁₋₆ , I, aVF	1 : 19	Angina*
7	I, aVF	2 : 42	Angina				
8							

Δ ST, ST segment change : \uparrow , elevation : \downarrow , depression : [#], chest pain during recovery : *, frequent rest pain during α -blockade

3 9 12 , 1/5 . ST
 2 , ST 3/5 (Table 3).
 1 , 1 -
 ST 6 5
 ST 가 1- doxazosin 3
 1 4 , 2
 - phentolamine 2
 , 1 ST
 phentolamine
 가
 50 가 (Table 3).

ST (6, 7) 고 안
 가 가 ,
 1
 ST
 가 ST
 6 5), 가
 6)
 , 7
 ST
 (5, 8)
 ST
 , 1
 ST
 2 Yasue
 2)
 ST
 13
 ST
 ST 71% 2 ST
 64%, 50%, 50%,
 25%, 38% .
 가
 ST
 Yasue

2. Atropine과 α -차단제에 대한 반응

Atropine

ST 6 5 5
 5 4/5 5

가

ST

Specchia ⁷⁾ ST 2 (6, 7)

10 Yasue 2 Specchia

7 , 1 7

, 1 ST , 가 가

1 가 가 가 2

가 Yasue 가

threshold가 , 가 6

Specchia 가 1 4

ST , 6 ST

, Yasue ST

ST Specchia Scardi ⁸⁾ Inomata ⁹⁾

ST

Speechia 가

가 가 . Specchia

ST 가 ST (5, 8)

Specchia 가 2 ST

가 Yasue ²⁾ ST

ST 가 가

(1, 2, 3, 4)가 가

Yasue ²⁾ 1 5

가 4 ST

가

가 가 ST

19) 19 100% 3-6) 가
 20) 21%, 19% 가
 ST 가
 가
 Yasue 2)
 ST
 71%, 64%, 50%, 50%,
 25%, 38% ST 가
 가
 3,5) 가 6, 7 가 17),
 (handgrip exercise) 18),
 가 ST
 5, 8
 2, 3, 4
 가 ST 가
 가 de Servi
 가
 10)
 가 가
 10) 요 약
 연구배경 :
 11-16) epinephrine Yasue 11)
 ST 가
 , Mudge
 12) cold pressor test 가

대상 및 방법 : 가 6) ST 5 at-ropine ST 8

결 론 : , atropine phentolamine doxazosin 3 , 1 , 2 , 2 가 가

결 과 :

1) ST (5 , 1) 8 6
 2) ST 가 4 , 2 ST 1 4
 3) ST 가 가 가
 4) 2 ST ,
 5) ST 71% 25%, 64%, 38% 50%, 50%

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