

협심증환자에서 운동부하심전도검사에 의한 허혈부위 예측

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Localization of Ischemic Area with Exercise Electrocardiography in Angina Pectoris : Correlation with ^{99m}Tc-MIBI Myocardial Perfusion Scanning

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ABSTRACT

Background : The purpose of the study was to determine the value of exercise electrocardiography in predicting the area of myocardial ischemia. **Method :** Seventy-six anginal patients with a perfusion defect in one vessel territory on exercise ^{99m}Tc-MIBI myocardial perfusion scan were studied. Each patient underwent exercise electrocardiography using modified Bruce protocol. Exercise electrocardiography was interpreted as abnormal when the horizontal or downsloping depression in ST segment was 0.1 mV or greater at 80 msec after the J point during exercise. Forty-eight patients had exercise induced ST-segment depression. **Result :** Twenty-five patients had exercise induced ST-segment depression in single lead-group and 23 patients had in multiple lead-groups. In 18 patients (18/23) with exercise induced ST-segment depression in multiple lead-groups, the perfusion defect involved the apical area on myocardial perfusion scanning and in 21 patients (21/25) with ST-segment depression in single lead-group, the perfusion defect did not involve the apical area. In patients without perfusion defect in the apical area, ST-segment depression in anterior lead-group (V₁ to V₄) was associated with myocardial perfusion defects in left anterior descending artery territories in five of five cases (100%), ST-segment depression in lateral lead-group (I, aVL, V₅, V₆) was associated with defects in left circumflex artery territories in six of six cases (100%), and ST-segment depression in inferior lead group (II, III, aVF) was associated with defects in right coronary artery territories in nine of ten (90%) (p<0.01). In patients with perfusion defect in the apical area, exercise induced ST-segment depressions were observed in multiple lead-groups (18/22). **Conclusion :** ST-segment depression on 12 lead exercise electrocardiography was a good predictor of the site of myocardial ischemia in anginal patients with single vessel territory ischemia when ST-segment depression developed in single lead group. However, ST-segment depressions in multiple lead-groups suggested that the perfusion defect involved the apical area and did not predict the site of myocardial ischemia. (Korean Circulation J 1998;28(4):676-682)

KEY WORDS : Exercise electrocardiography · Myocardial perfusion scan · Angina pectoris.

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서론

modified Bruce protocol¹²⁾

가

가

가

, 3

, 3

, 5 , 7

12

2 mm

가 가 ST , 10 mmHg

ST

1 mm ST

J 0.08

ST (V₁₋₄),

(I, aVL, V₅₋₆), (II, III, aVF)

1 - 5)

ST

심근관류스캔

가 6-10), , 20 mCi ^{99m}Tc -MIBI 1
ST 30 가
 , 1
 , ST 24
 11) SPECT (Prism 2000, Picker,
 USA) 45 45
 180 64 × 64
 ST (matrix) 25 60
 (Odyssey, Picker, USA)

대 상

대 상

1995 5 1996 8

2.3 4.6 mm

long axis view), (short axis view)

(horizontal long axis view)

76 2 가

48 가

11, 7, 7, ST, 7, ST, 16 (Table 3).

ST Gamma statistic¹³⁾

운동부하심전도상 ST분절하강위치와 심근관류스캔에서의 관류결손위치의 관계

결 과

48
40 72 , 55 ± 8
, 40 가 14 , 50 가 16 , 60 가
17 , 70 가 1 . 가 35 (73%,
55 ± 8), 가 13 (27%, 58
± 6) (Table 1).

심근관류스캔

48 (Left anterior descending artery) 24 (50%),
 9 (Left circumflex artery) (19%),
 (Right coronary artery) 15 (31%),
 24 19
 ,
 15 3
 , 9

(Table 2).

운동부하심전도 검사

ST

Table 1. Characteristics of the patients (n = 48)

Age (year)	55 ± 8
M : F	35 : 13
Weight (kg)	67 ± 7
Height (cm)	162 ± 15
Exercise duration (min)	12 ± 4
Exercise capacity (METs)	8 ± 3
Peak systolic blood pressure (mmHg)	171 ± 22
Peak heart rate (beats/min)	125 ± 20

Figures are mean \pm standard deviation

M = male F = female

MET = metabolic equivalent

ST
ST
가
, ST
ST
7
가
ST
7
6 (86%) , 1 (14%)
ST
11 10 (91%)
ST
, 1 (9%)
가
ST
16 9
(56%) , 2 (13%)
, 5 (31%)
(Table 4).
ST
23 18

Table 2. Distribution of the perfusion defect in myocardial perfusion scintigraphy

Territory	No (%)
LAD	24 (50)
LCX	9 (19)
RCA	15 (31)

LAD = Left anterior descending artery

LCX = Left circumflex artery

RCA = Right coronary artery.

Table 3. Distribution of the ST segment depression

Location	No (%)
Anterior leads (V ₁₋₄)	7 (14.6)
Lateral leads (I, aVL, V ₅₋₆)	7 (14.6)
Inferior leads (II, III, aVF)	11 (22.9)
Anterior & Inferior leads	7 (14.6)
Lateral & Inferior leads	16 (33.3)

Table 4. Agreement between exercise electrocardiography and myocardial perfusion scintigraphy in total patients

MPS	EET	V ₁₋₄	I, aVL, V ₅₋₆	II, III, aVF	V ₁₋₄ & II, III, aVF	V ₅₋₆ & II, III, aVF	Total
LAD		7	1	0	7	9	24
LCX		0	6	1	0	2	9
RCA		0	0	10	0	5	15
Total		7	7	11	7	16	48

EET = Exercise electrocardiographic test MPS = Myocardial perfusion scintigraphy (Gamma = 1, p<0.01)
Other abbreviations are as in Table 2

Table 5. Agreement between exercise electrocardiography and myocardial perfusion scintigraphy in the patients in whom the perfusion defect did not involve apex

MPS	EET	V ₁₋₄	I, aVL, V ₅₋₆	II, III, aVF	V ₁₋₄ & II, III, aVF	V ₅₋₆ & II, III, aVF	Total
LAD		5	0	0	0	0	5
LCX		0	6	1	0	2	9
RCA		0	0	9	0	3	11
Total		5	6	10	0	5	26

Abbreviations are as in Tables 2 and 4 (Gamma = 1, p<0.01).

Table 6. Agreement between exercise electrocardiography and myocardial perfusion scintigraphy in the patients in whom the perfusion defect involved apex

MPS	EET	V ₁₋₄	I, aVL, V ₅₋₆	II, III, aVF	V ₁₋₄ & II, III, aVF	V ₅₋₆ & II, III, aVF	Total
LAD		2	1	0	7	9	19
LCX		0	0	0	0	0	0
RCA		0	0	1	0	2	3
Total		2	1	1	7	11	22

Abbreviations are as in Tables 2 and 4

ST 25 4 ST 2

ST 1 ST

1 ST 7

26 ST 11

5 9 (82%) 2 (18%)

ST 6 (Table 6).

ST 10 9 (90%) 고 안

1 (10%) ST 5 2

(40%) 3 (60 %) (Table 5).

14)

22

681

ST

V 5 aVF 가 ST

가 ST

, 12 가

. Fox ¹⁷⁾ 방 법 :

16

, , ST 48

, , ST

. Nakajima ¹⁸⁾ 87

body surface mapping 28

23 가 결 과 :

ST - T isointegral map 48 25 ST

. Saito , 23 ST

¹⁹⁾ 20 electrodes multiple unip - ST

olar precordial lead ECG ST

R - wave amplitude (correction) 가 , ST

52% 86% 가 , (left main) 100% . Brad ST 23 18

²⁰⁾ 48 body surface mapping , ST

95%, 25 4

80% 26

ST (21) , ,

ST ST (V₁₋₄) ST

ST

가 100%(5/5) , (I, aVL, V₅₋₆) ST

ST 100%

(6/6) , (II, III, aVF) ST

90%(9/10)

(p<0.01). 22

가 (18) ,

ST

요 약

연구배경 : 결 론

ST

, ST

ST
가 , ST

중심 단어 :

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