

급성심근경색증 환자의 좌심실 국소벽 운동 평가에 대한 심초음파와 게이트 심근 SPECT의 비교

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Comparison between Echocardiography and Gated SPECT in the Assessment of Left Ventricular Wall Motion in Patients with Acute Myocardial Infarction

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ABSTRACT

Background and Objectives : Assessment of the regional left ventricular function provides valuable diagnostic and prognostic information of patients with coronary artery disease. The aim of the study was to analyze the agreement between wall motion scores, derived by gated single photon emission computed tomography (SPECT) and echocardiography (Echo) in myocardial infarction patients with a perfusion defect. **Subjects and Methods :** We studied the regional wall motion in 81 patients with an acute myocardial infarction, who underwent adenosine stress gated SPECT and Echo. Echo was performed in all the patients immediately prior to, or following, gated SPECT. The regional wall motion was evaluated by both modalities, and scored using a 16-segment model with a 4-point scoring system : 1 = normal, 2 = mild and moderate hypokinesia, 3 = severe hypokinesia, 4 = akinesia or dyskinesia. **Results :** There was a high agreement in the left ventricular regional wall motion scores between the gated SPECT and the Echo of 84.2% of segments (1091/1296 segments, $k = 0.76$, $p < 0.0001$). The agreement in the regional wall motion scores between the two modalities decreased significantly along the longitudinal axis of the left ventricle from 92.9% (301/324, $k = 0.89$, $p < 0.0001$) at the apex, 84.6% (411/486, $k = 0.77$, $p < 0.0001$) at the mid point, to 77.9% (379/486, $k = 0.65$, $p < 0.0001$) at the basal segments ($p < 0.0001$). Also, the agreement based on the degree of myocardial perfusion was 86.6% for segments with normal, or mild hypoperfusion, and 82.6% with moderate to severe hypoperfusion ($p = 0.072$). **Conclusion :** The gated SPECT had a good agreement with the Echo for the assessment of the left ventricular regional wall motion in patients with an acute myocardial infarction. These results support the clinical use of gated SPECT. (*Korean Circulation J* 2002;32 (9):781-790)

KEY WORDS : Tomography, emission-computed, single-photon ; Echocardiography ; Ventricular function, left ; Myocardial infarction.

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서 론

12 (26 82) .

가

3 5
SPECT

¹⁾

가

가 가

²⁾³⁾

⁴⁾

아데노신 부하검사

SPECT
SPECT

5-7)

SPECT

가

SPECT

3 5

3

⁷⁾

1

SPECT

SPECT

가

⁸⁾⁹⁾

¹⁰⁾

0.16 mg/

¹¹⁾

kg/min

6

가

¹²⁻¹⁵⁾

가

24 48

SPECT

(88 100%)

(82

98%)

SPECT

게이트 심근 SPECT 검사

SPECT

ADAC

VERTEX V

60 2

8

⁹⁾¹⁶⁾¹⁷⁾

가

Tc-99m tetrofosmin(Myov-

iew[®]) 8 9 mCi

30

⁹⁾¹⁶⁾

, 3

0.16 mg/kg/min

¹³⁾¹⁸⁾

SPECT

가

6

3

가

가

Tc-99m tetrofosmin 25 30 mCi

. 30

30

SPECT

SPECT

1

SPECT

(ADAC, EPIC[®])

가

SPECT

45 °

45 °

180 °

32

SP-ECT

RR

16

대상 및 방법

(16 frames/cycle)

3

, 1

대상환자

, 1

SPECT

가

81 (62 ,

19)

, 60±

16

¹⁹⁾

4, 6, 6, 16, 2, 4 (Fig. 1B). (1, 2, 3, 4, 5, 6), (7, 8, 9, 10, 11, 12), (13, 14, 15, 16), (1, 2, 6, 7, 8, 12, 13, 14), (4, 5, 10, 11, 16), (3, 9, 15). (1 =, 2 =, 3 =, 4 =) Auto QUANT™ (ADAC, 2 =, 3 =, 4 = laboratories, Milpitas, CA) 가

20, 5 (0 =, 1 =, 2 =, 3 =, 4 =) (SRS=summed rest score) 20) (SRS) SRS<4, 4 8, 9 13 20) 14

관상동맥 조영술 Siemens MULTISTAR PL-US/T.O.P (Version 2.5) SPECT 0 3 Judkins 50%

심초음파 검사 GE Vivid 5 SPECT 통 계 SPSS 8.0 SPECT

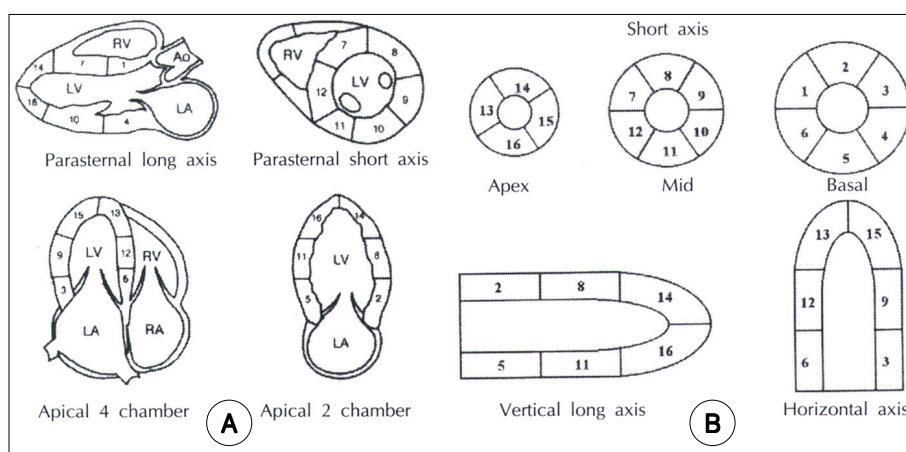


Fig. 1. Diagrammatic representation of the segmental division of the echocardiography (A) and SPECT (B) slices using the 16-segment model. SPECT : single photon emission computed tomography.

Cohen's kappa ANOVA
, $p < 0.05$

결 과

대상환자의 임상적 특성 (Table 1)

Table 1. Clinical and angiographic characteristics of the subjects

Number of subjects	81
Sex (Male)	62 (77%)
Age (years)	60 ± 12 (26~82)
Risk factors	
Hypertension	35 (43%)
Diabetes	19 (23%)
Smoking	48 (59%)
Dyslipidemia	26 (32%)
Clinical diagnosis	
Anterior MI	39 (48%)
Inferior and/or posterior MI	42 (52%)
Myocardial SPECT data	
Degree of perfusion defect	
Normal (SRS < 4)	13 (16%)
Mild (SRS 4 - 8)	20 (25%)
Moderate (SRS 9 - 13)	16 (20%)
Severe (SRS ≥ 14)	32 (39%)
Angiographic characteristics	
No. of diseased vessels (n = 81)	
0-VD	5 (6%)
1-VD	49 (60%)
2-VD	16 (20%)
3-VD	11 (14%)
Infarct related artery (n = 76)	
LAD	36 (47%)
RCA	25 (33%)
LCX	15 (20%)

MI : myocardial infarction, SPECT : single photon emission computed tomography, SRS : summed rest score, VD : vessel disease, LAD : left anterior descending artery, RCA : right coronary artery, LCX : left circumflex artery

81
가 62 (77%)
(48%), / 39
42 (52%)
1 - 49 (60%), 2 -
16 (20%), 3 - 11 (14%), 0 -
5 (6%)
가 36 (47%), 25 (33%),
가 15 (20%)
44 (39%), 37 (32%),
33 (29%)

좌심실 국소벽 운동의 일치율

SPECT

81 1296
1091 84.2%
($k = 0.76$, $p < 0.0001$) (Table 2). 16
63% 95%
Table 3
77.9%(379/486, $k = 0.65$, $p < 0.0001$),
84.6%(411/486, $k = 0.77$, $p < 0.0001$),
92.9%(301/324, $k = 0.89$, $p < 0.0001$)
($p < 0.0001$) (Fig. 2).
82.2%(533/648, $k = 0.72$, $p < 0.0001$),
83.2%(337/405, $k = 0.77$, $p < 0.0001$),
90.9%(221/243, $k = 0.84$, $p < 0.0001$)

Table 2. Segmental score agreement between gated SPECT and echocardiography for assessment of wall motion in patients with acute myocardial infarction

SPECT score	Echocardiographic score				
	1	2	3	4	Total
1	583	16	10	2	611
2	82	155	8	10	255
3	19	18	141	22	200
4	4	3	11	212	230
Total	688	192	170	246	1296

Exact agreement 84.2% (1091/1296 segments), $kappa = 0.763$, $p < 0.0001$. SPECT : single photon emission computed tomography

0.005)(Fig. 3).

심근 관류정도에 따른 국소벽 운동의 일치율 (Table 4)

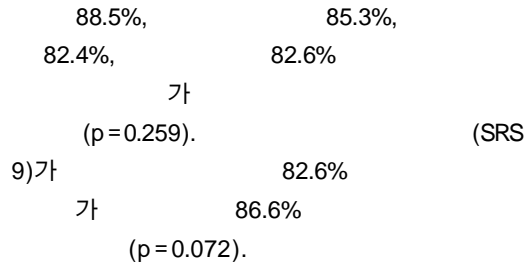


Table 3. Regional wall motion score agreement between gated SPECT and echocardiography of the each segments (n = 81)

Segment	Location	Agreement
1	Basal anteroseptum	69.1%
2	Basal anterior wall	76.5%
3	Basal anterolateral wall	92.6%
4	Basal posterolateral wall	81.5%
5	Inferobasal wall	85.2%
6	Inferobasal septum	63.0%
7	Midanteroseptum	81.5%
8	Midanterior wall	95.1%
9	Midanterolateral wall	86.4%
10	Midposterolateral wall	80.3%
11	Midinferior wall	77.8%
12	Midinferoseptum	86.4%
13	Apical septum	90.1%
14	Anteroapex	95.1%
15	Lateral apex	83.8%
16	Inferoapex	91.4%
Average		84.2%

SPECT : single photon emission computed tomography

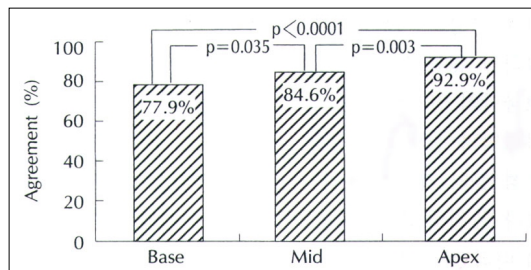


Fig. 2. The difference of agreement in regional wall motion scores between gated SPECT and echocardiography by the short axis view. SPECT : single photon emission computed tomography.

경색관련 혈관에 따른 국소벽 운동의 일치율 (Table 4)

SPECT

0 - 83.7%, 1 - 84.4%, 2 -

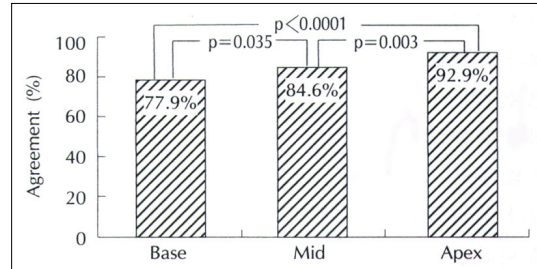


Fig. 3. The difference of agreement in regional wall motion scores between gated SPECT and echocardiography by the ventricular location. SPECT : single photon emission computed tomography.

Table 4. Regional wall motion score agreement between gated SPECT and echocardiography by the SPECT and angiographic characteristics of the subjects

	Agreement	P
SPECT characteristics		
Degree of perfusion defect		0.259
Normal (SRS <4)	88.5%	
Mild (SRS 4 - 8)	85.3%	
Moderate (SRS 9 - 13)	82.4%	
Severe (SRS 14)	82.6%	
Severity of perfusion defect		0.072
Normal and mild (SRS 0 - 8)	86.6%	
Moderate and severe (SRS 9)	82.6%	
Angiographic characteristics		
No. of diseased vessel		0.997
0-VD	83.7%	
1-VD	84.4%	
2-VD	83.9%	
3-VD	83.5%	
Infarct related artery		0.283
LAD	83.3%	
RCA	86.5%	
LCX	82.1%	
Infarct area		0.547
Anterior MI	83.5%	
Inferior &/or posterior MI	84.8%	

SPECT : single photon emission computed tomography, SRS : summed rest score, VD : vessel disease, LAD : left anterior descending artery, RCA : right coronary artery, LCX : left circumflex artery, MI : myocardial infarction

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