

## 급성 심근경색후 생존심근 진단에서 Dobutamine 심초음파도와 Thallium 심근스캔의 정확성 비교

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= Abstract =

### Comparision of Dobutamine Echocardiography and Thallium Scan in Assessment of Viable Myocardium after Acute Myocardial Infarction

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**Background :** It is clinically important to evaluate myocardial viability after acute myocardial infarction. There are several methods like dobutamine stress echocardiography(DSE) and thallium scan to identify viable myocardium. Thallium SPECT assesses cellular integrity, and dobutamine stress echocardiography assesses the contractile reserve of myocardium.

**Method :** Between March and August 1995, 30 consecutive patients(27 men and 3 women; mean age  $52 \pm 12$  years) within 3 weeks after acute myocardial infarction were admitted to Asan Medical Center. Each underwent two-dimensional echocardiography before and during dobutamine infusion  $8.6 \pm 6.5$  days after acute myocardial infarction and thallium scan with rest-redistribution or stress-redistribution-reinjection protocol  $8.1 \pm 6.4$  days after acute myocardial infarction. Myocardial viability was considered if there were improvements in regional wall motion during dobutamine infusion(5, 10  $\mu\text{g/kg/min}$  for 5min and 20, 30  $\mu\text{g/kg/min}$  for 3min). With thallium SPECT, myocardial viability was considered if regional wall motion was normal, if perfusion defects were either completely or partial mildly reversible, or if myocardial perfusion decreasedly or moderately and if irreversible perfusion was detected. Follow-up echocardiography was performed  $3 \pm 1$  months after acute myocardial infarction. Recovery of regional function was identified when follow-up echocardiography showed improvement of wall motion. We evaluated the accuracy of dobutamine stress echocardiography and thallium scan by concordant interpretation in acute and follow-up studies.

**Results :** Among the enrolled 30 patients, 27 patients had Q-wave MI. Thrombolysis was performed

in 17 patients(57%) and PTCA was done in 18 patients(60%). The location of myocardial infarction was the anterior wall in 20 patients and the inferior and lateral wall in 10 patients. Dobutamine stress echocardiography was performed safely in all 30 patients 8.6  $\pm$  6.5 days after acute myocardial infarction. Improved wall motion was apparent in 15 patients(50%) after follow-up echocardiography 3  $\pm$  1 months after acute myocardial infarction. The positive and negative predictive values of dobutamine stress echocardiography were 14/17(82%) and 12/13(92%), respectively. Thallium SPECT was done in 26 patients 8.1  $\pm$  6.4 days after acute myocardial infarction. Among these 26 patients, follow-up echocardiography showed improved wall motion in 12 patients. The positive and negative predictive values of thallium SPECT were 9/10(90%) and 13/16(80%), respectively. Positive dobutamine stress echocardiography(r = 0.46, p = 0.001), positive thallium SPECT(r = 0.44, p = 0.003), hypokinetic segments(p = 0.01) and non-anterior MI(p = 0.02) were associated with reversible postischemic dysfunction.

**Conclusion :** Dobutamine stress echocardiography(DSE) can be safely performed early after acute myocardial infarction. Both dobutamine stress echocardiography and thallium SPECT are reliable and complementary methods to diagnose viable myocardium.

**KEY WORDS :** Dobutamine stress echocardiography · Thallium SPECT · Myocardial viability · Acute myocardial infarction.

## 서 론

3,4) 가 . dobutamin 5)  
(Dobutamine stress echocardiography, DSE)  
Thallium - 201 SPECT<sup>6)</sup>(Thallium Single photon  
Emission Computed Tomography, T1 SPECT)  
가 , 가 . T1 SPECT DSE가  
T1 scan cellular integrity  
DSE  
가 가  
가  
DSE  
가 , DSE T1  
SPECT .

## 연구대상 및 방법

가 1,2,8) .  
가 가 1. 대 상  
1995 4 8  
3 30  
가 27 52  $\pm$  12 .  
(positron emission tomo -  
graphy, PET) . PET  
가 가 6mm echogeni -  
city가 가 scarring

가  
myocardial sca-  
ring  
30 Q 27 (90%) , 17  
(75%) 18  
(60%) 20 ,  
10 .

## 2. 방 법

### 1) Dobutamine 부하 심초음파도

DSE 24  
Dobutamine  
4  
2 . Dobu-  
tamine 5 µg/kg/min, 10 µg/  
kg/min 5 20 µg/kg/  
min, 30 µg/kg/min 3  
Dobutamine

ST  
가 2mm , 220mmHg  
가 130 ,  
30 µg/kg/min  
16 18)  
1, (hypokinesia)  
2, (akinesia) 3, (dyskinesia)  
4 dobutamine  
dobutamine 2

2) T1 SPECT  
T1 SPECT stress - redis-  
tribution - reinjection rest - redistribution protocol  
(Dipyridamole) 0.56mg/kg 4  
3 T1 - 201 2.5 3mCi  
Triple head SPECT camera( TRIAD, Tri-

onox) 12 , 3 4  
(redistribution image)  
(reinjection image) 2mCi T1 -  
201 . Rest - redistribution  
protocol Thallium

5 10  
4 24  
가 (Completely reversible)  
가 (partially reversible  
perfusion defect)

가  
(irreversible perfusion defect)  
60 84% Thallium  
(mild), 50 59%  
(moderate), 50%  
(severe) (mild),  
(moderate)  
T1 SPECT  
T1 SPECT

### T1 SPECT

### 3) 관동맥 조영술

7 10  
50%  
25  
가 13 , 7 ,  
4 ,  
가 1 3  
25 18 ,  
6 , 1  
85 ± 24%, 79 ±  
27%  
70% 22 17

가 1  
T1 scan  
DSE

#### 4) 생존 심근의 분석과 검사 시기

3 ± 1

|       | 가  | DSE | T1 |
|-------|----|-----|----|
| SPECT |    |     |    |
| 가 2   | 16 | 2   |    |
|       | 16 | 1   |    |

#### 5) 통계적 분석

|          | ±               |                     |
|----------|-----------------|---------------------|
| test     | chi-square test | unpaired Student t- |
| analysis | p               | 0.05                |
|          |                 | logistic regression |

#### 결 과

##### 1. Dobutamine 부하 심초음파도의 유용성

|      |            |                                   |
|------|------------|-----------------------------------|
| DSE  | 30         | 8.6 ± 6.5                         |
| 가    | 17         | 14 (82%)                          |
| 가    | DSE가       | 13 12 (92%)                       |
|      | DSE        | 14/17(82%), 12/13(92%) (Table 1). |
| DSE가 | 13         | DSE 17                            |
| 4    | Dobutamine | 30 µg/kg/min                      |
|      | DSE        | 17 4                              |
|      | Dobutamine | 20 µg/kg/min 1 , 30 µg/kg/min     |
| 3    | biphasic   |                                   |

**Table 1.** Results of DSE and T1 SPECT

|                      | DSE            | T1 SPECT       |
|----------------------|----------------|----------------|
| Number               | 30             | 26             |
| Interval after AMI   | 8.6 ± 6.5 days | 8.1 ± 6.4 days |
| (+) predictive value | 14/17(82%)     | 9/10(90%)      |
| (-) predictive value | 12/13(92%)     | 13/16(81%)     |

DSE : Dobutamine Stress Echocardiography  
T1 SPECT : Thallium-201 Single Photon Emission Computed Tomography  
AMI : Acute Myocardial Infarction

|                  |             |              |
|------------------|-------------|--------------|
| Dobutamine       | 5 µg/kg/min |              |
| 8 , 10 µg/kg/min |             | 7 ,          |
| 20 µg/kg/min     |             | 2 30         |
| µg/kg/min        |             | . 5 µg/      |
| kg/min           | DSE         | 10 µg/kg/min |

|     |              |     |
|-----|--------------|-----|
| DSE | 7 2          |     |
|     | 20 µg/kg/min | DSE |
| 2 1 |              |     |

##### T1 SPECT

|                                       |    |         |
|---------------------------------------|----|---------|
| 8.1 ± 6.4                             | 26 | . 26 14 |
| stress - redistribution - reinjection |    |         |

##### rest - redistribution

|            |       |
|------------|-------|
| 12         | 26 12 |
| T1 SPECT   |       |
| , T1 SPECT |       |
| , T1 SPECT |       |

10 9

|          |       |
|----------|-------|
| T1 SPECT | 16 13 |
|----------|-------|

##### T1 SPECT

|            |            |
|------------|------------|
| 9/10(90%), | 13/16(81%) |
|------------|------------|

##### 2. 생존 심근군과 비생존 심근군의 임상적 특징

|               |   |
|---------------|---|
| 15            |   |
| 15            |   |
| , Q           |   |
| , Dobutamine  |   |
| (hypokinesia) | 가 |

**Table 2.** Clinical characteristics of the patients with viable and nonviable myocardium

|                 | Viable     | Nonviable |
|-----------------|------------|-----------|
| Patients        | 15         | 15        |
| Age             | 52 ± 14    | 53 ± 11   |
| Sex(M/F)        | 13/2       | 14/1      |
| Thrombolysis(%) | 10(67%)    | 7( 47%)   |
| Q wave MI       | 12(80%)    | 15( 100%) |
| Anterior MI     | 7(47%)     | 13( 87%)  |
| Hypokinesia     | 5(33%)     | 0/15(0%)  |
| IRA stenosis    | 82 ± 24%   | 79 ± 27%  |
| TVR(%)          | 12/13(92%) | 6/9( 67%) |

IRA : Infarct Related Artery  
TVR : Target Vessel Revascularization

**Table 3.** Predictors of myocardial viability

|                 | r value | P value |
|-----------------|---------|---------|
| Positive DSE    | 0.46    | 0.001   |
| Positive T1     | 0.44    | 0.003   |
| Hypokinesia     |         | 0.01    |
| Non-anterior MI |         | 0.02    |

(infarct - related artery stenosis)

가 (Table 2).

### 3. 심근기능 호전과 관련된 예측인자

Logistic regression

analysis

(hypokinesia) (p = 0.01),

가 (p = 0.02) 가  
DSE(r = 0.46, p = 0.001)  
T1 scan(r = 0.44, p = 0.003)

(Table 3).

### 고 안

가 가

가

1,7,16)

dobutamine

PET

do -

pamine, isoproterenol

dobutamine

9 - 11)

12,13)

가

가

가

가

Dobutamine

가

dipyridamole

coronary steal

DSE

Q , dobutamine  
(hypokinesia)<sup>15)</sup>

가

DSE<sup>17)</sup>

biphasic

가

(im -

proved response)

가

DSE

(improved response)

biphasic response

. Smart<sup>14)</sup>

DSE

63

2 7

DSE

. Dobuta -

mine (low dose) 4 μg/kg/min,

(intermediate dose) 12 μg/kg/min,

- 220 -

(p=0.02)

결론 :

DSE

, DSE T1 SPECT

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