

## 관상동맥 중재술 후 국소적 심근 손상을 관찰하는 지표로서 Troponin의 유용성

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### The Usefulness of Cardiac Troponin as a Marker for the Detection of Minor Myocardial Injury Following Percutaneous Coronary Intervention

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#### ABSTRACT

**Background and Objectives :** The purpose of the study was to evaluate the usefulness of cardiac troponin as a marker for the detection of minor myocardial injury following percutaneous coronary intervention (PCI). **Subjects and Methods :** In 79 patients who underwent successful PCI under the diagnosis of stable angina, serum creatinine kinase MB isoenzyme (CK-MB), cardiac troponin T (cTnT), and cardiac troponin I (cTnI) were measured before and at 6, 12 and 24 hours after PCI, and the angiographic findings and procedural characteristics of PCI were compared between the elevated and the normal enzyme groups. **Results :** Abnormal values of one or more markers following PCI were observed in 17 patients (22%) ; 11 after stenting and 6 after balloon angioplasty alone. The frequency of abnormal cTnI levels was 19% and was significantly higher than that of CK-MB (6%,  $p<0.01$ ). No significant differences in target vessel number, target artery, ACC/AHA type, TIMI flow, stenting, time and number of ballooning, maximal inflation pressure or balloon diameter and length were observed between the two groups. Small side branch occlusions developed in 23% of the elevated enzyme group and in 3% of the normal enzyme group. **Conclusion :** Minor myocardial injury can be detected by cTnI and is observed frequently in patients with stable angina following PCI. A small side branch occlusion is related with elevated cTnI. (Korean Circulation J 2002;32(5):413-419)

**KEY WORDS :** Coronary disease ; Angina pectoris ; Angioplasty, balloon.

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## 서론

(PCI : percutaneous coronary intervention)

8 15%

PCI

가

PCI

5-9)

creatine kinase - isoenzyme MB(CK -

MB)

, PCI

CK - MB

Troponin

CK - MB

가

Troponin

10-13)

PCI

Troponins

PCI

## 대상 및 방법

### 대 상

PCI

PCI

79

48

6

가

, PCI

가 가

, PCI

### 심근효소의 측정 및 분석

PCI

PCI

6, 12, 24

CK,

CK - MB, Troponin T(cTnT), Troponin I(cTnI)

. CK CK - MB immune

inhibition(Synchron CX9, Beckman Coulter, USA),

cTnT immunoassay(Elecys 1020, Bohringer Ma-

nnheim Diagnostics, Germany), cTnI immunoa-

ssay(Opus, Dade Behring Inc, USA)

PCI

가

. CK - MB 16 U/L

cTnT 0.2 ng/mL , cTnI 0.5 ng/mL

### 경피적 관상동맥 중재술

aspirin ticlopidine(500 mg/day)

procedure 48

, 7 F

(Judkins Amplatz)

7,500

10,000 units

hep -

arin Dalteparin

activated clo -

tting time 300

pl -

atelet glycoprotein IIb/IIIa antagonist

American College of Cardiology/

American Heart Association(ACC/AHA)

14)

Thrombolysis In

Myocardial Infarction(TIMI) flow

15)

가

50%

TIMI flow가 grade 2

PCI

PCI

, 가

PCI

가

### 통계분석

SPSS

Student's t - test

Fisher's

**Table 1.** Incidence of elevated cardiac enzyme during percutaneous coronary intervention

	Balloonning (n=25)	Stenting (n=54)	Total (n=79)	p
CK-MB	1 ( 4%)	4 ( 7%)	5 ( 6%)	0.57
Troponin T	3 (12%)	6 (11%)	9 (11%)	0.72
Troponin I	5 (20%)	10 (19%)	15 (19%)	0.87
Elevated enzymes	6 (24%)	11 (20%)	17 (22%)	0.71

CK-MB : creatine kinase isoenzyme MB

exact test p 0.05

## 결 과

79 53 , 26 , 35 79 , 61.5±9.5 . 25 54 . PCI . PCI CK - MB 5 (27.4±7.6 U/L), cTnT 9 (0.57±0.33 ng/mL), cTnI 15 (1.31±0.69 ng/mL) 79 PCI 가 17 (22%) , 54 11 (20%) 25 6 (24%) . CK - MB 5 , 4 , 1 . cTnT 9 6 , 3 . cTnI 15 , 10 , 5 가 17 CK - MB, cTnT, cTnI 가 4 , cTnT, cTnI 가 4 , CK - MB 가 1 , cTnT 가 가 1 , cTnI 가 7 . CK - MB 5 (6%) cTnI 15 (19%) , cTnI CK - MB (p<0.01).

CK -

MB, cTnT, cTnI

**Table 2.** Clinical and angiographic characteristics in patients with elevated or normal enzymes

	Group with elevated enzyme (n=17)	Group with normal enzyme (n=62)	p
Age	62.8±8.0	60.1±9.8	0.32
Sex (Male/Female)	10/7	43/19	0.41
Target vessel number			
1 VD	14 (82%)	58 (94%)	0.29
2 VD	2 (12%)	3 ( 5%)	
3 VD	1 ( 6%)	1 ( 2%)	
Target artery			
LAD	12 (57%)	33 (49%)	0.71
LCX	6 (29%)	18 (27%)	
RCA	3 (14%)	16 (24%)	
ACC/AHA type			
A	1 ( 6%)	3 ( 5%)	0.51
B1	11 (65%)	32 (52%)	
B2	1 ( 6%)	15 (24%)	
C	4 (24%)	12 (19%)	
TIMI flow			
0	2 (12%)	9 (15%)	0.23
I	2 (12%)	2 ( 3%)	
II	5 (29%)	10 (16%)	
III	8 (47%)	41 (66%)	
Procedure			
Balloonning	6 (35%)	19 (31%)	0.39
Stenting	11 (65%)	43 (69%)	

VD : vessel disease, LAD : left anterior descending coronary artery, LCX : left circumflex coronary artery, RCA : right coronary artery, ACC/AHA : American college of cardiology/American heart association, TIMI : thrombolysis in myocardial infarction

(Table 1).

PCI 가 17 가 62 ,

, , ACC/AHA ,

**Table 3.** Procedural characteristics

	Group with elevated enzyme (n=17)	Group with normal enzyme (n=62)	p
Total time of ballooning (sec)	77.5 ± 83.2	59.0 ± 30.9	0.23
Total number of ballooning	3.5 ± 1.8	3.1 ± 1.7	0.54
Longest time of ballooning (sec)	23.5 ± 6.3	23.9 ± 7.0	0.84
Maximal pressure of ballooning (atm)	10.3 ± 2.3	11.3 ± 2.0	0.15
Balloon diameter (mm)	2.8 ± 0.5	3.0 ± 0.5	0.13
Balloon length (mm)	20.3 ± 5.0	19.7 ± 4.3	0.66
Side branch occlusion	4 (23%)	2 (3%)	0.005

TIMI 가 (Table 2). 18-21) 가

PCI PCI PCI PCI

, 가 , No-reflow ,

, ,

, PCI PCI

가 가 4 (23%) CK-MB, cTnT, cTnI가

2 (3%)

(p<0.01)(Table 3). CK-MB가 3

고 찰 6% CK-MB , 11%

cTnT , 19% cTnI ,

PCI cTnT

creatine kinase - isoenzyme MB(CK - CK-MB

MB) 18)19)22)23) cTnI cTnT

가 CK-MB

cTnI가 가

CK-MB

가 2 가 CK-MB , , 가

, PCI CK-MB가 3 가 22-25)

PCI 16)17) , , ,

PCI CK-MB ACC/AHA , TIMI

Troponin

CK-MB

가 10)11) 가

Troponin PCI 26) PCI

PCI  
 , 가  
 ,  
 ,  
 가  
 가  
 cTnI  
 가  
 (directional atherectomy),  
 (ro -  
 tational atherectomy),  
 (excimer  
 laser angioplasty)  
 (23)(27)(28)  
 가  
 cTnI cTnT  
 가가  
 IIb/IIIa  
 (29)  
 PCI  
 cTnI가 가  
 10  
 (MACE)가  
 cTnI가  
 PCI  
 (30)  
 가  
 PCI  
 troponin  
 ,  
 cTnI  
 ponin  
 tro -  
 ponin  
 PCI  
 가

## 요 약

### 배경 및 목적 :

Troponin

### 방 법 :

79  
 6, 12, 24 CK, CK - MB, Troponin I  
 (cTnI), Troponin T(cTnT)

### 결 과 :

79 17 (22%)  
 54 11 (20%),  
 25 6 (24%) CK - MB  
 5 (6%), cTnI 15 (19%)  
 cTnI CK - MB  
 (p<0.01).

### TIMI

PCI  
 , 가  
 ,  
 ,  
 가 가  
 4 (23%) 2 (3%)  
 (p<0.01).

### 결 론 :

cTnI가 cTnI 가  
 , 가 가 cTnI

### 중심 단어 :

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