

## 급성 심근경색증 환자에서 혈전용해요법의 시간지연에 영향을 미치는 요인

정진옥 · 김윤철 · 성보영 · 김준경 · 정준용 · 류정곤 · 성인환 · 전은석

= Abstract =

### Analysis of Time Delay to Affect Thrombolytic Therapy in Patients with Acute Myocardial Infarction

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**Background :** Early reperfusion therapy with thrombolytic agents or primary PTCA is most important to salvage ischemic myocardium in acute myocardial infarction(AMI). Timely reperfusion of jeopardized myocardium clearly improves hemodynamics, decreases infarct size and improves survival. The extent of protection appears to be directly related to the rapidity of reperfusion after onset of coronary occlusion. Although the intravenous thrombolysis is a feasible therapy in the patients with evolving AMI, the benefit of thrombolytic therapy decreases because of the time delay after onset of symptom. This study was performed to analyze the factors of time delay between onset of symptom and the thrombolytic therapy with retrospective and prospective questionnaire in the patients with AMI.

**Method :** Eighty one patients with AMI were included in this study who came to the emergency room(ER) of Chungnam National University Hospital(CNUH) from February 1995 to October 1996. Delay between onset of chest pain and seeking ER of CNUH was defined as prehospital time delay. Delay between door and thrombolytic therapy was defined as hospital time delay.

**Results :** Thrombolytic therapy(rt-PA or urokinase iv) was done in 60 patients(74.1%) and mean prehospital time delay was significantly decreased in the patients with thrombolytic therapy when compared with those without thrombolytic therapy( $462 \pm 90$  vs  $1375 \pm 473$  minutes,  $p = 0.005$ ). There were no significant factors for prehospital time delay such as age, sex, residence, ER near residence, transfer time to ER near residence, family status, family history of AMI, severity of chest pain, presence of risk factors of cardiovascular disease(CVD), previous CVD, degree of education, history of other disease and routine check, transfer methods. The only 8 patients(9.8%) knew about AMI and 7 patients among these patients came to ER earlier and received thrombolytic therapy.

From 57 referred patients, 40 patients (70.2%) received reperfusion therapy and only 30 patients (52.6%) had recorded EKG in the referred hospital. In the analysis of hospital delay from patient's arrival to the thrombolytic therapy, the arrival time at weekdays and weekend had no differences, but hospital delay were significantly prolonged when patients arrived at ER in the night.

**Conclusion :** Since prehospital time delay is a most important factor of time delay for the effective thrombolytic therapy in AMI, the public education program and effective transport system are needed. And routine record of EKG in patient with chest pain in the local hospital is very helpful to start effective thromolytic therapy at ER. The well designed prospective study with more patients in our local region is essential to get more accurate information about transport system and to improve survival rate in patients with AMI.

**KEY WORDS :** Acute myocarfiar infarction · Time delay · Thrombolytic therapy.

## 서 론

가

## 연구 대상 및 방법

1995 2 1996 10 116  
1-4)  
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3  
가 ( 53 , 28 ,  $61 \pm 1.2$  )  
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30  
2 ST 2mm  
(CPK - MB)  
3가 2  
5) 가  
(rt - PA urokinase)  
6 , 6  
가  
가 75 6  
가  
urokinase 150 bolus 30  
2 /Kg bolus  
rt - PA 15 mg bolus 0.75mg/Kg 30

0.5mg/Kg 60 .  
 1) 가  
 (patient time  
 delay), 2) 1, 2  
 (transfer time delay), 3)  
 (hospital time delay)  
 가  
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17) (6 , )  
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 22)  
 23) (total CPK)  
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 26) ( - / , )  
 1) 2)  
 (prehospital time delay) 3) (ho -  
 spital time delay)  
 SPSS PC<sup>+</sup> program  
 Student t - test , chisquare test  
 p 0.05  
 ±

## 결 과

### 1. 대상 환자들의 일반적 특징

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4 81 ,  
 53 , 28 , 61 ± 1.2 .  
 Fig. 1

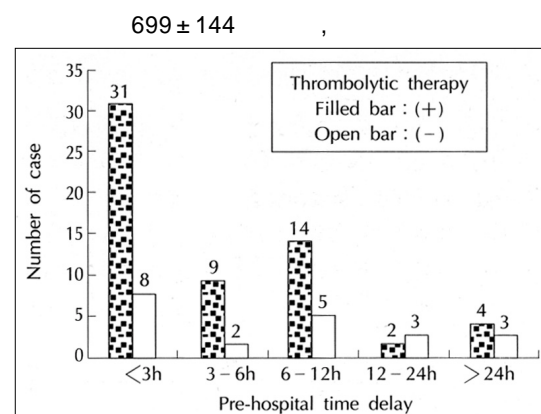


Fig. 1. Distribution of prehospital time delay.

100.6 ± 19

## 2. 혈전용해요법에 관여하는 요인 분석

81 50  
(61.7%) 가 6  
60 (74.1%)  
21  
Table 1

## 3. 병원도착전 시간지연에 영향을 미치는 요인 분석

6 6  
Table 2

(462  
± 90min vs 1375.7 ± 473min, p = 0.005).  
(CPK) 가 (2898  
± 291 vs 2449 ± 479, p = 0.428),  
(17 ± 1.4 vs 28 ± 5.4 hours, p =  
0.006)

## 4. 병원내 시간지연에 영향을 미치는 요인에 의한 분석

**Table 1.** Comparison of variables between patients with or without thrombolytic therapy

Variables	Thrombolytic therapy		p value
	(+) (n = 60)	(-) (n = 21)	
Age(years)	60.1 ± 1.47	64.0 ± 2.57	p = 0.18
Sex(M/F)	41/19	12/9	p = 0.5
Prehospital time delay(min)	462 ± 90	1375 ± 473	p = 0.005
Peak CPK level(IU/L)	2898 ± 291	2449 ± 479	p = 0.428
Time to peak CPK(hours)	17 ± 1.4	28 ± 5.4	p = 0.006
Residence(city/rural area)	38/22	17/4	p = 0.2
Hospital near home(+/-)	56/4	21/0	p = 0.52
Transfer time to hospital near home(< 1hr / > 1hr)	57/1	20/1	p = 0.43
Family history of AMI(+/-)	7/53	2/19	p = 1.0
Severity of chest pain(severe/moderate/mild)	45/12/3	11/8/2	p = 0.1
Referred patients(Yes/No)	40/20	17/4	p = 0.34
Initial EKG(other hospital/CNUH)	20/40	10/11	p = 0.37
Awareness of AMI(yes/no)	7/53	1/20	p = 0.62
Risk factor(+/-)	31/29	10/11	p = 0.94
Location of infarction(ant./inf./lat./post.)	35/21/3/1	13/7/0/1	p = 0.63

Data are mean ± S.E.M

CPK : creatinine phosphokinase, EKG : electrocardiogram, AMI : acute myocardial infarction, CNUH : Chungnam National University Hospital

**Table 2.** Analysis of variables for prehospital time delay

Variables	Thrombolytic therapy		p value
	(< 6hrs) (n = 50)	(> 6hrs) (n = 31)	
Age(years)	60.1 ± 1.8	61.7 ± 1.8	p = 0.70
Sex(M/F)	30/20	23/8	p = 0.28
Prehospital time delay(min)	380 ± 173	1213 ± 229	p = 0.003
Peak CPK level(IU/L)	3006 ± 353	2457 ± 319	p = 0.283
Time to peak CPK(hours)	13.7 ± 0.6	29.2 ± 3.7	p = 0.000
Residence(city/rural area)▮	33/17	22/9	p = 0.82
Hospital near home( + / - )	48/2	29/2	p = 1.0
Transfer time to hospital near home(<1hr/>1hr)	48/1	26/4	p = 0.108
Family history of AMI( + / - )	5/45	4/27	p = 0.96
Severity of chest pain(severe/moderate/mild)	35/12/3	21/8/2	p = 0.97
Referred patients(Yes/No)	33/17	24/7	p = 0.39
Initial EKG(other hospital/CNUH)	16/34	14/17	p = 0.339
Awareness of AMI(yes/no)	7/43	1/30	p = 0.23
Risk factor( + / - )	26/24	15/16	p = 0.93

Data are mean ± S.E.M

CPK : creatinine phosphokinase, EKG : electrocardiogram, AMI : acute myocardial infarction, CNUH : Chungnam National University Hospital

**Table 3.** Analysis of variables for hospital time delay

Variables	Hospital delay		p value
	(< 1 hour) (n = 35)	(> 1 hour) (n = 25)	
Age(years)	60.1 ± 2.0	60 ± 2.2	p = 0.9
Sex(M/F)	23/12	18/7	p = 0.81
Prehospital delay(min)	300 ± 98	553 ± 167	p = 0.399
ER arrival time			
(day, evening/night)	48/10	14/9	p = 0.036
(weekend/week)	16/41	8/15	p = 0.55
Referred(yes/no)	28/7	12/13	p = 0.02
Peak CPK level(IU/L)	3359 ± 375	2254 ± 436	p = 0.06
Time to peak CPK(hours)	16.2 ± 1.6	18.4 ± 2.6	p = 0.465

Data are mean ± S.E.M

CPK : creatinine phosphokinase, ER : emergency room

**Table 3**

가 19 9 (47%)가 가 40 28 (70%)가 가 62 48 (77%)가 가 20 7 (35%)가 (p=0.03).

가

가

가

57

14 - 16)

30 (52.6%)

4

5,17 - 19)

Schroeder<sup>14)</sup>

가 9

가

65%

가

Schmidt<sup>20)</sup>

고 안

가

(prehospital time delay) 가

가

가

20)

가

(PTCA)

21

1375 ± 473

(462 ± 90 )

(p = 0.05).

6 - 8)

9 - 12). GISSI

1

2 6

가

47% 15% , 6

가<sup>9)</sup>

ISIS - 2<sup>10)</sup>, ISAM<sup>11)</sup>, Western Washington Trial<sup>12)</sup>

81

가

가

(9.8%)

7 (87.5%)

가

6

13)

가

27.5%

81 60 (74%)가

가

Mitic<sup>24)</sup> 2

가

60 15.8%

20 6 31.5%, 29.3% 가

6

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21 - 23) , ,  
81  
57 가 40  
(70.2%) 가

30 (52.6%) 가 가 가  
가 가

25 - 27)  
가 가 PTCA  
Herlitz 28) 요 약

#### 연구배경 :

가  
가  
가

#### 방 법 :

100.6 ± 19 1995 2 1996 10 81

PTCA

#### 결 과 :

1) 81 50 (61.7%) 가 6  
60 (74.1%)

29 - 31)

2)

가 , 가  
3) 81  
8 (9.8%)  
7 (87.5%)  
가  
가  
4)  
가 가  
5)  
57 30 (52.6%)  
결 론 :  
가  
가

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## References

- 1) ISIS-2 collaborative Group : *Randomised trial of intravenous streptokinase, oral aspirin, both or neither among 17,187 cases of suspected acute myocardial infarction : ISIS-2. Lancet ii* : 349-360, 1988
- 2) Gruppo Italiano per lo studio della streptochinasi nell'infarto miocardico (GISSI) : *Long-term effects of intravenous thrombolysis in acute myocardial infarction : Final report of the GISSI Study. Lancet ii* : 871-874, 1987
- 3) Simoons ML, Serruys PW, van den Brane M, et al : *Early thrombolysis in acute myocardial infarction : Limitation of infarct size and improved survival. J Am Coll Cardiol* 7 : 717-728, 1986
- 4) Serruys PW, Simoons ML, Suryapranata H, et al : *Preservation of global and regional left ventricular function after early thrombolysis in acute myocardial infarction. J Am Coll Cardiol* 7 : 729-742, 1986
- 5) Lee TL, Weisberg MC, Brand DA : *Candidates for thrombolysis among emergency room patients with acute chest pain. Ann Inter Med* 110 : 957, 1989
- 6) White HD, Robin MN, Michael AB, Morimasa T, Andrew M, Nigel MB John AO, Toby W : *Effect of intravenous streptokinase of left ventricular function and early survival after acute myocardial infarction. N Engl J Med* 317 : 850, 1987
- 7) Wall TC, Harry RP, Richard SS, Susan M, Lynne A, Jane B, Kristina S, Michael D, David W, Mark Z, Mossa H, Sadanaud H, Walter B, Richard T, Robert MC : *Results of high dose intravenous urokinase for acute myocardial infarction. Am J Cardiol* 65 : 124, 1990
- 8) O'Neill W, Timmis GC, Bourdillon PD : *A prospective randomized clinical trial of intracoronary streptokinase versus coronary angioplasty for acute myocardial infarction. N Engl J Med* 314 : 812, 1986
- 9) Gruppo Italiano per studio della streptochinasi nell'infarto miocardico (GISSI) : *Effectiveness of intravenous thrombolytic treatment in acute myocardial infarction, Lancet* 1 : 397, 1986
- 10) ISIS-2 (Second international study of Infarct Survival) collaborative group : *Randomized trial of intravenous streptokinase, oral aspirin, both or neither among 17,187 cases of suspected acute myocardial infarction : ISIS-2 Lancet* 2 : 349, 1988
- 11) The ISAM Study Group : *A prospective trial of Intravenous Streptokinase in Acute Myocardial Infarction (IS-AM) : Mortality, morbidity, and infarct size at 21 days. N Engl J Med* 314 : 1465, 1986
- 12) Maynard C, Althoyse R, Olsufka MI : *Early versus late hospital arrival for acute myocardial infarction in the western Washington thrombolytic therapy trials. Am J Cardiol* 63 : 1296, 1989
- 13) 김범수 · 조승연 · 심원흠 · 정남식 · 장양수 · 안중배 · 조재용 · 김성순 : 급성 심근경색증 환자의 임상적 고찰. 순환기 22 : 498, 1993
- 14) Schroeder JS, Lamb IH, Hu M : *The prehospital course of patients with chest pain : Analysis of the prodromal, symptomatic, decision-making. Transportation and emergency room periods. Am J Med* 64 : 742, 1978
- 15) Pressley JC, Severance HW Jr, Raney MP, McKinnis RA, Smith MW, Hindman MC : *A Comparison of paramedic versus basic emergency medical care of patients at high and low risk during acute myocardial infarction. J Am Coll Cardiol* 12 : 1555, 1988
- 16) Karlson BW, Herlitz J : *Clinical factors associated with*



- delay time in suspected acute myocardial infarction. *Am Heart J* 120 : 1213, 1990
- 17) Ho MT : Delays in the treatment of acute myocardial infarction : An overview. *Heart & Lung* 20 : 566, 1991
  - 18) Roth A, Hod H, Miller HI : Time-consuming procedures and prehospital thrombolytic treatment. *Critical Care Medicine* 21 : 374, 1993
  - 19) Dracup K, Moser DK : Treatment-seeking behavior among those with signs and symptoms of acute myocardial infarction. *Heart & Lung* 20 : 570, 1991
  - 20) Schmidt SB, Borsch MA : The prehospital phase of acute myocardial infarction in the era of thrombolysis. *Am J Cardiol* 65 : 1411, 1990
  - 21) Ho MT, Eisenberg MS, Litwin PE : Delay between onset of chest pain and seeking medical care : The effect of public education campaign. *Ann Emerg Med* 18 : 727, 1989
  - 22) Moses HW, Englking N, Talyor GT, Scheier JA : Effect of a two year public education campaign of reducing response time of patients with symptoms of acute myocardial infarction. *Am J Cardiol* 68 : 249, 1991
  - 23) Herlitz J, Hartford M, Blohm M : Effect of a media campaign on the delay times and ambulance use in suspected acute myocardial infarction. *Am J Cardiol* 64 : 90, 1989
  - 24) Mitic WR, Perkins J : The effect of a media campaign of heart attack delay and decision times. *Can J Public Health* 75 : 415, 1984
  - 25) McAleer B, Ruane B, Burke E, Cathcart M, Costello A, Dalton G, William JR, Varma MP : Prehospital thrombolysis in a rural community. *Cardiovasc Drugs Ther* 6 : 369, 1992
  - 26) Bouten MJ, Simoons ML, Hartman JA, van Miltenburg AJ : Prehospital thrombolysis with alteplase (rt-PA) in acute myocardial infarction. *Eur Heart J* 13 : 925, 1992
  - 27) Gersh BJ, Anderson JL : Thrombolysis and myocardial salvage. Results of clinical trials and the Animal Paradigm Paradoxical or Predictable? *Circulation* 88 : 296, 1993
  - 28) Herlitz J, Hartford M, Aune S, Kallsson T, Hjalmarson A : Delay time between onset of myocardial infarction and start of thrombolysis in relation to prognosis. *Cardiology* 82 : 352, 1993
  - 29) Gonszales RE : Thrombolytic therapy. *Ann Emerg Med* 21 : 1216, 1992
  - 30) Mamacrid R, Weaver WD : The Avoidable delay. *Ann Emerg Med* 21 : 1243, 1992
  - 31) Rawles JM, Haites NE : Patient and general practitioner delays in acute myocardial infarction. *Br Med J* 296 : 882, 1988