

급성 하벽 심근경색증에서 경색관련혈관의 예측을 위한 초기 심전도의 유용성

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Usefulness of the Initial Electrocardiogram for Predicting the Infarct-Related Artery in Acute Inferior Myocardial Infarction

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ABSTRACT

Background and Objectives : Electrocardiogram (ECG) may provide valuable informations regarding the infarct-related artery (IRA), which may be of guidance in selecting the therapeutic modality. ST segment elevation in inferior leads usually indicates occlusion of right coronary artery, less often left circumflex coronary artery or rarely occlusion of left anterior descending coronary artery may be the cause. We are to determine whether the initial ECG can differentiate the right coronary artery (RCA) or left circumflex artery (LCx) occlusion in acute inferior myocardial infarction (IMI). **Materials and Method :** We compared retrospectively the ECG recorded within 12 hours from the onset of chest pain with coronary angiographic findings in 85 patients (34% of all 250 patients) having electrocardiographic criteria for IMI. **Results :** 1) Angiographic characteristics. Of the 85 patients, IRA was RCA in 65 (76%) (38[58%] proximal, 27[42%] distal to first right ventricular branch), and LCx in 20 (24%) (nine[45%] proximal to first obtuse marginal branch or involving a high first marginal branch, eleven[55%] distal obstruction). RCA dominance was more common in RCA occlusion group (100% vs 80%, p = 0.001), and LCx dominance in LCx occlusion group (15% vs 0%, p = 0.001). No significant difference was noted between two groups regarding vessels diseased, involvement of left anterior descending coronary artery and contralateral artery (RCA or LCx), location of the lesion. 2) Electrocardiographic characteristics. *Lateral limb leads (I, aVL) :* ST segment depression (≥ 1 mm) was more common in RCA occlusion group (82% vs 45%, p = 0.001). Isoelectric ST segment in I was more common in LCx occlusion group (100% vs 15%, p = 0.001). *Left precordial leads (V_{5,6}) :* ST segment elevation (≥ 1 mm) was more common in LCx occlusion group (60% vs 15%, p = 0.001). Isoelectric ST segment was more common in RCA occlusion group (57% vs 20%, p = 0.004). ST segment depression (≥ 1 mm) was not different between two groups. *Right precordial leads (V₁₋₄) :* ST segment changes were not different between two groups. *Lead I and left precordial leads (V_{5,6}) :* Isoelectric ST segment in lead I and ST segment elevation (≥ 1 mm) in V₅ or V₆ was more common in LCx occlusion group (60% vs 5%, p < 0.05, sensitivity 60% specificity 95% positive/negative predictive value

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80%/89%, test accuracy 87%). *Amplitude of R wave in V₁* : Amplitude of R wave in V was greater in LCx occlusion group (3.60±1.42 mm vs 2.20±1.42 mm, p<0.05). **Conclusion** : The initial electrocardiogram was useful in differentiating LCx occlusion from RCA occlusion in patients with IMI. Absence of ST segment depression in I and aVL, and ST segment elevation in V_{5,6}, isoelectric ST segment in I, tall R wave in V₁ were significantly more common in LCx occlusion. (**Korean Circulation J 1998;28(7):1096-1104**)

KEY WORDS : Acute inferior myocardial infarction · Infarct-related artery · Electrocardiogram.

서 론

58±9) (1) 30

12

12 가

, (2) , , aVF

1 mm ST ,

(3)

가

WPW (Fig. 1). 91

ST 6

ST 85 (250 34%)

12

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가 1-3)

심전도 분석

12

ST

ST 50% 85

4-6)

(deviation) J 0.08 ,

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mm(0.1 mV) ST

12

재료 및 방법

재 료

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Q 271 (52%)

250(48%)

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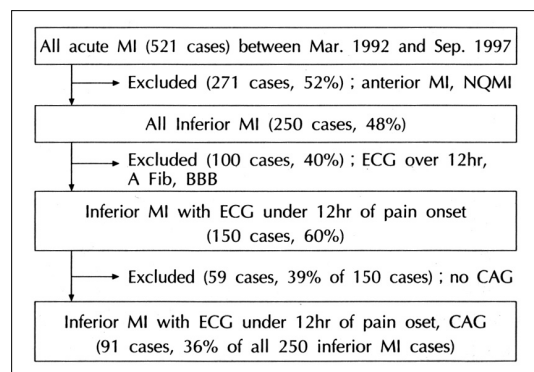


Fig. 1. Summary of the selection of study population. MI : myocardial infarction.

관상동맥 및 좌심실 조영조건 분석

통계 및 분석
 PC - SAS version 6.12
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 Student ' s t test
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 결과
 대상 환자의 임상적 특징 및 혈관조영 소견의 특징
 (first right vent - 85 65 (76%)
 ricular branch) (38 [58%], 27 [42%]), 20
 (first (24%) (9 [45%],
 obtuse marginal branch) 11 [55%]) (dominance)

Table 1. Clinical and angiographic characteristics of the 85 patients

	Left circumflex artery (n = 20)	Right coronary artery (n = 65)	P value
Age (yr)	56.05 ± 7.74	58.85 ± 10.06	NS
Male sex	19 (95%)	50 (77%)	NS
Angiographic diagnosis			
1 VD	15 (75%)	50 (77%)	NS
2 VD	3 (15%)	11 (17%)	NS
3 VD	2 (10%)	4 (6%)	NS
Dominance			
RCA	16 (80%)	65 (100%)	0.001
LCx	3 (15%)	0 (0%)	0.001
Balanced	1 (5%)	0 (0%)	NS
LAD disease	4 (20%)	9 (14%)	NS
Contralateral artery disease	4 (20% ; RCA)	6 (9% ; LCx)	NS
Lesion location			
Proximal	9 (45%)	38 (58%)	NS
Distal	11 (55%)	27 (42%)	NS
Collaterals to IRA	2 (10%)	14 (22%)	NS
Total CK (U/L)	2718.17 ± 1485.89	3241.17 ± 1618.64	NS
CK-MB (U/L)	241.83 ± 140.11	325.00 ± 191.73	NS
Segments of RWMA	3.45 ± 0.86	3.29 ± 0.69	NS

VD : vessel diseased ; RCA : right coronary artery ; LCx : left circumflex coronary artery ; LAD : left anterior descending coronary artery ; IRA : infarct-related artery ; CK : creatine kinase ; CK-MB : creatine kinase-MB fraction ; RWMA : regio-nal wall motion abnormalities

p=0.001). (100% vs 80%, 15%, p=0.001, 60% 85%
 55% 87% 79%)(Table 2 and
 3). V₅ V₆ ST (1 mm)
 가 (20% vs 28%). V₅
 V₆ ST
 (57% vs 20%, p=0.004)(Table 2).

심전도 특징 (V₁₋₄)
 (I, aVL) V₁₋₄ ST , ST
 aVL ST (1 mm) 가 (5% vs 5%, 30% vs 43%, 65%
 vs 52%)(Table 2).
 가 (5% vs 3%). aVL
 ST (1 mm) (V_{5,6})
 (82% vs 45%, p=0.001, ST V_{5,6} ST
 82% 55% 85% 48% (60% vs
 75%)(Table 2, 3). 5%, p<0.05, 60% 95% 80%
 (isoelectric) ST 89% 87%)(Table 2, 3).
 (100% vs 15%, p=0.001)(Table 2).
 (V_{5,6}) V₁ R
 V₅ V₆ ST (1 mm) (3.60 ± 1.42mm vs 2.20 ± 1.42
 (60% vs mm, p<0.05)(Table 2).

Table 2. Electrocardiographic characteristics of the 85 patients

	Left circumflex artery (n = 20)	Right coronary artery (n = 65)	P value
Lateral limb leads (I, aVL)			
ST elevation (≥ 1 mm)	1 (5%)	2 (3%)	NS
ST depression (≥ 1 mm)	9 (45%)	53 (82%)	0.001
Isoelectric ST in I	20 (100%)	10 (15%)	0.001
Lateral precordial leads (V _{5,6})			
ST elevation (≥ 1 mm)	12 (60%)	10 (15%)	0.001
ST depression (≥ 1 mm)	4 (20%)	18 (28%)	NS
Isoelectric ST	4 (20%)	37 (57%)	0.004
Precordial leads (V ₁₋₄)			
ST elevation (≥ 1 mm)	1 (5%)	3 (5%)	NS
ST depression (≥ 1 mm)	6 (30%)	28 (43%)	NS
Isoelectric ST	13 (65%)	34 (52%)	NS
Combined isoelectric ST in I and ST elevation in V _{5,6}	12 (60%)	3 (5%)	<0.05
R wave amplitude in V ₁ (mm)	3.60 ± 1.42	2.20 ± 1.42	<0.05
R/S ratio in V ₁ > 1	2 (10%)	1 (2%)	NS
Peak R wave amplitude in I, aVL (mm)	4.79 ± 1.25	5.83 ± 2.43	NS
Peak R wave amplitude in V _{5,6} (mm)	10.74 ± 4.43	12.91 ± 4.09	NS

Table 3. Summary of diagnostic accuracy for the significant electrocardiographic variables

ECG variable	IRA	Sensitivity	Specificity	PPV	NPV	Test accuracy
ST depression (≥ 1 mm) in I, aVL	RCA	82%	55%	85%	48%	75%
Isoelectric ST in I	LCx	100%	85%	67%	100%	88%
ST elevation (≥ 1 mm) in V _{5,6}	LCx	60%	85%	55%	87%	79%
Isoelectric ST in V _{5,6}	RCA	57%	80%	90%	36%	62%
Isoelectric ST in I and ST elevation (≥ 1 mm) in V _{5,6}	LCx	60%	95%	80%	89%	87%

IRA : infarct-related artery ; PPV : positive predictive value ; NPV : negative predictive value ; RCA : right coronary artery ; LCx : left circumflex coronary artery

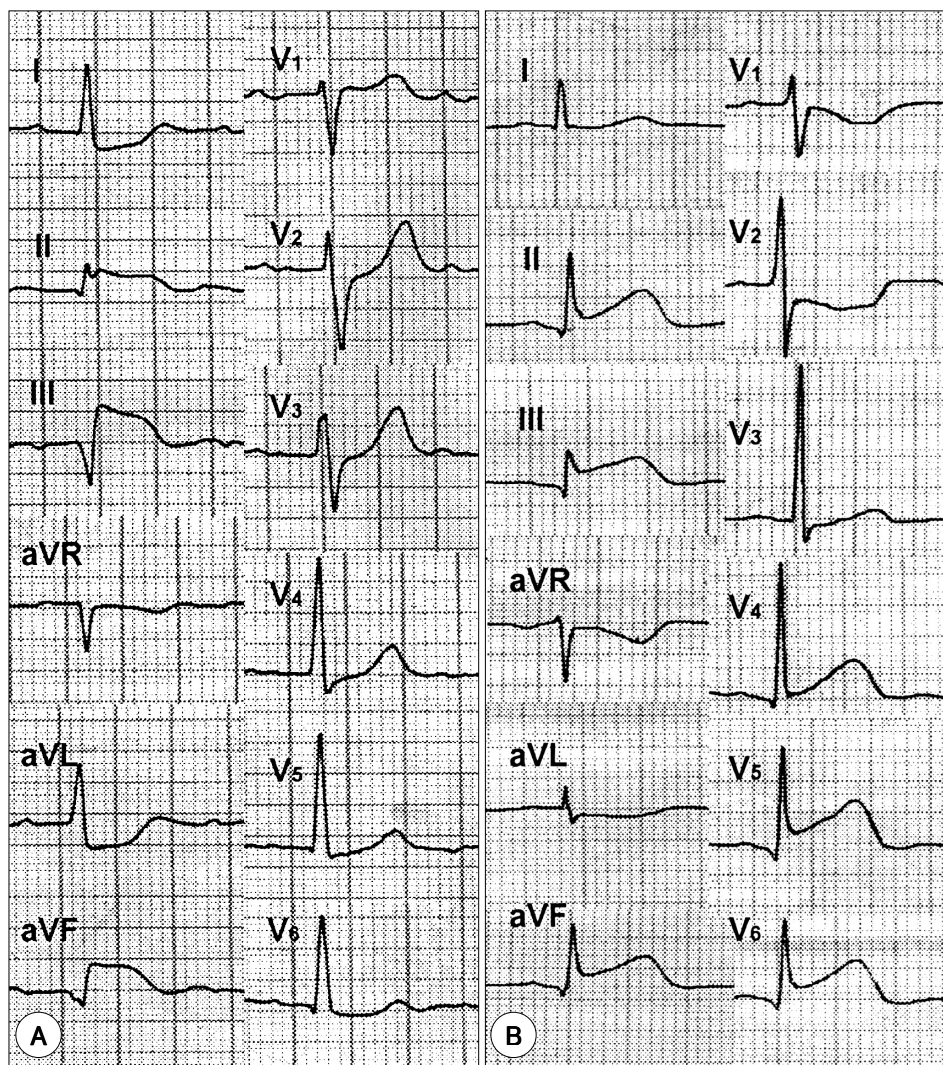


Fig. 2. Typical electrocardiograms of right coronary artery (RCA) (A) and left circumflex coronary artery (LCx) (B) occlusion in acute inferior myocardial infarction. A : ST segment depression in I, aVL and no ST-segment elevation in V_{5,6} suggest RCA occlusion. No ST segment depression in V₁₋₄ may suggest involvement of right ventricle. Occlusion of proximal RCA prior to right ventricular branch was demonstrated in coronary angiography. B : No ST segment depression in I, aVL, ST segment elevation in V_{5,6}, tall R wave in V₁ suggest LCx occlusion and large infarction. Occlusion of proximal LCx prior to first obtuse marginal branch was demonstrated in coronary angiography.

12 가 (vs 33%, 69% vs 29%), Hasdai ¹²⁾
aVL ST (70% 100%,
) aVL ST 63% 38%). Kontos ¹³⁾
, V_{5,6} ST , ST ST
, V₁ R (58% vs 23%), aVL ST
, 가 (Table 3). 77 %). , aVL ST (90% vs
I, aVL 유도 V_{5,6} 유도 , aVL
aVL V_{5,6} , aVL
(reciprocal) . Dunn -
7) (obtuse marginal branch) V_{5,6} ST
, (distal marginal branch) Huey ⁶⁾ Bairey ¹⁰⁾ Kanemoto ¹¹⁾ Hasdai
¹²⁾ Kontos ¹³⁾ V_{5,6} ST
. Hasegawa ⁸⁾ 가 (20% vs
aVL ST 28%). V_{5,6} ST
ST ST
. Huey ⁶⁾ Bairey ¹⁰⁾ Kanemoto ¹¹⁾
V_{5,6} ST
⁹⁾ (47% vs 9%, 83% vs 24%,
, aVL ST Huey ⁶⁾ Bairey 36% vs 8%), Kontos ¹³⁾
¹⁰⁾ Kanemoto ¹¹⁾ (46% vs 22%).
(32% vs 3%, 17% vs 0%, V_{5,6} ST
43% vs 8%), Hasdai ¹²⁾ aVL (60% vs 15%).
ST
(71% 86%, V₁₋₄ 유도 ST
65% 100%). Kontos ¹³⁾ ST
ST (67% vs 38%), aVL ST
(0% vs ¹⁴⁾17-21)
3%). ST , Lew ³⁰⁾ ST ST 27-29)
(100% vs 15%). , 가 ST
, aVL ST Huey ⁶⁾ 가 ST
Bairey ¹⁰⁾ Kanemoto ¹¹⁾ 가 가
(78% vs 44%, 81% .

ST
 가
²³⁾³¹⁾³²⁾
 Huey ⁶⁾, Bairey ¹⁰⁾, Kanemoto ¹¹⁾
 V₁₋₄ ST
 가 (30% vs 43%). Kontos ¹³⁾
 V₁ V₂ ST
 (92% vs 41%),
 (90%, 55%), V₁ V₂
 ST
 (95%)
 ST
 50% ST
 가 ST
 ST 가 ³⁰⁻³³⁾
 V₁₋₄ ST
³⁴⁾ Huey ⁶⁾, Bairey ¹⁰⁾, Kontos ¹³⁾
 V₁₋₄ ST
 5% 가

ST
 1) aVL ST
 , ST (ST
) 가
 2) V₅₆ ST , ST
 가 ¹⁴⁻¹⁶⁾
 3) V₁₋₄ ST
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 4) V₁ R
 5) V_{4R} ST
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V_{4R} 유도에서 ST-T절의 변화
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⁶⁻⁸⁾¹⁰⁻¹³⁾³⁴⁾

R 가 , V₁
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재료 및 방법 :
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결 과 :
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 (38 [58%], 27 [42%]), 20
 (24%) (9 [45%],
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 (100% vs
 80%, p=0.001). (15% vs 0%, p=0.001).
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2) :
 (, aVL) : aVL
 ST (1 mm)
 (82% vs 45%, p=0.001).
 (isoelectric) ST
 (100% vs 15%, p=0.001).
 (V_{5,6}) : V₅ V₆ ST
 (1 mm)
 (60% vs 15%, p=0.001). ST
 (57% vs 20%,
 p=0.004). ST (1 mm)
 가 (20% vs 28%).
 (V₁₋₄) :
 V₁₋₄ ST ,
 ST 가 (5% vs 5%,
 30% vs 43%, 65% vs 52%).
 (V_{5,6}) :
 ST V_{5,6} ST
 (60% vs 5%, p<0.05,
 60% 95% 80%
 89% 87%).

V₁ R : V₁ R
 (3.60
 ± 1.42 mm vs 2.20 ± 1.42 mm, p<0.05).

결 론 :
 . aVL ST , V_{5,6}
 ST , ST , V₁
 R .
 중심 단어 : . . .

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