

관상동맥 스텐트 재협착 예측인자로서 QT 분산의 가치

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Value of QT Dispersion as a Predictor of Coronary Artery Stent Restenosis

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ABSTRACT

Background : QT dispersion (QTd) in 12-lead ECG, a noninvasive parameter of the degree of inhomogeneous myocardial repolarization, has been reported useful in assessing the risk of ventricular tachyarrhythmias and sudden cardiac death in patients with coronary artery disease. Restenosis after coronary stenting was not infrequent. However, there was no reliable ECG predictor for stent restenosis. This study was performed to evaluate the value of QTd as a predictor of coronary artery stent (CAS) restenosis. **Methods :** One hundred eighty eight patients who underwent both successful coronary artery stenting for significant coronary artery stenosis and follow-up coronary artery angiography were included in this study. QTcd (difference of maximum and minimum QTc intervals) was measured in the 12-lead surface ECG, which was recorded 6 -12 hours after the successful CAS and 12 -18 hours before the follow-up coronary angiography, which was performed 1 -12 months (Group I : 6 ±3 months ; Group II : 7 ±2 months, p = NS) after CAS. The follow-up coronary angiography demonstrated no restenosis of the stented coronary artery in 122 patients (Group I : 97 men, 25 women ; 58 ±13 years), but restenosis in 66 patients (Group II : 58 men, 8 women ; 61 ±13 years). **Results :** There were no significant differences in the distribution of the target vessels between the two groups. The minimal luminal diameters of the target vessels were similar in the two groups before and after CAS (0.99 ±0.49 mm vs. 0.92 ±0.51 mm ; 2.94 ±0.71 mm vs. 2.71 ±0.79, respectively). QTcd after CAS was 52.6 ±22.0 ms in the Group I and 51.6 ±30.5 ms in the Group II, with no significant difference between the two groups. QTcd at the follow-up examination was 50.0 ±19.8 ms in the Group I and 58.3 ±21.6 ms in the Group II, showing a significant difference between the two groups (p <0.05). The change in QTcd (QTcd) during the follow-up period was significantly different between the two groups : QTcd significantly increased in the Group II, particularly in patients with angina pectoris, single or two-vessel disease, or left coronary artery stenosis, compared with the Group I (Group I : -2.18 ±22.11 ms, Group II : 8.77 ±28.82 ms, p <0.05). The sensitivity, specificity, negative predictive value, positive predictive value and diagnostic accuracy of QTcd

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(cut-off value, 7 ms) in predicting coronary artery stent restenosis were 64%, 65%, 77%, 49%, and 64%, respectively. **Conclusion** : The change of QTc dispersion according to restenosis was significantly different, but its clinical usefulness is limited due to low positive predictive value. (**Korean Circulation J 2000;30(5):555-562**)

KEY WORDS : Coronary stent · Restenosis · QT dispersion.

서론

1986 Sigwart¹⁾ 120 msec

2)3) 188 122

20~30% I (97 , 25 ; 58 ± 13)

8 ; 61 ± 13) II (58 ,

가 4) , QT

방법

QT 분산의 측정

12 Marquette

Mac - 12

6~12

12~18

QT (inhomogeneity) 5-8) QT RR , QT , Bazett

가 14) QT (QTc) QTc QTc

9-13) QTcd QTcd QTc

QT 가 QTcd

QT

관상동맥 스텐트 시술

3 300

QT 가 mg aspirin 500 mg ticlopidine

10,000 unit

. Palmaz - Schatz , Microstent II Freedom

대 상

11

추적 관찰

aspirin 100~300 mg

ticlopidine 500 mg

4

6

50%

통계 분석

±

unpaired Student's t-test, chi-square test, p 0.05

관상동맥조영술 소견

I 58 ± 13%, 61 ± 13%

가 (Table 1).

I 80 (65.6%), II 25 (20.5%), III 5 (7.6%), IV 13 (19.7%)

가

AHA/ACC I A 8 (6.6%), B 81 (66.4%), C 33 (27.0%), II A 6 (9.1%), B 43 (66.7%), C 16 (24.2%)

가

임상적 특징

I II

가

I II

56 (45.9%), 26 (39.4%), 33 (27.0%), 26 (39.4%), 20 (16.4%), 55 (45.1%), II 23 (34.8%), I 63 (51.6%), II 35 (53.0%) 7 (10.6%), 13 (10.7%), 7 (10.7%)

가 (Table 2).

I II

68 (55.7%), 44 (66.7%), 26 (21.3%), 14 (21.2%), 50 (41.0%), 24 (36.4%), 20 (16.4%), 9 (13.6%)

추적 관상동맥조영술 결과

I II

0.99 ± 0.49 mm, 0.92 ± 0.51 mm,

Table 1. Baseline clinical characteristics

	Group (No Restenosis, N = 122)	Group (Restenosis, N = 66)	P
Age (years)	56 ± 10	57 ± 10	NS
Sex (male/female)	97/25	58/8	NS
Ejection fraction (%)	58.4 ± 13.3	61.4 ± 12.5	NS
Follow-up (months)	6 ± 3	7 ± 2	NS
Clinical diagnosis (%)			NS
Acute myocardial infarction	55 (45.1)	23 (34.8)	
Unstable angina	63 (51.6)	35 (53.0)	
Stable angina	4 (3.3)	8 (12.1)	
Risk factor (%)			
Current smoking	68 (55.7)	44 (66.7)	NS
Hypercholesterolemia	26 (21.3)	14 (21.2)	NS
Hypertension	50 (41.0)	24 (36.4)	NS
Diabetes mellitus	20 (16.4)	9 (13.6)	NS

Values are expressed as mean value ± SD or number (%) of patients. NS : not significant

2.94 ± 0.71 mm, 2.71 ± 0.79 mm 22.0 ms, 51.6 ± 30.5 ms
 가 . , 50.0 ± 19.8 ms, 58.3
 I II 1.70 ± 0.56 mm, 0.71 ± 0.41 ± 21.6 ms 가
 mm II (p < 0.05, Table 3). (p < 0.05, Table 4).
 QT 분산 QT (QTcd) I - 2.18 ± 22.11
 ms, II 8.77 ± 28.82 ms II
 QTc I II (p < 0.05, Fig. 1). QTcd
 417.2 ± 30.3 ms, 405.7 ± 33.1 ms, I - 4.69 ± 24.68 ms, II 6.72 ±
 396.6 ± 21.8 ms, 401.3 ± 40.2 ms 30.01 ms, 3.44 ± 16.03 ms,
 가 . QTc I 28.62 ± 34.72 ms II
 II 52.6 ± (p < 0.05), I II

Table 2. Target lesion characteristics

	Group	(No Restenosis, n = 122)	Group	(Restenosis, n = 66)	P
Target vessel (%)					NS
LAD		80 (65.6)		48 (72.7)	
LCX		17 (13.9)		5 (7.6)	
RCA		25 (20.5)		13 (19.7)	
ACC/AHA lesion classification (%)					NS
Type A		8 (6.6)		6 (9.1)	
Type B1		54 (44.3)		27 (40.9)	
Type B2		27 (22.1)		17 (25.8)	
Type C		33 (27.0)		16 (24.2)	
Number of diseased vessels					NS
1		67 (54.9)		38 (57.6)	
2		42 (34.4)		21 (31.8)	
3		13 (10.7)		7 (10.6)	
Indications for stenting (%)					NS
Elective		56 (45.9)		26 (39.4)	
Restenosis		33 (27.0)		26 (39.4)	
Suboptimal PTCA		20 (16.4)		7 (10.6)	
Bailout		13 (10.7)		7 (10.6)	
Types of stent					NS
Palmaz-Schatz stent		34 (27.9)		18 (27.3)	
Microstent II		32 (26.2)		17 (25.8)	
Freedom stent		39 (32.0)		19 (28.8)	
Others		17 (13.9)		12 (18.2)	

LAD : left anterior descending artery, LCX : left circumflex artery, RCA : right coronary artery, ACC/AHA : American College of Cardiology/American Heart Association, PTCA : percutaneous transluminal coronary angioplasty, NS : not significant

Table 3. Quantitative coronary angiographic data

	Group	(No Restenosis, n = 122)	Group	(Restenosis, n = 66)	P
Minimal luminal diameter (mm)					
Before stenting		0.99 ± 0.49		0.92 ± 0.51	NS
Immediately after stenting		2.94 ± 0.71		2.71 ± 0.79	NS
At 6-month follow-up		1.70 ± 0.56		0.71 ± 0.41	< 0.05

NS : not significant

Table 4. QT interval and QT dispersion

	Group (No Restenosis, n = 122)	Group (Restenosis, n = 66)	P
QT interval (ms)			
Post-stenting	397.2 ± 44.6	391.4 ± 35.4	NS
Follow-up	387.7 ± 36.3	398.4 ± 43.3	NS
QTc interval (ms)			
Post-stenting	417.2 ± 30.3	405.7 ± 33.1	NS
Follow-up	396.6 ± 21.8	401.3 ± 40.2	NS
QTd (ms)			
Post-stenting	49.5 ± 20.7	49.1 ± 28.7	NS
Follow-up	48.6 ± 18.6	56.7 ± 19.7	<0.05
QTcd (ms)			
Post-stenting	52.6 ± 22.0	51.6 ± 30.5	NS
Follow-up	50.0 ± 19.8	58.3 ± 21.6	<0.05

QTd : QT dispersion, QTcd : corrected QT dispersion, NS : not significant

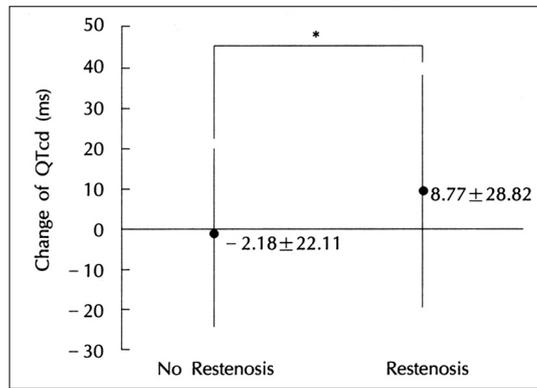


Fig. 1. Change of QTc dispersion (QTcd) after successful coronary stenting. * : p<0.05

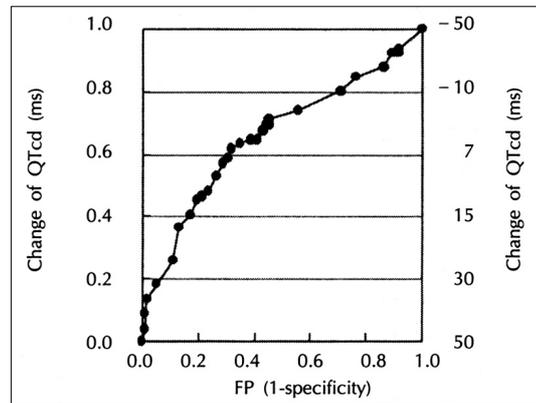


Fig. 2. ROC curve for prediction of coronary stent restenosis using QTcd. TP : true positive, FP : false positive.

2.01 ± 15.08 ms, 8.69 ± 19.70 ms
 가 . QTcd
 I II - 0.51 ± 21.93 ms
 7.96 ± 29.56 ms, - 3.51 ± 22.86 ms 13.65 ±
 22.90 ms II
 (p<0.05), - 6.49 ± 21.32 ms
 - 1.51 ± 40.65 ms 가
 . QTcd I
 - 2.22 ± 22.07 ms, II - 1.96 ± 37.83 ms 2)3)
 가 ,
 - 2.15 ± 22.31 ms, 14.90 ± 20.20 ms II I
 (p<0.05, Table 5). ENT STRESS
 ROC QTcd 7 20~30%
 ms , , 가
 , , 64%, 65%, 4)15)16)

49%, 77%, 64% (Fig. 2).
 고 안
 1986 Sigwart¹⁾
 2)3)
 BENEST -
 ENT STRESS
 20~30%
 가
 4)15)16)

QTcd I 52.6 ± 22.0 ms, II 51.6 ± 30.5 ms
 QTcd I 50.0 ± 19.8 ms, II 58.3 ± 21.6 ms II
 (p<0.05). QTcd I -2.18 ± 22.11 ms, II 8.77 ± 28.82 ms II
 (p<0.05). QTcd
 QTcd(cut - off value, 7 ms)
 64%, 65%, 49%, 77%, 64%

결론 :

QTc
 가 50% QT
 가

중심 단어 : QT

1998

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