

## 관동맥 스텐트 시술 후 혈관조영상 재협착의 예측 인자에 대한 연구 : 혈관내 초음파를 이용한 스텐트 단면적과 길이에 따른 재협착율에 대한 연구

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### Predictors of Angiographic Restenosis after Intracoronary Stenting according to Stent Lumen Cross Sectional Area and Stent Length in Native Coronary Artery Lesions : An Intravascular Ultrasound Study

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#### ABSTRACT

**Background :** The adequate intravascular ultrasound (IVUS) criteria for stent optimization have not been determined in long coronary stenting. We evaluated the predictors of angiographic restenosis and compared that according to stent lumen cross-sectional area (CSA) and stent length between short (stent length <20 mm) and long (≥ 20 mm) coronary stenting. **Methods :** IVUS-guided coronary stenting was successfully performed in 285 consecutive patients with 304 native coronary lesions. Six-month follow-up angiogram was performed in 236 patients (82.8%) with 246 lesions (80.9%). Results were evaluated using conventional (clinical, angiographic, and IVUS) methodology. **Results :** The overall angiographic restenosis rate was 22.8% (56/246)(short stent 17.6% vs long stent 32.2%, p = 0.009). Using multivariate logistic regression analysis, the independent predictors of angiographic restenosis were the IVUS stent lumen CSA (odds ratio = 1.51, 95% CI 1.18 -1.92, p = 0.001) and stent length (odds ratio = 0.95, 95% CI 0.91 -1.00, p = 0.039). The angiographic restenosis rate was 54.8% in stent lumen CSA <5.0 mm<sup>2</sup> (short stent 37.5% vs long stent 73.3%, p = 0.049), 27.4% between 5.0 and 7.0 mm<sup>2</sup> (short stent 24.1% vs long stent 31.7%, p = 0.409), 10.5% between 7.0 and 9.0 mm<sup>2</sup> (short stent 10.0% vs long stent 12.5%, p = 0.772), and 11.4% in stent lumen CSA ≥ 9.0 mm<sup>2</sup> (short stent 10.4% vs long stent 13.3%, p = 0.767)(p = 0.001). **Conclusions :** Compared with short coronary stenting, long coronary stenting is effective treatment modality to cover long lesions with comparable long-term clinical outcomes in cases of stent lumen CSA ≥ 7.0 mm<sup>2</sup>. Regardless of the stent length,

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the most important factor determining the angiographic restenosis was the IVUS stent lumen CSA in relatively large coronary artery lesions. (**Korean Circulation J 2000;30(1):23-30**)

**KEY WORDS** : Stent · Coronary artery disease · Intravascular ultrasound.

서론

2006년 6월 236 (82.8%)

246 (80.9%)

1)2) 49

3-5) 가 159 (<20 mm) 151 (20 mm) 85

3) 가 70%

2 (target lesion revascularization) (target lesion revascularization) 6)

가 스텐트 시술

7-9) (stent optimization) 1)2)16)17) (activated clotting time) 300 가

(intravascular ultrasound, IVUS) 10-12) 79, CrossFlex 32, NIR 25, tantalum Cordis 10, Wiktor 5, Palmaz-Schatz 4, Multilink 4, GFX 27 (24 mm 14, 30 mm 8, 40 mm 5), 25 mm CrossFlex 12, Crown 12 (22 mm 1, 30 mm 11), Wallstent(40.4 mm) 10, Gianturco-Roubin 9 (20 mm 7, 40 mm 2), 25 mm Multilink 1, GFX 9

1) (quantitative coronary angiography, QCA), IVUS, 2) (<20 mm) (20 mm) (cross sectional area, CSA)

방법

대상 환자 285

IVUS 304

1, 3, 6 6

285

2

18)19) GFX, tantalum Cordis CrossFlex

optimization) 16 (angiographic stent 가 . IVUS 가 . IVUS (optimum stent expansion) CSA가 가 CSA 80% 가 250 mg 3 1

정량적 IVUS 분석 (plaque) , (external elastic membrane, EEM), (lumen) + (plaque + media) CSA IVUS .<sup>20)21)</sup> EEM CSA (adventitia) leading edge (reference segment) , (lesion site) IVUS CSA가 가 10 mm 가 CSA

정량적 혈관조영 분석

0.2 mg (ANCOR V2.0, Siemens, Germany) (percent diameter stenosis), (minimal luminal diameter, MLD), (reference vessel diameter) 가 50%

통계 분석 SPSS Fisher's exact Student  $t$   $\pm 1$  , <sup>2</sup> p 0.05

결 과

IVUS 시술

0.2 mg IVUS (p=0.007) (Table 1). Table 2 (CVIS system, SCIMED life system INC, Boston Scientific Corporation, USA) B2 C 10 mm (p=0.01). 15.8 mm 29.7 mm (p=0.001). QCA MLD (p=0.001), (p=0.190). mm/sec . IVUS Table 3 3.2 F 1,800 rpm 가 (p=0.001), (p=0.190). s - VHS IVUS EEM, CSA MLD (lesion segm -



**Table 4.** Angiographic and IVUS findings between restenosis and non-restenosis (%)

	Non-restenosis	Restenosis	p
Number of lesions	190	56	
Mean stent length (mm)	19.7 ± 6.9	24.1 ± 11.1	0.007
Reference vessel diameter (mm)	3.4 ± 0.7	3.2 ± 0.4	0.148
Minimal lumen diameter (mm)			
Pre-intervention	0.8 ± 0.5	0.8 ± 0.5	0.853
Post-intervention	3.3 ± 0.7	3.1 ± 0.4	0.018
Follow-up	2.3 ± 0.7	1.1 ± 0.8	0.001
Last balloon size (mm)	3.8 ± 0.5	3.5 ± 0.4	0.001
Pressure (atm)	13.1 ± 3.4	12.6 ± 2.8	0.347
IVUS findings			
Proximal reference segment			
EEM CSA (mm <sup>2</sup> )	16.8 ± 4.3	15.0 ± 3.3	0.012
Lumen CSA (mm <sup>2</sup> )	9.9 ± 3.0	8.0 ± 2.5	0.001
Lumen MLD (mm)	3.3 ± 0.5	2.9 ± 0.5	0.001
Lesion segment			
Lumen CSA (mm <sup>2</sup> )	7.6 ± 2.2	6.0 ± 1.8	0.001
Lumen MLD (mm)	2.9 ± 0.4	2.5 ± 0.4	0.001
Distal reference segment			
EEM CSA (mm <sup>2</sup> )	14.4 ± 4.4	11.9 ± 4.0	0.001
Lumen CSA (mm <sup>2</sup> )	8.8 ± 2.8	7.1 ± 2.1	0.001
Lumen MLD (mm)	3.1 ± 0.5	2.7 ± 0.5	0.001

**Table 5.** Angiographic restenosis rate (%) according to postintervention lumen CSA and stent length

Lumen CSA, mm <sup>2</sup>	Stent length, mm			p
	Total	< 20	20	
< 5.0	17/31 (54.8)	6/16 (37.5)	11/15 (73.3)	0.049
5.0 <7.0	26/95 (27.4)	13/54 (24.1)	13/41 (31.7)	0.409
7.0 <9.0	8/76 (10.5)	6/60 (10.0)	2/16 (12.5)	0.772
9.0	5/44 (11.4)	3/29 (10.4)	2/15 (13.3)	0.767
P	0.001	0.025	0.001	

가 가 가 가 .

22-24)

20 mm

63%

가

24)

(ablative device)

25-27)

IVUS

CSA가 가

CSA가

가

10-15)

CSA

CSA가 5.0

mm<sup>2</sup> 37.5% , 5.0 mm<sup>2</sup> 7.0

mm<sup>2</sup> 24.1%, 7.0 mm<sup>2</sup> 9.0 mm<sup>2</sup>

10.0%, 9.0 mm<sup>2</sup> 10.4%

(p=0.025).

CSA

3-5) IVUS 가  
 10-12) IVUS 가  
 13-15) IVUS 가  
 13-15) IVUS 가  
 (absolute lumen dimension)  
 CSA 가  
 CSA가 5.0 mm<sup>2</sup> 73.3%, 5.0 mm<sup>2</sup>  
 7.0 mm<sup>2</sup> 31.7%, 7.0 mm<sup>2</sup>  
 9.0 mm<sup>2</sup> 12.5%, 9.0 mm<sup>2</sup>  
 13.3% (p=0.001).  
 30 mm 40 mm  
 (debulking procedure) 가

요 약  
 연구배경 :  
 (stent optimization) (IVUS) (<20 mm) (CSA)  
 ( 20 mm)  
 ( CSA <5.0 mm<sup>2</sup>)  
 27)  
 방 법 :  
 IVUS  
 285 304  
 6 236 (82.8%) 246  
 (80.9%)  
 CSA가 7.0 mm<sup>2</sup>  
 IVUS  
 결 과 :  
 22.8%(56/246)

(17.6%) (32.2%)  
 (p=0.009).  
 IVUS CSA  
 (odd ratio = 1.51, 95% CI = 1.18 1.92, p=0.001)  
 (odd ratio = 0.95, 95% CI = 0.91 1.00,  
 p=0.039) . CSA (  
 : ) CSA <5.0 mm<sup>2</sup> 54.8%  
 ( 37.5% : 73.3%, p=0.049), 5.0 mm<sup>2</sup> CSA <7.0  
 mm<sup>2</sup> 27.4%(24.1% : 31.7%, p=0.409), 7.0  
 mm<sup>2</sup> CSA <9.0 mm<sup>2</sup> 10.5%(10.0% : 12.5%,  
 p=0.772) CSA 9.0 mm<sup>2</sup> 가 11.4% (10.4% :  
 13.3%, p=0.767) (p=0.001).

결 론 :

CSA가 7.0 mm<sup>2</sup> 가  
 IVUS 가  
 CSA가 가

중심 단어 :

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