

AVE Micro- II Stent : 6개월 추적 검사 결과

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= Abstract =

AVE Micro- Stent : 6-months Follow up Result

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Background : Several stents are now available for the treatment of failed or suboptimal angioplasty. However, one of the limitations of stents is difficult to deploy especially in tortuous vessels, lesions at a bend, and distal to previously deployed stents. The AVE Micro- stent has a very low profile(1.65mm), optimum radio-opacity, and highly flexible properties. It is mounted on a semi-compliant balloon with a monorail delivery system. Therefore, it is easy to operate and feasible in tortuous, distal lesions and variety of lesion lengths. We report clinical outcomes and angiographic follow up results of AVE Micro- stent.

Methods : Between January 1996 and September 1996, 77 patients were stented with the AVE Micro- stent. Six-months follow-up angiogram was performed in 57 patients(64 lesions, follow-up rate : 74%).

Results : The overall angiographic restenosis rate was 26.6%. By univariable analysis, the rate of restenosis was significantly higher for stents in angulated lesions, in smaller post-stent luminal diameter, in the left anterior descending artery lesion than the right coronary artery, in ostial lesion ($p = 0.02$), in persistent dissecting lesions ($p = 0.02$), in tortuous proximal vessels ($p = 0.03$). Stenting of angulated lesions ($p = 0.0001$, Odds ratio = 54.64), small post-stent luminal diameter ($p = 0.01$, Odds ratio = 5.46), and the left anterior descending artery than the right coronary artery ($p = 0.03$, Odds ratio = 17.2) were the strong independent predictors of restenosis in a multiple logistic regression analysis. Event-free survival(freedom from death, myocardial infarction or revascularization) was 80.7% at 6 months.

Conclusion : 1) The AVE Micro- stent can be placed safely and efficiently. 2) The angiographic restenosis rate was 26.6%, and 80.7% of patients remained free of cardiovascular events at 6 months. 3) Stenting of angulated lesions, small post-stent luminal diameter, and the left anterior descending artery than the right coronary artery are associated with higher rates of restenosis.

KEY WORDS : AVE Micro- Stent · Restenosis · Angulated lesion · Event-free survival.

서 론

0.014inch , stent
 . Stent
 aspirin(100mg po qd), ticlopidine
 (250mg po bid) 2 3
 stent 2 4 ticlopidine
 , aspirin . heparin
 10,000 ,
 , 24 heparin
 Micro - stent가 1,000 .

가 ,
 Micro - stent

6 .

대상 및 방법

1. 대 상

1996 1 1996 9
 Micro - stent가
 77 6 가
 57 .
 stent 1 , 3
 , 가 6

5.8 ± 1.6
 , 20
 57 .
 stent stent 50%
 . Stent
 ,
 event가

2. 스텐트 시술방법 및 약물요법

Micro - stent AVE
 , 8F 175cm

3. 자료의 분석 및 통계
 , AHA/ACC
 empty catheter
 electric caliper .
 , ±
 Chi - square test
 multiple logistic regression analysis(
) .

결 과

1. 대상환자

77 (87) stent 57
 (64) 5.8
 가 (74%). 57 44 (77.2%),
 13 (22.8%) , 57 .
 14 (24.6%),
 34 (59.6%), 9 (15.8%)
 .
 28 , 36 (Table 1).

2. Characteristics of the lesions

가 64
 가 27 , 가 11 , 26
 . AHA/ACC B
 43 . 45 °

Table 1. Clinical characteristics of the patients

	Number(%)
Sex (male/female)	44(77.2)/13(22.8)
Age	57 years
Clinical diagnosis	
Stable angina	9(15.8)
Unstable angina	34(59.6)
Acute MI	14(24.6)
Angiographic diagnosis	
One vessel disease	28(43.8)
Two vessel disease	22(34.3)
Triple vessel disease	14(21.9)

Table 2. Angiographic characteristics of the lesions

	Number(%)
Location	
LAD	27(42.2)
LCX	11(17.2)
RCA	26(40.6)
Lesion type(AHA/ACC classification)	
A	8(12.5)
B	43(67.2)
C	13(20.3)
Angulation > 45°	23(35.9)
Tortuosity*	14(21.9)
Caicification	7(10.9)
No. of stents by lesion vessel	
Single stent	51(79.7)
Multiple stents	13(20.3)

*Moderate tortuosity :
Lesion is distal to two bands >75°
Severe tortuosity :
Lesion is distal to three bends >75° or two bends >90°

(angulated lesion) 23
, 75° 2
14
가 7 10.9%
stent 가 13 20.3%
(Table 2).

3. Angiographic results

stent 3.0mm(76.6%), (10%), 38
3.5mm(15.6%), 4.0mm(7.8%) , 18mm stent 11 28.9%
(79.7%), 30mm(20.3%) (Table 3).
87.1 ± 10.9% 16 stent가

Table 3. Stent size and length

	Number(%)
Diameter(mm)	
3.0	49(76.6)
3.5	10(15.6)
4.0	5(7.8)
Length(mm)	
18	51(79.7)
30	13(20.3)

Table 4. Angiographic results

Reference diameter(mm)	3.17 ± 0.45
MLD(mm)	
Pre-stent*	0.41 ± 0.34
Post-stent*	3.06 ± 0.45*
6 months follow up	1.93 ± 0.91
Percentage of diameter stenosis(%)	
Pre-stent*	87.1 ± 10.9
Post-stent*	1.5 ± 9.3*
6 months follow up	39.2 ± 27
Lesion length(mm)	16.09 ± 6.21

MLD : minimal luminal diameter

Mean ± S.D.

* : Pre-vs Post-stent ; p<0.001

1.5 ± 9.3% 39.2 ± 27%
. Minimal luminal diameter(MLD)
0.41 ± 0.34mm 3.06 ± 0.45mm
1.93 ± 0.91
3.17 ± 0.45mm
16.1 ± 6.2mm (Table 4).

4. Restenosis

가 57
74% ,
, 10 가 2
6 event free survival 80.7% . 64
17 (26.6%).
10
stent 1
(10%), 38
stent 11 28.9%
. 16 stent가

Table 5. Angiographic results-lesion specific

	LAD	LCX	RCA	p-value
Pre-MLD(mm)	0.34 ± 0.24	0.49 ± 0.37	0.42 ± 0.39	NS
Post-MLD(mm)	2.99 ± 0.34	3.02 ± 0.26	3.20 ± 0.58	NS
Reference diameter(mm)	3.09 ± 0.46	3.07 ± 0.23	3.33 ± 0.48	NS
Lesion length(mm)	16.11 ± 5.96	14.36 ± 3.83	16.81 ± 7.26	NS

Mean ± S.D. NS : non significant

5 31.3%

19

31.6%

22.0%

28.6%

25%

27 9

33.3% (18.2%), 11 2

6 (23.1%) 26

가

가

stent MLD가

가 , stent MLD

(Table 5). Stent MLD

가

(p - value

= 0.03, Odds ratio = 17.2).

가 3.0mm

12 3 (25%),

3.0mm 3.5mm 36 11

(30.6%), 3.5mm

16 3 18.8%

stent 3.0mm

stent 28.6%, 3.5mm 4.0

mm stent 20%

stent 18

mm stent 51 13 7 3 (43%),

Table 6. Restenosis rate

	Number(%)
Overall restenosis rate	17/64 (26.6%)
Clinical diagnosis	
Stable	1/10 (10)
Unstable	11/38 (28.9)
Acute MI	5/16 (31.3)
Diabetes mellitus	
Yes	6/19 (31.6)
No	9/41 (22.0)
Angio. Diagnosis	
One-vessel	8/28 (28.6)
Two-vessel	4/22 (18.2)
Triple-vessel	5/14 (35.7)
Lesion sites	
LAD	9/27 (33.3)*
LCX	2/11 (18.2)
RCA	6/26 (23.1)
Reference vessel diameter	
<3.0	3/12 (25.0)
3.0 <3.5	11/36 (30.6)
3.5	3/16 (18.8)
Stent length	
18mm	13/51 (25.5)
30mm	4/13 (30.8)
Stent diameter	
3.0mm	14/49 (28.6)
3.5mm	2/10 (20.0)
4.0mm	1/ 5 (20.0)

*p-value = 0.03 between LAD and RCA

(25.5%), 30mm stent 13

4 (30.8%)

(Table 6).

stent

(p - value = 0.02).

Table 7. Restenosis rate according to lesion characteristics

	Restenosis rate (%)
Lesion location	
Ostial	2/ 2 (100)*
Non-ostial	15/62 (24.2)
Lesion calcification	
Calcified	3/ 7 (42.9)
Non-calcified	14/57 (24.6)
Total occlusion	
Total lesion	2/ 8 (25)
Non-total lesion	15/56 (26.8)
Tortuosity	
Tortuous lesion	7/14 (50)**
Non-tortuous lesion	10/50 (20)
Angulation	
Yes	12/23 (52.2)***
No	5/41 (12.2)
Thrombi	
Yes	3/ 8 (37.5)
No	14/56 (25)

*p-value = 0.02 **p-value = 0.03 ***p-value = 0.0001

45 ° 23
 12 (52.2%)
 가 (12.2%)
 (p - value = 0.0001, Odds ratio = 54.6).
 75 ° 2
 14 7
 (50%) 20%
 (p - value = 0.03). stent
 (25% vs 26.8%).

(Table 7). Stent 26
 (40.6%) 14
 (16)
 . Stent 2 stent
 23.1%
 .
 Micro - stent

Table 8. Restenosis rate according to procedure technique

Stent overlapping	
Yes	3/13 (23.1)
No	14/51 (27.5)
High pressure dilation	
Yes	8/26 (30.8)
No	9/38 (23.7)
Persistent dissection	
Yes	6/11 (54.5)*
No	11/53 (20.8)

High pressure : 15.8 ± 1.6 atms
 *p-value = 0.02

Table 9. Factors affecting restenosis in multiple logistic regression analysis

	P-value	Odds ratio
Angulation	0.0001	54.6
Post-stent MLD	0.01	5.46
LAD lesion	0.03	17.2

peristent dissection 11 6
 (54.5%) peristent dissection
 (20.8%)
 (p - value = 0.02)(Table 8).

univariable analysis 가

45 ° 가
 , stent
 MLD가 (p - value = 0.01, Odds ratio = 5.46),
 stent
 (Table 9).

고 안

가 stent
 Palmaz - Schatz stent, Gianturco - Roubin
 stent, Wiktor stent, ACS Multilink stent, Wallstent,
 Cordis stent, and AVE Micro - stent .
 stent radial compliance .
 stent compliance가 recoil ,
 compliance가 stent
 stent ,

. 10 가 2 6
 Palmaz - Schatz(P - S) stent Gianturco - Roubin event free survival 80.7% .
 (GR) stent profile (8 F guiding catheter stent thrombosis 0
) 1.8% 7 - 10)
 가 , radio - opacity가 stent 1.2% AVE Micro - stent
 가 metallic surface area가 stent
 GR - stent
 profile (3.5mm stent :
 1.68mm). ACS Multilink stent profile stent expansion pressure(4 atms)
 (1.72mm). AVE Micro - stent stent
 profile (1.65mm) 가 deployment .
 , radio - opacity가 , 26.6%
 , side branch가 . Koster 11)
 , rapid - exchange delivery system 가 3 29%
 (bailout procedure) (remodeling)
 . STRESS BENESTENT 4.5)
 AVE Micro - stent가 stent가 PTCA
 가 6 - 10) stent가 acute elastic recoil
 12,13)
 Micro - stent rapid - exchange delivery Palmaz -
 system 가 Schatz stent recoil
 가 stent stent
 AHA/ACC type B C stent
 87.5% , 35.9%, 14,15) 가
 proximal tortuosity 가 21.9% stent
 , stent stent .
 type B, C , stent
 stent . Ozaki 8) , stent 3.31mm 가
 AVE Micro - stent 가
 96% , 10% 16)
 30 event - free
 survival rate 85% .
 96.1% 17)
 univariable analysis
 가 74% , proximal
 , tortuosity가 , 45 ° 가
 , stent stent 가

stent 가 3.0mm

stent 가 20,21)

stent 가 3.0mm 25%

Micro - stent 가 predilation 가 stent (27 38%) Gianturco - Roubin stent (31%)

45 ° , stent MLD가

45 ° , stent MLD가

stent stent

가 42.9%

Stent 연구배경 : stent profile radio - opacity가

18) Micro - stent expansion pressure가 apposition stent Micro - stent radio - opacity가

side branch가 norail system stent delivery가 가 , mo -

stent metal 19) Micro - stent 6

Micro - stent가 stent metallic 1996 1 1996 9 Micro - stent가

surface area(8.4%)가 가 . 77 6 가

가 3.0mm 57 (74%).

stent stent thrombosis가 stent 5.8 ± 1.6 stent

stent 50% .

결 과 :

1) 3.0mm(76.6%), 3.5mm(15.6%), 4.0mm(7.8%) , 18mm (79.7%), 30mm(20.3%) .

87.1 ± 10.9% 1.5 ± 9.3% 39.2 ± 27% Mini - mal luminal diameter(MLD) 0.41 ± 0.34mm

3.06 ± 0.45mm 1.93 ± 0.91 .

3.17 ± 0.45mm .

16.1 ± 6.2 mm .

2) 64 17 (26.6%).

10 가 2 6

event free survival 80.7% .

3) Univariable analysis 가

(p - value = 0.02), 45 ° ,

75 ° 2

(p - value = 0.03), Micro - stent (p - value = 0.02), MLD가

45 ° (p - value = 0.0001, Odds ratio = 54.6), MLD가

(p - value = 0.01, Odds ratio = 5.46), stent (p - value = 0.03, Odds ratio = 17.2)가

결 론 :

Micro - stent 26.6% .

45 ° , stent

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