

항 혈소판 요법을 이용한 관동맥내 Stent 삽입술의 초기 결과

가

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Initial Results after Implantation of Coronary Artery Stents with Antiplatelet Agents

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ABSTRACT

Background : The placement of stents in coronary arteries has been shown to reduce acute closure and restenosis in comparison to balloon angioplasty. However, clinical use of intracoronary stents is impeded by the subacute stent thrombosis and hemorrhagic complications associated with the anticoagulant regimen. It is known that the complete stent deployment with high pressure inflation and new antiplatelet agents are effective in reduction of subacute thrombosis and hemorrhage. So we evaluated initial results (success and complication rate) after high pressure-stent deployment with new anticoagulation protocol. **Methods :** One hundred and ninety one patients with 201 lesions were treated with 231 stents of various types. The high pressure balloon inflation and antiplatelets agents were used in all cases. Final high pressure balloon inflation guided by IVUS were performed in 23 consecutive cases with incomplete stent deployment according to angiographic findings. **Results :** 1) The indications of stenting (n = 210) were De novo in 124 (59%), bailout procedure in 57 (27%), suboptimal result after PTCA in 19 (8%), and restenosis after PTCA in 14 (6%). The location of lesions were LAD in 101, RCA in 67, circumflex in 28, ramus intermedius in 3, and LMT artery in 2 lesions. Angiographic morphologic characteristics were type A in 2, type B in 158 (B1 : 57, B2 : 101), and type C in 22 lesions. 2) The angiographic and clinical success rate was 96% (192/201) and 92% (186/201) respectively. 3) In angiographic analysis, the baseline average reference vessel diameter was 3.33 ± 0.35 mm. Baseline minimum lumen diameter(MLD) was 0.58 ± 0.29 mm, with baseline percent diameter stenosis of $82.86 \pm 8.64\%$. The final stent diameter was 3.37 ± 0.29 mm, with mean final percent stenosis of $0.63 \pm 8.25\%$. The mean MLD after stenting was significantly increased ($p < 0.001$). The mean MLD within stent increased 14%, from 2.91 ± 0.39 mm at the nominal balloon inflation (inflation pressure = 7 atm) to 3.37 ± 0.29 mm at high pressure balloon inflation (inflation pressure > 12 atm) ($p < 0.001$). The length of lesions in GR (cook), GR, and Micro stents were significantly longer than ones in PS, Cordis, Wiktor, Nir ($p < 0.001$). 4) In intravascular ultrasound analysis, the mean lumen CSA at the tightest point within stent increased 11%, from 8.4 ± 2.4 mm² at the initial intravascular ultrasound to 9.4 ± 2.1 mm² at the final intravascular ultrasound ($p < 0.001$). 5) The procedural and postprocedural complications were 2 acute closures associated with AMI and emergent CABG, 1 subacute closure which was revascularized by bail out stenting, 5 major hemorrhage requiring transfusion associated with 1 CVA and 2 metabolic acidosis induced by acute renal failure, and 5

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death. **Conclusion** : The high pressure stent deployment procedure and new anticoagulation protocol associating tidopidine and aspirin without coumadin or prolonged heparin infusion allow us to obtain an acceptably low subacute thrombosis or bleeding complication rate. These results are encouraging and allow a wide use of coronary stenting. **(Korean Circulation J 1998;28(6):939-946)**

KEY WORDS : Stent · Antiplatelets · High pressure inflation.

서론		70% ,	
3.0 mm ,		, Bail out	
stent		PTCA	
, ,		가 50% ,	
suboptimul		recoil	
. 1)2) stent		50% ,	
Direct stenting, PTCA			
. Colombo 3) stent			
stent			
stent		사용한 stent 종류 및 삽입방법	
, stent		191 (201) 6 stent	
stent (complete stent apposit -		Palmaz - Schatz stent 126 (half	
ion),			
(intravascular ultrasound, IVUS)		Table 1. Clinical and angiographic chracteristics of patients (n = 191, 201 lesions)	
. stent		Age (year)	
(> 12 atm) ,		60 ± 10	
stent		Sex (M/F)	
가 , stent		152/29	
		Clinical diagnosis (n = 191)	
연구 및 방법		Stable angina	
대상환자		42	
1995 4 1996 10		Unstable angina	
70%		56	
		Myocardial infarction	
SPECT		93	
191 (201)		acute/old	
56 , 42		48/45	
, 48 , 45		Indication	
(Table 1). stent		De novo	
de novo		124 (59%)	
		Bail out precedure	
		(AMI)	
		(40)	
		Suboptimal result	
		19 (8%)	
		Restenosis	
		14 (6%)	
		Single VD/Multi VD	
		171/30	
		Location	
		LAD/RCA/LCX/RI/LMT	
		101/67/28/3/2	
		Lesion morphology*	
		A/B1/B2/C	
		21/57/101/22	
		VD : Vessel disease	
		LAD : Left anterior descending	
		RCA : Right coronary artery	
		LCX : Left circumflex	
		LMT : Left main trunk	
		RI : Ramus intermedius	
		*AHA/ACC classification	

stent 12), Gianturco - Roubin stent 64 (GRI : 42 , GRII : 22), Microstent 27 , Cordis stent 7 , Wiktor stent 4 , Nir stent 3 , single multiple stent 171 , 30 , debulking devices 5 (Rotational Atherectomy 4 , Eximer Laser Atherectomy 1) stent .

Stent predilation . Stent 가 20% stent 가 1.0 1.1 : 1 . Stent Cordis, AVE Micro, Wiktor stent 12 , stent 15 (angiogra - phic optimization)

stent . heparin 10,000 U activated clotting time 300 , 3,000 5,000 heparin . Stent ticlopidine(250 mg Bid) , 1 (100 mg gd) . direct stenting ticl - opidine 500 mg Qd 300 mg gd , .

혈관 조영 결과 분석

nitroglycerin stent ANCOR(V 2.0 simens) system (reference vessel diameter), (minimal luminal diameter), percent diameter stenosis (lesion length)

혈관내 초음파의 시술방법 및 정량적 분석

Cardiovascular Imaging System (CVIS) 30 MHz (transducer)가 360 ° Rotational tip 2.9 F/

3.2F 가 . 200 µg Nitroglycerin 가 automatic pullback system 0.5 cm pullback .

stent (cross sectional area, CSA), (major diameter) (minor diameter) stent 23 , subo - ptimal (stent deployment가), 가 , stent filling defect 가 . stent

9 mm 2 , 1) stent 60% , 2) stent 60% , 3) stent .

통계분석

통계분석 ± , unpaired t - test chi square test , p 0.05 가 .

결 과

1) Stent De novo 124 (59%), 57 (27%), PTCA 19 (8%), PTCA 14 (6%) . 101 , 67 , 28 , Ramus intermedius 3 , 2 , ACC/AHA A 가 21 , B1가 57 , B2가 101 , C가 22 (Table 1).

2) Angiographic success rate(30%) 96%(192/201) , procedural success rate(30% , 1 major clinical events가) 92%(186/201) (Fig. 1).

3) reference diameter 3.33

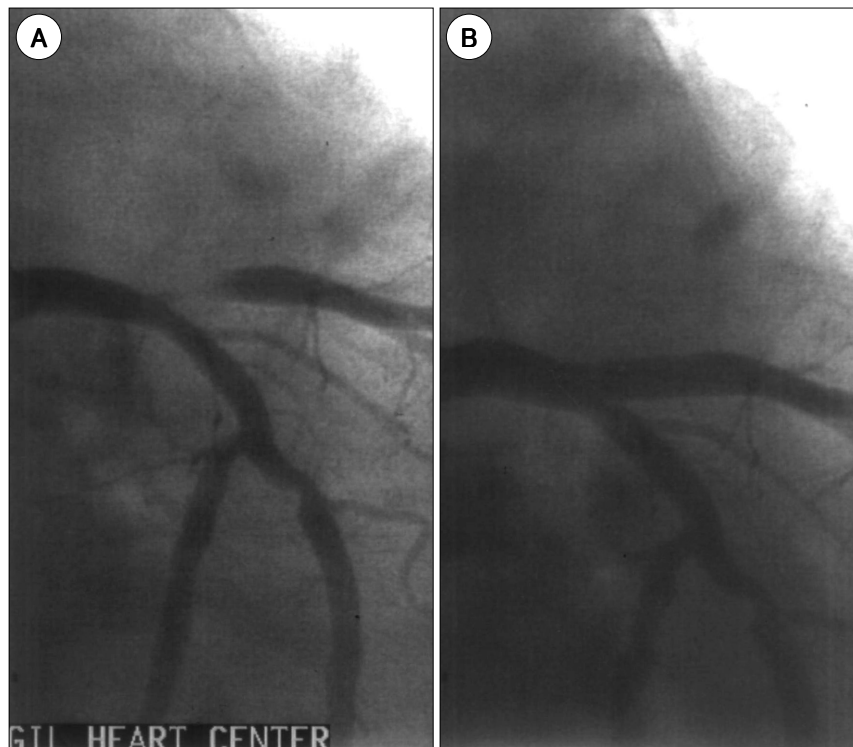


Fig. 1. Coronary angiographic finding. A : pre-stenting B : poststenting+high pressure balloon inflation

± 0.35 mm stent 0.58 ± 0.29 mm stent 3.37 ± 0.29 mm 가 , stent diameter stenosis가 $82.86 \pm 8.64\%$ stent $0.63 \pm 8.25\%$ ($p < 0.0001$). GR , Micro stent가 ($p < 0.001$), stent nominal balloon inflation (minimal luminal diameter) 2.91 ± 0.39 min 3.37 ± 0.29 min 가 ($p < 0.001$) (Table 2). 4) IVUS stent (cross sectional area)가 8.4 ± 2.4 mm² 9.4 ± 2.1 mm² 가 ($p < 0.001$) (Fig. 2, Table 3). 5) 2 stent , bypass (Table 4). 6) 30 가 1 stent ,

Table 2. Quantitative angiographic measurements

	Pre	Post
RD (mm)	3.33 ± 0.35	
MLD (mm)	0.58 ± 0.29	$3.37 \pm 0.29^{**}$
DS (%)	82.86 ± 8.64	$0.63 \pm 8.25^{**}$
Length of lesion (mm)	P-S stent	11.68 ± 4.62
	G-R stent	Cook $20.12 \pm 8.60^{*}$
		GR II $32.62 \pm 4.52^{**}$
	Micro II	$25.34 \pm 3.56^{**}$
	Wiktor	10.11 ± 0.28
	NIR	9.87 ± 0.11
Final nominal balloon size (mm)		3.71 ± 0.37
Balloon/artery ratio		1.11 ± 0.08
Maximal pressure (atm)		16.33 ± 1.64
Stent recoil (%) : P-S stent		8.27 ± 3.84
	G-R stent	9.26 ± 4.11
MLD after nominal balloon inflation (mm) (at 7 atm)		$2.91 \pm 0.39^{*}$
MLD after maximal balloon inflation (mm)		3.37 ± 0.29

RD : Reference diameter MLD : Minimal luminal diameter
DS : Diameter stenosis * : $p < 0.001$ ** : $p < 0.0001$
p-s : Palmaz-Schatz G-R : Gianturco-Robin

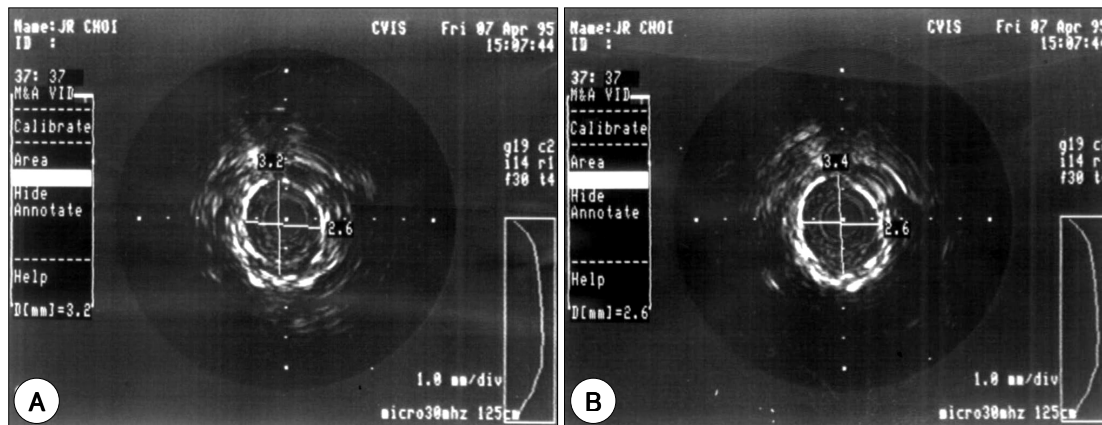


Fig. 2. IVUS image after stent implantation. A : with nominal balloon inflation (6-8 atm) B. with high pressure balloon inflation (> 12 atm)

Table 3. Intravascular ultrasound measurements of stented sites(n = 23)

	Initial IVUS	Final IVUS
Lumen area (mm ²)	8.4 ± 2.4	9.4 ± 2.1*
Minor diameter (mm)	2.9 ± 0.4	3.2 ± 0.5*
Major diameter (mm)	3.4 ± 0.6	3.6 ± 0.5*
Minor/major diameter	0.85 ± 0.04	0.89 ± 0.07

* : p<0.001

primary stenting 1

5 , 1 , 2

(Table 4).

고 안

(

) stent aspirin,heparin cou -

madin

stent

(bail out) 9

28%,⁴⁻⁷⁾ elective 2 3%,⁴⁾⁸⁾⁹⁾ Palmaz

Schatz Gianturco -Roubin stent

6.7%¹⁰⁾ major cardiac

events

(bail out), stent ,

stent , stent

minimal luminal diameter) 3 mm

(LVEF) 45%

4)5)11)12)

Benestent 1)

stent 가

(13.5% vs 3.1%, p<0.001)

3.5 16% 8)

stent

French - teams¹³⁾

heparin

coumadin 5 6 가

coumadin low molecular heparin

10%(elective gr -

oup ; 4%, bail out group ; 30%) ,

5 8

stent

가 ,

ticlopidine monoclonal antibodies가

, stent (adhesion)

¹⁴⁾¹⁵⁾ Barragan ¹⁶⁾

(ticlopidine subcutaneous heparin)

stent

French multicenter study

ticlopidine 250 mg aspirin 100 mg

subcutaneous low molecular heparin 가

Table 4. Intraprocedural and postprocedural (within 30 days) complications

	Intraprocedural complications		Postprocedural complications within 30 days		Total	
	n	%	n	%	n	%
Clinical follow up	191	100	191	100	191	100
Myocardial infarction	2	1.1	0	0	2	1.1
Coronary bypass	2	1.1	0	0	2	1.1
Stent thrombosis	0	0	1	0.5	1	0.5
Emergency intervention	0	0	1	0.5	1	0.5
Death	2	1.1	3	1.6	5	2.6
Vascular complication	0	0	5	2.6	5	2.6
Per-patient events	2	1.1	6	3.1	8	4.2

n = 191 patients

stent
thrombin
가 3%
2,900 French
multicenter registry
stent
unplanned procedure가 39%
1.8%¹⁶⁾ AVID
(angiography versus intravascular ultrasound - directed stent placement)
59%가, type C(ACC/AHA classification)
25%, three vessel disease가 가
가
stent 1.3%
stent 1.6%²⁴⁾ 가
stent
stent가
80%²⁰⁾²¹⁾
stent가
Colombo³⁾
stent
(ticlopidine asp -
irin)
가
22)
stent
9 mm²
90%
가
25)
8 mm²
가
26)
stent
9 mm²
Colombo³⁾
Nakamura²³⁾

stent
stent가

stent
stent
가

data가

요 약

연구배경 :

stent
stent

stent 가

stent

대상 및 방법 :

231 stent가 191 , 201

stent

결 과 :

1) Stent De novo 124 ,
57 (27%), PTCA 19
(8%), PTCA 14 (6%) .
101 , 67 ,
28 , Ramus intermedius 3 , 2

ACC/AHA A가 21 ,
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2) Angiographic success rate 96%(192/201)
, procedural success rate 92%(186/201) .

3) reference diameter
3.33±0.35 mm stent diameter stenosis가
82.86±8.64% stent 0.63±8.25%
(p<0.0001). GR , Micro
stent가 (p<0.001), stent
nominal balloon inflation (mininial
lumiml diameter) 2.91±0.39 min
3.37±0.29 min 가
(p<0.001).

4) IVUS stent
(cross sectional area)가 8.4
±2.4 mm² 9.4±2.1 mm² 가
(p<0.001).

5)
bypass 2 (1.1%),
가 stent
1 (0.5%), 1 2
5 (2.6%), 5
(2.6%) .

결 론 :

stent
stent
stent가
가

중심 단어 : stent .

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