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Evaluation of Restenosis in Major Vessels and Side Branches

Teruo OKABE, MD
Yasushi ASAKURA, MD
Keiko ASAKURA, MD
Akiko YAMANE, MD
Keishu RI, MD
Akio KAWAMURA, MD
Satoshi OGAWA, MD,

Abstract

Objectives. The indications for concurrent intervention for stenosis of a side branch during the treatment for stenosis of the main vessel were investigated using quantitative coronary angiography.

Methods. The retrospective study included 451 patients treated for a stenotic main vessel incorporating a side branch, who underwent follow-up angiography within 6 months. Patients were divided into Group Ⅰ with the side branch treated by coronary angioplasty, and Group Ⅱ with the side branch left untreated. Quantitative coronary angiography was used to measure the minimum luminal diameter(MLD)and percentage diameter stenosis(%DS)of the main vessel and the side branch.

Results. The MLD of the side branch after treatment was larger in Group Ⅰ(1.4±0.1mm)than in Group Ⅱ(0.7±0.1mm), and the %DS of the side branch after treatment was smaller in Group Ⅰ(34±3%)than in Group Ⅱ(63±2%). These differences decreased at follow-up to 1.1±0.1mm, 48±2% in Group Ⅰ; 0.9±0.04 mm, 46±2% in Group Ⅱ, respectively. The MLD and %DS of the side branch at follow-up in Groups Ⅰ and Ⅱ were affected by the presence of main vessel restenosis[Restenosis(+): 0.9±0.1mm, 57±4%; restenosis(−): 1.2±0.1mm($p<0.05$), 43±3%($p<0.05$)in Group Ⅰ; Restenosis(+): 0.9±0.1mm, 51±8%; restenosis(−): 1.0±0.1mm, 44±3% in Group Ⅱ]. Multivariate analysis showed that %DS of the main vessel at follow-up was the only powerful predictor of restenosis of the side branch($p=0.0249$, odds ratio=1.031, confidence interval=1.004−1.059)in Groups Ⅰ and Ⅱ.

Conclusions. Restenosis of the main vessel rather than the initial outcome of the side branch is the major influence on restenosis of the side branch.

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Key Words

■Coronary artery disease ■Angiography ■Angioplasty ■Restenosis ■Interventional cardiology

INTRODUCTION

Stenotic lesions which incorporate side branches are often difficult to treat by coronary angioplasty, and the results are frequently suboptimal, as dilation of the main lesions may damage the ostium of the side branch as a result of plaque movement or dissection[1]. Coronary angioplasty also carries a high risk of side branch occlusion[2−5], so side branch protection by wire placement and a "kissing" balloon technique are required[6,7]. In addition, the ostium of the side branch frequently undergoes marked elastic recoil after angioplasty[1,8], so the medium-term outcome is less satisfactory com-

慶應義塾大学医学部 呼吸循環器内科: 〒160−8582 東京都新宿区信濃町35
Cardiopulmonary Division, Department of Medicine, Keio University School of Medicine, Tokyo
Address for correspondence: OKABE T, MD, Cardiopulmonary Division, Department of Medicine, Keio University School of Medicine, Shinano-machi 35, Shinjuku-ku, Tokyo 160−8582
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pared to that of stenotic lesions without side branches[2,6,8].

Treatment of major stenoses associated with stenosis of a side branch by directional atherectomy improves the immediate outcome compared to only balloon dilation, but the incidence of restenosis remains high[9]. The use of coronary stents also improves the outcome of such lesions, but this procedure is technically challenging and carries a high risk of compromising the branch[10]. Therefore, treatment planning for a stenosis of a major vessel must also consider the effect on the side branch.

Treatment of a side branch imposes limitations on the procedures used for the main lesion. Various techniques[6,7] and new devices have been tried[9–20], but none have achieved optimal initial and late effects, and the influence of the immediate effects on the late effects in the side branch remain unknown.

The present retrospective study examined the early and late outcomes in patients with stenotic lesions in a major vessel associated with a side branch treated by coronary angioplasty to evaluate whether concurrent intervention for side branch lesions during the procedure for the main lesion is effective using quantitative coronary angiography (QCA).

SUBJECTS AND METHODS

Patients

This retrospective study included 451 consecutive patients admitted to our institution for percutaneous coronary intervention because of stable angina pectoris, unstable angina pectoris or acute myocardial infarction.

The patients were treated by coronary angioplasty, using plain old balloon angioplasty, stent implantation, or directional coronary angioplasty. The main lesion was contiguous to the side branch, and was located in the angle of the bifurcation in all patients. All patients underwent QCA evaluation before and after angioplasty and at follow-up examination within 6 months was performed at the Keio University School of Medicine between August 1995 and January 1999.

A significant lesion was defined as a stenosis greater than 75% according to the American College of Cardiology/American Heart Association (ACC/AHA) classification. Group Ⅰ consisted of 85 patients who underwent coronary angioplasty for significant lesions in the ostium of a side branch before treatment of the main lesion, or had newly developed significant lesions during the procedure. Group Ⅱ consisted of 142 patients who received no treatment for significant lesions in the ostium of a side branch regardless of whether the lesions were present before treatment or were newly developed during the procedure. Group Ⅲ consisted of patients who had no significant side branch lesions before or throughout the procedures, and had QCA parameters of the main lesion before the procedure matching those of the other two groups. Group Ⅱ acted as a control.

Angioplasty procedure

Coronary angioplasty was performed according to the standard technique via the femoral approach. All patients received aspirin (81 mg daily) from the day before the procedure and continued for 6 months. Patients who underwent stent implantation received ticlopidine (100 mg twice daily) continued for 1 month after the procedure. During the procedure, all patients received a bolus of heparin (10,000 IU), followed by an additional bolus if necessary. The double wire technique was used to treat the bifurcation lesion, and either the kissing balloon technique or sequential balloon technique was performed in Group Ⅰ. Patients who underwent stent implantation for side branch lesions were excluded. Cases in which the side branch was finally occluded without hemodynamic abnormality were included in this study.

Angiographic analysis

Quantitative coronary angiography analysis of the main lesion was performed by an experienced angiographer not involved in the treatment, using an automated edge detection algorithm (QCA-CMS system version 3.0, MEDIS; Leiden) and a contrast-filled catheter as the calibration standard. The reference diameter and the minimum lumen diameter (MLD) of the main lesion were measured, and the percentage diameter stenosis (%DS) was calculated at each evaluation point. Two angiographers performed QCA analysis of the side branch, to avoid measurement bias. The same indices for the side branch as mentioned above were measured and calculated by each angiographer, and the mean values were used. The reference diameter of the side branch was measured at a site $<$ 10 mm from the ostium which was considered not to be involved in the stenotic lesion.

Table 1 Clinical characteristics of the patients

	Group Ⅰ (n=85)	Group Ⅱ (n=142)	GroupⅢ (n=224)
Sex (male/female)	75/10	125/17	193/31
Age (yr, mean±SE)	64±1	63±1	61±1
Risk factor			
Hypertension	31(36)	58(41)	76(34)
Hyperlipidemia	23(27)	54(38)*	62(28)
Diabetes mellitus	17(20)	23(16)	32(14)
Smoking	33(39)	54(38)	71(32)
Target vessel			
Left anterior descending artery	60(71)	86(61)	141(63)
Left circumflex artery	18(21)	17(12)	37(17)
Right coronary artery	7(8)	39(27)#	46(20)#

( ): %.
Group Ⅰ: With side branch treated by coronary angioplasty. Group Ⅱ: With side branch left untreated. GroupⅢ: No significant side branch lesions.
*$p<0.05$ vs GroupⅢ, #$p<0.05$ vs Group Ⅰ.

Coronary angiography was repeated within 6 months of the treatment to evaluate the occurrence of restenosis of the main lesion. If the patient became symptomatic, coronary angiography was performed at less than 6 months, and the measurements were included in this analysis. Restenosis of the main vessel was defined as $>$ 50%DS in the treated segment at follow-up angiography. Restenosis of the side branch was defined as $>$ 60%DS in the treated segment at follow-up angiography, because the differences in QCA measurements by the two angiographers were minimized by this definition.

Statistical analysis

The chi-squared test and Fischer's exact test were used for analysis of categorical variables if appropriate, and one-way ANOVA and post hoc tests were used for analysis of continuous variables between the three groups. The unpaired *t*-test was used to compare the quantitative data between two groups. Differences were considered statistically significant if $p < 0.05$. Univariate and multivariate logistic regression analyses were used to determine predictors of side branch restenosis. Univariate predictors with $p < 0.2$ were entered into the multivariate model. Independent predictors of side branch restenosis and 95% confidence interval were calculated. Baseline clinical characteristics, sex, age, target vessel and risk factors were included. Reference diameter, MLD and %DS of the main vessel, and reference diameter, MLD and %DS of the side branch, both before and after the procedure and at follow-up examination, were included in the model.

RESULTS

Characteristics of patients and lesions

The clinical characteristics of the patients are shown in **Table 1**. There were significantly more patients with hyperlipidemia in Group Ⅱ compared to Groups Ⅰ and Ⅲ. The main lesion was located more often in the right coronary artery in Groups Ⅱ and Ⅲ.

Baseline angiographic characteristics

The baseline angiographic characteristics of the main lesion were similar in all groups (**Table 2**). The reference diameter of the side branch was significantly larger in Group Ⅰ than in Groups Ⅱ and Ⅲ. Predictably, MLD was significantly smaller in Groups Ⅰ and Ⅱ than in Group Ⅲ. Similarly, %DS was significantly larger in Groups Ⅰ and Ⅱ than in Group Ⅲ.

Quantitative coronary angiography of side branches

The MLD of the side branch was similar before treatment in Groups Ⅰ and Ⅱ, but became significantly greater after treatment (1.4 ± 0.1 mm) in Group Ⅰ compared to Group Ⅱ (0.7 ± 0.1 mm) ($p < 0.05$). However, although MLD at follow-up

Table 2 Baseline angiographic characteristics

	Group Ⅰ (*n*=85)	Group Ⅱ (*n*=142)	GroupⅢ (*n*=224)
Main lesion			
Reference diameter (mm)	2.6±0.1	2.6±0.1	2.6±0.1
Minimum luminal diameter (mm)	0.5±0.1	0.5±0.03	0.5±0.03
Percentage diameter stenosis (%)	79±2	80±1	81±1
Side branch			
Reference diameter (mm)	2.1±0.1*	1.7±0.1	1.7±0.04
Minimum luminal diameter (mm)	0.8±0.1	0.9±0.03	1.4±0.1#
Percentage diameter stenosis (%)	58±3*	44±2**	18±1

Values are mean±SE.
*$p<0.05$ vs Groups Ⅱ andⅢ, #$p<0.05$ vs Groups Ⅰ andⅢ, **$p<0.05$ vs GroupⅢ.
Explanation of the groups as in Table 1.

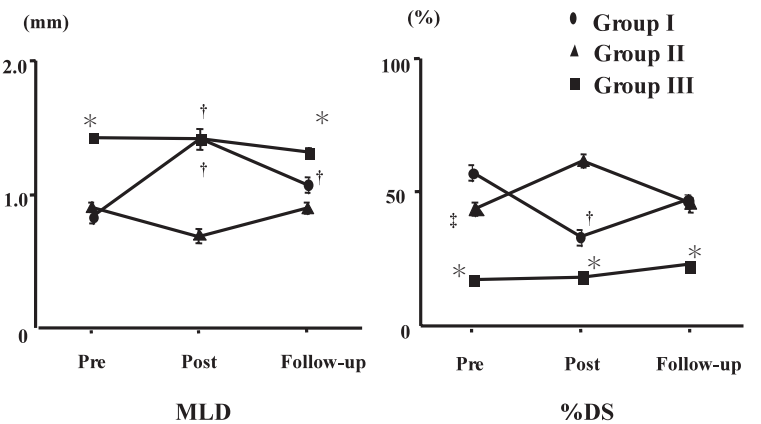

Fig. 1 Comparison of minimum luminal diameter of the side branch before and after treatment, and at follow-up (*left*) and comparison of the percentage diameter stenosis of the side branch before and after treatment, and at follow-up (*right*)
*$p<0.05$ vs Groups Ⅰ and Ⅱ, †$p<0.05$ vs Group Ⅱ, ‡$p<0.05$ vs Group Ⅰ.
MLD = minimum luminal diameter; %DS = percentage diameter stenosis; Pre = before procedure; Post = after procedure. Explanation of the groups as in Table 1.

was still larger in Group Ⅰ (1.1±0.1 mm) than in Group Ⅱ (0.9±0.04 mm) ($p<0.05$), there was a significant late loss in Group Ⅰ, so the difference between the two groups clearly decreased (**Fig. 1−left**). The %DS of the side branch before treatment was significantly greater in Group Ⅰ (58±3%) compared to Group Ⅱ (44±2%) ($p<0.05$), and but became significantly smaller after treatment in Group Ⅰ (34±3%) compared to Group Ⅱ (63±2%) ($p<0.05$). However, the difference in %DS between Groups Ⅰ (48±2%) and Ⅱ (46±2%) had disappeared at follow-up angiography (**Fig. 1−right**).

Relationship between outcomes of the main vessel and side branch

The MLD of the side branch after the procedure had significantly increased compared to the MLD before the procedure in Group Ⅰ, regardless of restenosis of the main lesion (without restenosis, before: 0.8±0.1 mm, after: 1.4±0.1 mm; with restenosis, before: 0.9±0.1 mm, after: 1.4±0.1 mm) (both $p<0.05$). However, the MLD of the side branch was significantly greater at follow-up angiography in the absence of restenosis of the main lesion (without restenosis, 1.2±0.1 mm; with restenosis, 0.9±0.1 mm) ($p<0.05$). Moreover, there was no difference in MLD of the side branch between before the procedure and at follow-up angiography in the presence of restenosis (**Fig. 2−left**).

The %DS of the side branch similarly increased after the procedure (without restenosis, before: 58±4%, after: 33±4%; with restenosis, before: 59±4%, after: 35±5%) (both $p<0.05$). The %DS of the side branch at follow-up angiography was greater in the presence of restenosis of the main vessel (57±4%), compared to absence of restenosis (43±3%) ($p<0.05$). The %DS of the side branch did not differ between before the proce-

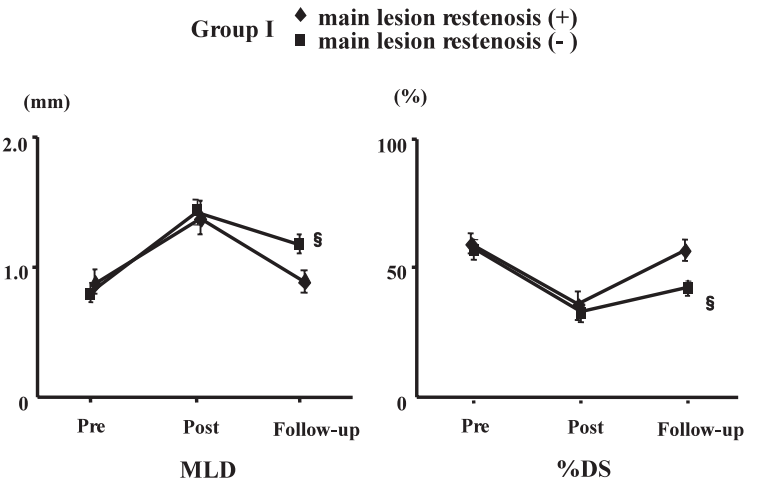

Fig. 2 Relationship between restenosis of the main vessel and the side branch, and the minimum luminal diameter in Group Ⅰ (*left*) and relationship between restenosis of the main vessel and the side branch, and the percentage diameter stenosis in Group Ⅰ (*right*)
§ $p < 0.05$ vs main lesion restenosis.
Explanation of the group and abbreviations as in Table 1, Fig. 1.

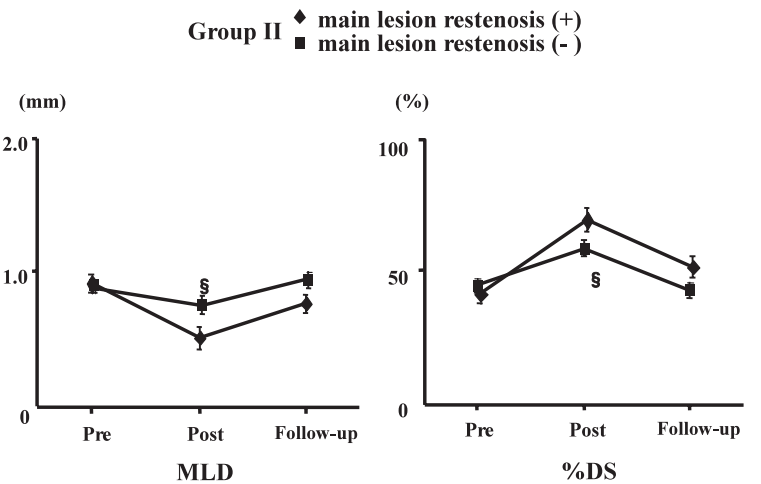

Fig. 3 Relationship between restenosis of the main vessel and the side branch, and the minimum luminal diameter in Group Ⅱ (*left*) and relationship between restenosis of the main vessel and the side branch, and the percentage diameter stenosis in Group Ⅱ (*right*)
§ $p < 0.05$ vs main vessel restenosis.
Explanation of the group and abbreviations as in Table 1, Fig. 1.

dure and at follow-up angiography in the presence of restenosis(**Fig. 2−right**).

The MLD of the side branch was greater after the procedure in the absence of restenosis than in the presence of restenosis(without stenosis, after: 0.8 ± 0.1 mm; with restenosis, after: 0.5 ± 0.1 mm)($p < 0.05$). The difference was not significant at follow-up angiography(without restenosis, 1.0 ± 0.1 mm; with restenosis, 0.9 ± 0.1 mm; **Fig. 3−left**). The %DS of the side branch was smaller in the absence of restenosis(without restenosis, after: $59 \pm 3\%$; with restenosis, after: $69 \pm 4\%$). The difference was not significant at follow-up angiography(without restenosis, $44 \pm 3\%$; with restenosis, $51 \pm 4\%$; **Fig. 3−right**).

Effect of main vessel variables on restenosis of the side branch

The baseline characteristics were not significantly different in Groups Ⅰ and Ⅱ between populations with and without side branch restenosis(data not shown). Univariate analysis showed that both the MLD and %DS of the main vessel at follow-up angiography were significantly correlated with restenosis of the side branch($p < 0.05$; **Table 3**).

Effect of side branch variables on restenosis

Statistical analysis showed that both the MLD and %DS of the side branch after the procedure in Groups Ⅰ and Ⅱ significantly differed between populations with and without side branch restenosis ($p < 0.05$). The reference diameter of the side branch after the procedure also tended to differ between populations with and without side branch restenosis, although the difference was not significant(**Table 4**).

Table 3 Univariate analysis of predictive factors for restenosis of the side branch(1)

Restenosis of side branch	Groups I and II			Original lesion			New lesion		
	(+) (n=101)	(−) (n=126)	p value	(+) (n=62)	(−) (n=74)	p value	(+) (n=36)	(−) (n=55)	p value
Parameters of main lesion									
Pre RD(mm)	2.6±0.1	2.7±0.1	0.384	2.3±0.1	2.8±0.1	0.007	3.1±0.2	2.6±0.1	0.048
Post RD(mm)	3.1±0.1	3.0±0.1	0.600	2.9±0.1	3.1±0.1	0.621	3.3±0.2	2.9±0.1	0.116
Follow-up RD(mm)	2.7±0.1	2.8±0.1	0.637	2.6±0.1	2.8±0.1	0.354	2.8±0.2	2.7±0.1	0.650
Pre MLD(mm)	0.6±0.1	0.6±0.1	0.970	0.6±0.1	0.5±0.1	0.675	0.5±0.1	0.6±0.1	0.518
Post MLD(mm)	2.7±0.1	2.9±0.2	0.616	2.5±0.2	2.7±0.1	0.287	3.1±0.3	3.0±0.4	0.085
Follow-up MLD(mm)	1.4±0.2	1.8±0.1	0.028	1.4±0.2	1.8±0.1	0.072	1.4±0.3	1.8±0.1	0.214
Pre %DS(%)	78±3	80±2	0.481	76±3	81±2	0.156	82±4	77±2	0.316
Post %DS(%)	13±3	11±2	0.530	15±4	11±2	0.295	9±4	12±3	0.608
Follow-up %DS(%)	48±4	35±3	0.007	47±5	36±3	0.066	51±8	33±4	0.042

Values are mean±SE.
RD=reference diameter. Explanation of the groups and other abbreviations as in Table 1, Fig. 1.

Table 4 Univariate analysis of predictive factors for restenosis of the side branch(2)

Restenosis of side branch	Groups I and II			Original lesion			New lesion		
	(+) (n=101)	(−) (n=126)	p value	(+) (n=62)	(−) (n=74)	p value	(+) (n=36)	(−) (n=55)	p value
Parameters of side branch									
PCI	52/49	54/72	0.157	32/30	32/42	0.271	15/21	22/33	0.929
Pre RD(mm)	2.1±0.1	2.1±0.1	0.594	2.1±0.1	2.3±0.1	0.476	2.0±0.1	2.0±0.1	0.670
Post RD(mm)	1.9±0.1	2.1±0.1	0.142	2.0±0.1	2.1±0.1	0.285	1.9±0.1	2.0±0.1	0.264
Pre MLD(mm)	0.9±0.1	0.9±0.1	0.739	0.7±0.1	0.6±0.1	0.425	1.4±0.1	1.4±0.1	0.943
Post MLD(mm)	0.9±0.1	1.3±0.1	0.011	0.9±0.1	1.4±0.1	0.002	1.0±0.2	1.0±0.1	0.942
Pre %DS(%)	56±3	56±2	0.987	68±2	70±2	0.453	32±4	28±3	0.434
Post %DS(%)	53±4	41±3	0.024	55±5	34±3	0.001	48±9	55±4	0.488

Continuous values are mean±SE.
PCI=percutaneous coronary intervention. Explanation of the groups and other abbreviations as in Tables 1, 3, Fig. 1.

Multivariate analysis

Multivariate analysis of the significant univariate variables showed that follow-up %DS of the main lesion was the only independent factor affecting the restenosis of the side branch in all groups, with the cut-off value of side branch restenosis set at 60% ($p = 0.0249$, odds ratio = 1.031, confidence interval = 1.004−1.059; **Table 5**).

Subgroup analysis

The patients were sub-divided into two groups according to the timing of side branch lesion development. Patients in the original lesion group had preexisting lesions in the ostium of the side branch before the treatment of the main lesion. Patients in the new lesion group had newly developed lesions in the side branch during the procedure for the main lesion. Both univariate and multivariate analyses were performed to examine the effect on restenosis of the side branch. The baseline characteristics in these groups did not differ between populations with and without side branch restenosis(data not shown). Univariate analysis showed that reference diameter of the main lesion before the procedure, and MLD and %DS of the side branch were significantly associated with restenosis of the side branch in the original lesion group($p < 0.05$). Reference diameter before the procedure and %DS at follow-up angiography of the main lesion were significantly associated with restenosis in the new lesion

Table 5 Multivariate logistic regression analysis of predictive factors for restenosis of the side branch

	Groups Ⅰ and Ⅱ		
	Odds ratio	Confidence interval	*p* value
Follow-up %DS of main lesion	1.031	1.004−1.059	0.0249
PCI	0.475	0.223−1.012	0.0538
Post RD of main lesion	1.775	0.939−3.356	0.0773
Post MLD of side branch	0.678	0.241−1.911	0.4623
Follow-up MLD of main lesion	1.295	0.558−3.007	0.5471
Post %DS of side branch	1.005	0.981−1.030	0.6814
Original lesion			
Follow-up %DS of main lesion	4.315	2.738−7.49	0.0058
Post RD of main lesion	1.739	0.982−2.258	0.1871
Post %DS of main lesion	1.013	0.027−0.028	0.3480
Pre MLD of side branch	2.494	2.087−12.794	0.3484
Pre RD of side branch	1.442	0.635−1.133	0.6558
Post MLD of side branch	0.736	0.508−1.64	0.7874
Follow-up RD of main lesion	1.205	0.659−1.452	0.8957
Post %DS of side branch	1.019	0.028−0.029	0.8957
New lesion			
Follow-up %DS of main lesion	2.947	1.832−4.841	0.0381
Post %DS of main lesion	0.977	0.025−0.026	0.3162
Pre %DS of side branch	1.015	0.025−0.026	0.5372

Explanation of the groups and abbreviations as in Tables 1, 3, 4, Fig. 1.

group ($p < 0.05$). However, multivariate analysis showed that %DS at follow-up angiography of the main lesion was the only independent factor affecting the restenosis of the side branch in Groups Ⅰ and Ⅱ.

DISCUSSION

The present study showed that the MLD of the side branch was significantly larger after the procedure and at follow-up in Group Ⅰ, in which the side branch was treated by coronary angioplasty, compared to Group Ⅱ, in which the side branch was not treated. However, the difference in MLD between the two groups was clearly decreased at follow-up. Moreover, there was no difference in %DS between the two groups at follow-up. These findings indicate that the initial outcome for the side branch does not reflect the possibility of late restenosis. The late outcome of the side branch is not affected by the perfusion status or the presence of an ostial stenosis immediately after the procedure[21].

This study also found that restenosis of the main vessel was associated with unfavorable outcome for the side branch. This finding suggests the possibility of restenosis in the main vessel directly affects the likelihood of restenosis in the side branch, especially if the side branch was treated during the procedure for the main lesion. Univariate analysis showed that %DS of the main vessel at follow-up, and both MLD and %DS of the side branch after the procedure were significant predictors of restenosis of the side branch. However, the multivariate model indicated that %DS of the main lesion at follow-up, and not %DS of the side branch immediately after the procedure, was the only powerful predictor of late results of the side branch. Accordingly, the restenosis of the side branch depends on the occurrence of restenosis of the main vessel. The analysis of the two subgroups, containing original lesions existing at the ostium of the side branch prior to procedures for the main vessel, and newly developed side branch lesions during the procedures, also showed that %DS of the main lesion at follow-up was the only powerful predictor of restenosis of the side branch in both groups.

A previous study found that despite the association between restenosis of the main lesion and the

side branch, reference diameter of the side branch before the procedure was the only predictor of restenosis of the side branch[21]. This finding is not consistent with our results. There are some possible reasons for this inconsistency, such as differences in the study population, reference diameter of the side branch before the procedure, treatment for the main vessel, and absence of treatment for the side branch in the previous study.

The exact mechanisms governing the flow in the side branches after treatment for stenosis of the main vessel remain unknown, but plausible explanations include the following: Remodeling of the plaque geometry at the ostium of the side branch by the increased flow in the main vessel, and reversal of acute coronary spasm of the side branch. Therefore, the patency of the side branch should be maintained in most cases even in the presence of any stenosis of the side branch after the treatment.

This study indicated that the initial results of coronary angioplasty for side branch lesions did not reflect the possibility of restenosis, so a different approach or strategy from that for the main vessel should not be chosen for the simultaneous treatment of side branch lesions. Adequate therapy for the main vessel should avoid restenosis of both the main vessel and the side branch.

CONCLUSIONS

We conclude that if intervention for stenosis of a side branch is considered during a procedure to treat stenosis in a main vessel, whether the side branch stenosis was previously present or newly developed, treatment for the main vessel must receive priority for optimal prevention of restenosis.

Study limitations

This study was non-randomized, retrospective and included a small population, so extension of the present findings to the general clinical population requires caution. The study was non-randomized, so there was bias in selecting cases and the devices used to treat side branches and main vessels. In addition, this study has several other limitations.

Firstly, the reference diameter of the side branch before the procedure tended to be small compared to that of the main vessel. However, the present study focused not on true bifurcation lesions, but on main vessels with side branches. Multivariate logistic regression analysis showed that restenosis of the side branch was more strongly affected by the %DS of the main vessel at follow-up, compared to the reference diameter of the side branch before the procedure.

Secondly, the reference diameter of the side branch at baseline differed between the three groups. Accordingly, the side branch restenoses that were not dilated could have been smaller, so the surgeon did not attempt dilation. Although we could not completely exclude this bias, multivariate logistic regression analysis suggested that the reference diameter of the side branch before the procedure did not influence the restenosis of the side branch.

Thirdly, we did not perform analysis according to the device used to treat the side branch and the main lesion. Treatment of the main vessel with a stent generally resulted in worse initial and late outcomes for the side branch compared to other procedures for the main lesion. Debulking of the main lesion seemed to give a superior outcome for the side branch. Although the results are not presented here, we confirmed that the same relationship held between the main vessel and the side branch in only patients who underwent stent implantation for stenosis of the main vessel.

A larger, prospective, randomized study is required to provide more accurate information.

要　　約

本幹主病変部と側枝における再狭窄の評価

岡部　輝雄　　朝倉　靖　　朝倉　恵子　　山根　明子

李　慧崇　　川村　朗夫　　小川　聡

目　的: 本幹主病変部分に一致して側枝が存在すると，側枝起始部に病変が存在する場合や，主病変治療中にプラークシフトなどにより狭窄が出現した場合には，主病変とともに治療を行うことが多い．しかし，側枝への加療は手技を複雑にするうえ，その遠隔期成績もいまだ満足できるもの

ではない．本幹主病変治療に際し，側枝病変への加療が有効か否かを定量的冠動脈造影法を使用して評価した．

方　法：対象症例は，本幹主病変部分に一致して側枝が存在した症例で，6ヵ月以内に確認造影を施行しえた451症例である．側枝への加療の有無により，加療群と非加療群とした．定量的冠動脈造影法により，主病変および側枝起始部の最小血管径，狭窄率を計測した．

結　果：術後側枝起始部の最小血管径と狭窄率は，側枝へ加療をしなかった非加療群（0.7±0.1mm，63±2%）に比べて，側枝へ加療を施した加療群（1.4±0.1mm，34±3%）で良好であった．しかし，この差は遠隔期には失われた（加療群では1.1±0.1mm，48±2%，非加療群では0.9±0.04mm，46±2%）．側枝起始部の遠隔期最小血管径と狭窄率は，両群とも本幹主病変が再狭窄した場合に，より増悪していた［加療群では，再狭窄（＋）：0.9±0.1mm，57±4%；再狭窄（－）：1.2±0.1mm（$p<0.05$），43±3%（$p<0.05$）．非加療群では，再狭窄（＋）：0.9±0.1mm，51±8%；再狭窄（－）：1.0±0.1mm，44±3%］．多変量解析の結果，両群において，本幹主病変の遠隔期%DSが，側枝狭窄の遠隔期成績に対する独立規定因子であった（$p=0.0249$，オッズ比＝1.031，信頼区間＝1.004－1.059）．

結　論：側枝狭窄の遠隔期成績は，側枝への加療の有無および側枝狭窄の程度とは関係なく，むしろ本幹主病変の遠隔期成績の影響を強く受けていることが示唆された．

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