

협심증 환자에서 관상동맥 조영상 병변의 특징이 측부순환의 발달에 미치는 영향*

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= Abstract =

The Influence of Morphological Characteristics of Lesions on the Development of Collateral Circulation in Angina Pectoris

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Background : It is well known that collateral circulation has important roles in ischemic heart disease. It reduce ventricular remodeling and infarct size to improve ventricular function and survival. Extents and duration of ischemia are critical stimulants of the development of coronary collateral circulation. We hypothesize that collateral circulation is poor in patients with lesions at branching points because atherosclerosis progress more rapidly not to allow the collateral circulation to develop.

Method : We studied total 330 coronary angiography, which have more than 50% stenosis in any coronary artery, normal left ventriculography and no history of myocardial infarction. In each coronary angiography, severity, site, proximity, length of lesions were analyzed, classified, and collaterale circulation was graded. We also observed whether the lesions involve branching points or not.

Results : While coronary collateral circulation developed well when stenosis was more than 90% in the severity, it was poor when the lesions involve branching points. Collateral circulation tended to be poor in case of eccentric lesions, but it was statistically insignificant. The above findings support our hypothesis of the accelerated atherosclerosis at branching points.

Conclusions : The facts that the development of coronary collaterals is poor with lesions involving branching points suggest that atherosclerosis is accelerated at these lesions that is characterized by blood stasis, turbulence and lower arterial wall tension.

KEY WORDS : Coronary collateral circulation · Atherosclerosis · Branching point.

Chilian³⁴⁾ , 가 , 가 , (ischemic burden) (extents) (duration) 35 - 38) . 가 , 1 - 21) . 가 20,39,40) , 가 1,2,14) . 20,41,42,43,44) . 가 1,2,14,35 - 37,45) . 가 2,13,20,21) . , 가 . Schaper (recruitment of pre-existing collapsed collaterals), (neoangiogenesis) 1,2,14) . 22) . 2,13,20,21) . gu - inea pig (native collateral) . recruitment) (neoangiogenesis) 23 - 29) . 30 - 32) . 가 (ischemic extents) Jugdutt¹⁵⁾ .

Ohno³³⁾

가

연구대상 및 방법

1986 1 1995 5 4500

(right ventricular branch)가
1
50% 330 50 74%, 75 89%, 90% ,
1cm ,
330 2 가
(filling defect)
, , ,
, , (branched form) , (main stream) 가
, 가 (Table 1). (opening)
4 Rentrop
(septal branch)가 Kohen⁴⁶⁾ 0
, 1 , 2
marginal branch) , , 3

Table 1. Patients' angiographic characteristics

| | |
|------------------------|-------------|
| Number of patients | 330 |
| Age (year) | 59.5 ± 8.53 |
| Sex (M : F) | 210 - 111 |
| Stenosis (%) | |
| 90% | 174 (53) |
| 75 - 89% | 115 (35) |
| 50 - 74% | 41 (12) |
| Collaterals (%) | |
| Grade 0 | 203 (61) |
| 1 | 53 (16) |
| 2 | 32 (10) |
| 3 | 42 (13) |
| Antegrade flow (%) | |
| Grade 3 | 230 (70) |
| 2 | 43 (13) |
| 1 | 30 (9) |
| 0 | 27 (8) |
| Proximal lesion (%) | 139 (42) |
| Diffuse lesion (%) | 112 (34) |
| Eccentric lesion (%) | 84 (25) |
| Branching point lesion | 73 (22) |
| Territory (%) | |
| LAD | 190 (58) |
| LCX | 64 (19) |
| RCA | 76 (23) |
| 1 vss ds | 188 (57) |
| 2, 3vss ds | 142 (43) |

LAD : Left anterior descending artery
LCX : Left circumplex artery
RCA : Right coronary artery
vss : Vessel ds : Disease

ombolysis in Myocardiac infarction)
⁴⁷⁾ . 0 가 , 1
, 2 가 , 3
가
가 SAS PC
ANOVA test, student's t test,
multivariate analysis by logistic regression

결 과

1. 관상동맥 조영의 소견과 측부순환 등급 간의 다변수 분석

가 (Table
2). 가

Table 2. Predictable variables for collateral development multivariate analysis by logistic regression

| Variables(N=330) | P value |
|------------------------|--------------|
| Severity of stenosis | 0.0001 |
| Branching point lesion | 0.0007 |
| Eccentric lesion | 0.1224 |
| 2 or 3 vss Ds | 0.2488 |
| Proximal lesion | 0.2874 |
| Lesion length 1cm | not included |

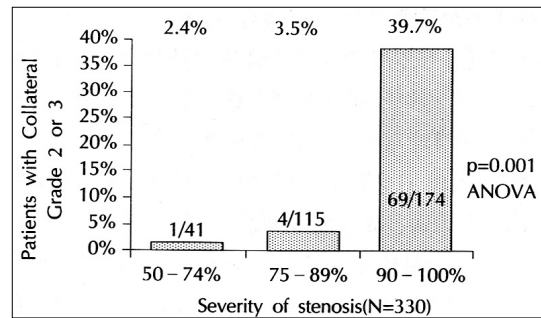


Fig. 1. Stenosis severity & collateral development.

Table 3. Predictable variables for collateral development in severe stenosis

| Grade | Stenosis 90% | Grade | P value |
|-------|------------------|-------|---------|
| 105 | Case number | 69 | |
| 31.4 | Branched(%) | 8.7 | 0.0001 |
| 31.3 | Eccentric | 18.3 | 0.06 |
| 45.7 | Proximal(%) | 51.5 | NS |
| 27.9 | Length 1cm(%) | 36.4 | NS |
| 41.9 | 2 or 3 Vss Ds(%) | 44.9 | NS |

2. 협착의 정도 별 측부순환의 등급

330
, 90 100% 가 174 , 75
89% 가 115 , 50 74%
가 41 . 2 가
90 100%
69 (39.66%), 75 89% 4 (3.
48%), 50 74% 1 (2.44%) 90%
(p=

0.001)(Fig. 1).

20,39,40,48,49)

가

3. 심한 협착이 있으면서도 측부순환 등급이 다른 군 간의 비교

Fig. 1 90%

90% 가 ,
174 2
39.66% 69 .
가 가
90% 가 ,
2 69 1
105
, 1

(31.4% 8.7%, p=0.0001).

(31.3% 18.3%)

(p=0.06).

가 (Table 3).

4. 심한 협착이 있는 병변을 근위, 원위로 나누었을 때, 편심성이거나 분기점에 위치한 병변이 측부순환 형성에 미치는 영향

Table 3 90%

가

가

가 ,

50-53)

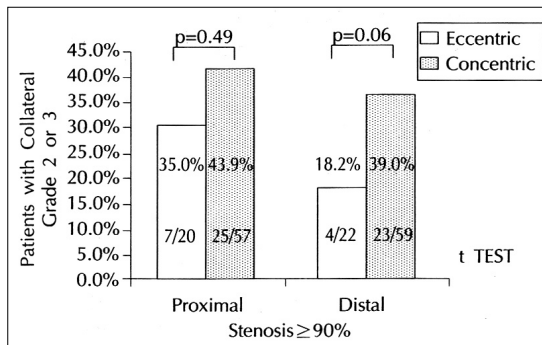


Fig. 2. Lesion morphology & collateral development.

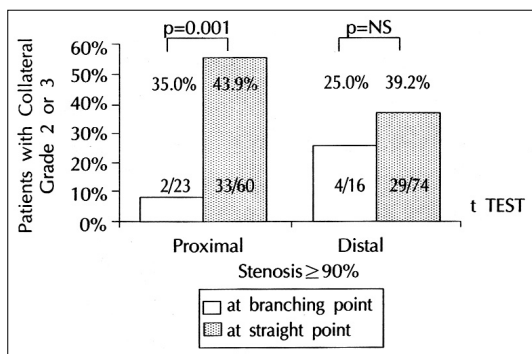


Fig. 3. Lesion site & collateral circulation.

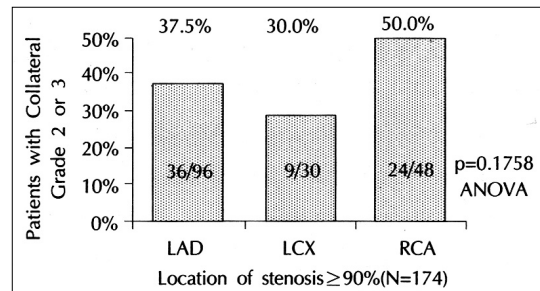


Fig. 4. Location of stenosis & collateral development.

2

(p = 0.001).

25% , 39.2%

2

가 (p=0.2698).

5. 병변의 위치와 측부순환의 발달

90% 가 ,

2

ANOVA test

48 24

(50%) 2

37.5%, 30%

(p=0.1758, Fig. 4).

고 안

- 본 연구에서 대상환자를, 심근경색이 없는 협심증 환자만으로 국한했던 논리적 이유 가

Fig. 2 90%

가 (35.0% 43.9%, p=0.4934). 90% 39.0%

2

18.2% 2

(p=0.0552).

Fig. 3 90%

8.7% 2

55%

1,2,13,14).

가 가 . 가 가 .

24

33%, 4 55% 가 가 ,

⁵⁴⁾ 가 가 가 ,

가 ,

가 , 가

가 .

가

가

. Naka -

mura⁵⁵⁾ 165 6 가 2

58%, 45

92% 1 Schwarz⁵⁶⁾ 3

Nitzberg⁵⁷⁾ 2 , 2

5 60% 2

2 3

Hirai⁵⁸⁾

Topol⁵⁹⁾ 가 ,

Schwarz Nitzberg가 , 가

가

⁶⁰⁾ 가 ,

가

79 54%

43

, 2 3

Nakamura, Schwarz, Nitzberg

43 60% 3

2. 측부순환의 가장 강력한 예측인자는 관상 동맥 협착의 정도(severity) 이다.

90% 2

⁶¹⁾ 75% 2.4%,

90% 3.5% 2

, 90%

39.7% 2

가 가 가 .

,

60)

, Scheel⁶⁹⁾

6 7

. Stadius⁷⁰⁾

가

. Giddens⁶⁴⁾

가

(shearing force) (oscillation)

. Perktold⁶⁵⁾

(compli -

(la -

ance)

mianr flow)가

가

, Thubrikar⁶⁶⁾

가

가

가

3

2

가

Davies⁵¹⁾

, Davies

5. 병변의 위치, 다혈관 질환과 측부순환의 발달

가

⁶⁷⁾. Pelinen⁶⁸⁾ 286

가

52%

22%

. Fujita Sasayama³⁸⁾

31

6. 전향적 혈류와 측부순환 발달 정도의 관계

TIMI

가

가 TIMI 3

TIMI 0

3

가 0

가

가
(Table 1). 가

7. 연구의 제한점

. Pijls⁷³⁾

8. 임상적 의의

가

가

가

(QCA, quantitative coronary angiography)

. QCA

가

74-79)가

가

가

가

가

가

가

요 약

(tandem lesion) -

연구배경 :

가

가

가

(neoangiogenesis)

가

가

(semiquantitative)

가

(ischemic extents)

가

방 법 :

1986 1 1995 5

가 50%

330

. 2 가

(, ,),

, , , , ,

(branched form) ,

가 (main stream)

가

4

결 과 :

90%

가

(

,)

결 론 :

가

가

가

가

가

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