

관동맥 질환의 중증도와 경동맥 동맥경화 진행의 연관성

주신배 · 최연현* · 추진아 · 최영란 · 김선우** · 류재춘 · 박승우
권현철 · 김준수 · 김덕경 · 이상훈 · 박정의 · 홍경표 · 이원로

= Abstract =

The Correlation between Coronary Artery Disease and Carotid Atherosclerosis

Shin Bae Joo, M.D., Yeon Hyeon Choi, M.D.,* Jin A Choo, R.N.,
Young Ran Choi, R.N., Seon Woo Kim, Ph.D.,** Jae-Choon Ryu, M.D.,
Seung Woo Park, M.D., Hyeon-Cheol Gwon, M.D., June Soo Kim, M.D.,
Duk-Kyung Kim, M.D., Sang Hoon Lee, M.D., Jeong Euy Park, M.D.,
Kyung Pyo Hong, M.D., Won Ro Lee, M.D.

Division of Cardiology, Cardiovascular Institute, Department of Radiology,
Samsung Biomedical Research Institute,** Samsung Medical Center,
Sungkyunkwan University College of Medicine, Seoul, Korea*

Background : In patients with coronary artery disease(CAD), atherosclerotic changes of carotid arteries(CA) often coexist with CAD itself. If the degree of carotid atherosclerosis can be estimated, it would be very helpful in the management of patients with CAD.

Methods : CA intima-media thickness(IMT) was evaluated by ultrasonography at 12 segments (both proximal, middle, distal common CA, bifurcation, internal and external CA- of the extracranial CA) on the 182 subjects whom underwent coronary angiograms. The subjects were divided into 4 groups according to the severity of CAD; control(C, n = 23), single vessel disease(, n = 64), two vessel disease(, n = 44), three vessel disease(, n = 51).

Results : The means(\pm SD) of maximal IMT, chosen from the 12 segments, of each group were 1.4 ± 0.7 mm(C), 2.1 ± 1.4 mm(), 2.2 ± 1.2 mm(), and 2.9 ± 1.7 mm(). The 4 groups showed significant differences between each other. The only comparison to yield insignificant differences was between group I and group (p = 0.02 for C and , p = 0.001 for C and , p < 0.001 for C and , p = 0.01 for and , p = 0.04 for and). When multivariate analysis was used to assess which major risk factors for CAD(age, male sex, smoking, hypertension, diabetes, cholesterol, triglycerides- and CAD groups affected CA IMT), group and increasing age were the most significant variables(p = 0.0001 and 0.0035, respectively).

Conclusion : It is necessary to evaluate the status of the extracranial carotid arterial system with

KEY WORDS : Coronary disease · Carotid arteries · Atherosclerosis.

- 63 -

가 .

5. 통 계

IMT (AN OVA)

IMT

(stepwise method)

연구결과

1. 대상군과 위험인자

182 (60±10, 49 73)

126 (69%), 56 (31%) .

209±44mg/dl, 153±70mg/dl,

LDL - cholesterol 136±39mg/dl, HDL - cholesterol

40±10mg/dl , 42%, 50%,

25% (Table 1).

Table 1. Risk factors in subjects

	Control (n = 23)	Group (n = 64)	Group (n = 44)	Group (n = 51)
Age(yr)	58 ± 9	59 ± 10	61 ± 9	63 ± 10
Sex(M : F)	10/13	46/19	36/7	31/20
T-chol. (mg/dl)	200 ± 30	214 ± 46	206 ± 47	217 ± 53
TG(mg/dl)	139 ± 77	158 ± 82	150 ± 74	163 ± 48
LDL-chol. (mg/dl)	127 ± 26	138 ± 42	138 ± 39	139 ± 48
HDL-chol. (mg/dl)	45 ± 12	42 ± 16	44 ± 20	40 ± 10
Smoking(%)	39.1	44.1	56.5	29.1
Hypertension(%)	43.5	37.7	58.7	60
DM(%)	8.7	16.7	32.6	41.8

DM = Diabetes mellitus, HDL = High density lipoprotein, LDL = Low density lipoprotein, T-chol. = Total cholesterol, TG = Triglyceride

Table 2. Maximal IMT of 12 segments of carotid arteries

	n	Mean of maximal-IMT(mm)
Control	23	1.4±0.7
Group	64	2.1±1.4
Group	44	2.2±1.2
Group	51	2.9±1.7
Total	182	

2. 관동맥조영술 및 경동맥 최대 IMT

23 , 64 ,

44 , 51 .

IMT 1.4±0.7mm, 2.1±1.4mm,

2.2±1.2mm, 2.9±1.7mm (Table 2).

3. 관동맥 동맥경화의 중증도와 경동맥 최대 IMT의 연관성

가 IMT

가 . IMT

, C (, ,)

IMT 가

(p=0.02, p=0.001, p<0.001).

IMT 가

(p=0.73, p=0.013).

IMT 가

(p=0.04).

4. 관동맥질환 중증도와 위험인자의 최대 IMT에 대한 연관관계

IMT

(p=0.0001)

(p=0.0035)

IMT = 0.034 x + 0.668 x

75% (R² = 0.75, Table 3).

고찰

IMT가 가 ,

가 IMT가 가

가

IMT 가

Table 3. Variables related to the maximal-IMT of carotid arteries

Variable	Reg. coef.	SE	P value	R ²
Age(yr)	0.034	0.002	0.0001	0.75
Three vessel disease	0.668	0.226	0.0035	

Reg. coef. = Regression coefficient

가 , ,

($R^2 = 0.75$).
B - Mode

IMT

IMT

가

가

IMT

6,7) 1991 14,19)

Craven 8) 1

50%

IMT가

가

IMT

IMT가

2

IMT가 1.0mm , 2.0mm

2.5mm 20)

가

가

가

IMT가 가 , IMT 가

13)

IMT

가

(Table 2),

가

가

($R^2 = 0.663$, $p = 0.0035$).

12

1994 Persson 25)

12 IMT 가 IMT

IMT가

IMT가

2 12 IMT

IMT

9 - 12)

가

13)

Candelize

26)

가

가

14,15)

16,17) MIDAS

18) 12 , IMT

IMT

가

27)

/

가

요 약

13,23),

연구배경 :

24)

. 50 30%

가 가

가

가

28),

IMT가

가

B - mode
IMT

29)

1995 Salasidis (80%

)

대상 및 방법 :

182 (50%

(18.2% : 1.7%, p=0.001)

4 , B - mode

30)

12

(

가 ,

IMT

IMT

가

결 과 :

(C, n=23)

가 ,

IMT $1.4 \pm 0.7\text{mm}$, (I, n=64)

31 - 33) $2.1 \pm 1.4\text{mm}$, (, n=44) $2.2 \pm$

1.2 mm, (, n=51) $2.9 \pm 1.7\text{mm}$

IMT

가

가

(, ,) IMT

가 (p=0.02, p=0.001,

p<0.001). IMT

가
가 ($p = 0.73$, $p =$
0.013). IMT
가 ($p = 0.04$). IMT
($p = 0.0001$)
($p = 0.0035$)
IMT = $0.034 \times$ + $0.668 \times$
IMT 75%
($R^2 = 0.75$).

결 론 :

가
IMT 가 , 가
IMT 가

50, 135 -

710,

References

- 1) Barnett HJM, Eliasaziw M, Meldrum HE : *Drug and surgery in the prevention of ischemic stroke*. *N Engl J Med* 332 : 238-242, 1995
- 2) Love BS, Grover-Mckay M, Biller J : *Coronary artery disease and cardiac events with asymptomatic and symptomatic cerebrovascular disease*. *Stroke* 23 : 939-944, 1992
- 3) Oberman A, Jones WB, Riley CP, Reeves TJ, Sheffield LT, Turner ME : *Natural history of coronary artery disease*. *Bull New York Acad Med* 48 : 1109-1125, 1972
- 4) Bruschke AVG, Proudfit WL, Sones FM Jr : *Progress study of 590 consecutive nonsurgical cases of coronary disease followed 5-9 years : I. Angiographic correlations*. *Circulation* 47 : 1147-1153, 1973
- 5) The CASS Principal Investigators : *The National Heart, Lung, and Blood Institute Coronary Artery Surgery Study (CASS)*. *Circulation* 63 (suppl 1) : 1-39, 1981
- 6) Mark RA, Akihiro N, Anthony K : *Carotid intima-media thickness is only weakly correlated with the extent and severity of coronary artery disease*. *Circulation* 92 : 2127-2134, 1995
- 7) Worfford JL, Kahl FR, Howard GR, McKinney WM, Toole JF, Crouse JR : *Relation of extent of extracranial carotid artery atherosclerosis as measured by B-mode ultrasound to the extent of coronary atherosclerosis*. *Arterioscler Thrombo* 11 : 1786-1794, 1991
- 8) Craven TE, Ryu JE, Espeland MA, Kahl FR, Mckenney WM, Toole JF, McMahan MR, Thopson CJ, Heiss G, Crouse JR : *Evaluation of the associations between carotid artery atherosclerosis and coronary artery stenosis*. *Circulation* 82 : 1230-1242, 1990
- 9) Heiss G, Sharrett AR, Barnes R, Chambless LE, Szklo M, Alzola C, and the ARIC Investigators : *Carotid atherosclerosis measured by B-mode ultrasound in population*. *Am J Epidemiol* 134 : 250-256, 1991
- 10) Gostomzyk JG, Heller WD, Gehardt P, Lee PN, Keil U : *B-scan ultrasound examination of the carotid arteries within a representative population (Monica project Augsburg)*. *Klin Wochensc* 66 (suppl 11) : 58-65, 1988
- 11) Salonen R, Salonen JT : *Progression of carotid atherosclerosis and its determinants. A population-based ultrasonography study*. *Atherosclerosis* 81 : 33-39, 1990
- 12) Grotta JC, Yatsu FM, Pettigrew LC, Rhoades H, Bratina P, Vital D, Alam R, Earls R, Picone C : *Predication of carotid stenosis progression by lipid and hematologic measurements*. *Neurology* 39 : 1325-1331, 1989
- 13) Glasgow S, Zarins C, Giddens DP, Ku DN : *Hemodynamics and atherosclerosis : Insights and perspectives gained from studies of human arteries*. *Arch Pathol Lab Med* 112 : 1018-1031, 1988
- 14) Crouse JR, Harpold GH, Kahl FR, Toole JF, Mckinney WM : *Evaluation of a scoring system for extracranial carotid atherosclerosis with B-mode ultrasound*. *Stroke* 17 : 270-275, 1986
- 15) Bond MG, Barnes RW, Riley WA, Wilmoth SK, Chambless LE, Howard G, Owens B, and the ARIC study group : *High resolution B-mode ultrasound scanning methods in communities study (ARIC)*. *J Neuroimaging* 1 : 68-73, 1991
- 16) Bond MG, Wilmoth SK, Enevold GL, Strickland HL : *Detection and monitoring of asymptomatic atherosclerosis in clinical trials*. *Am J Med* 86 (suppl 4A) : 33-36, 1989
- 17) Pignoli P, Tremole E, Poli A, Oreste P, Paoletti R : *Intimal plus medial thickness of the arterial wall : A direct measurement with ultrasound imaging*. *Atherosclerosis* 74 : 1399-1406, 1986
- 18) The MIDAS research group, Furberg CD, Byington RP, Borhami NA : *Multicenter Isradipine Diuretic Atherosclerosis Study (MIDAS) : Design features*. *Am J Med* 86 : 37-39, 1986
- 19) John RC III, Timothy EC, Amy H, Gene B : *Association of coronary disease with segment-specific intimal-medial thickening of the extracranial carotid artery*. *Circulation* 92 : 1141-1147, 1995
- 20) John RC III, Corleen JT : *An evaluation of methods for*

- imaging and quantifying coronary and carotid lumen stenosis and atherosclerosis. Circulation 87(suppl II) : 17-33, 1993*
- 21) Blankenhorn DH, Hodis HN : *Arterial imaging and atherosclerosis reversal. Arterioscler Thromb 14 : 177-192, 1991*
 - 22) Young W, Gofman JW, Tandy R, Malmud N, Waters ESG : *The quantification of atherosclerosis III : The extent of correlation of degrees of atherosclerosis within and between the coronary and cerebral arteries. Am J Cardiol 6 : 300-308, 1960*
 - 23) Olsson AG : *Regression of femoral atherosclerosis. Circulation 83 : 698-700, 1991*
 - 24) Ludwig MM, J ger U, Lund S, Stumpe KO : *Divergent responses of carotid artery intimalmedial thickness to high blood pressure and hypercholesterolemia in relation to age. J Hypertens 11 (suppl 5) : 130-131, 1993*
 - 25) Persson MG, Formgren J, Israelsson B, Berglund G : *Ultrasound-determined intima-media thickness and atherosclerosis. Arterioscler Thromb 14 : 261-264, 1991*
 - 26) Candelise L, Bianchi F, Galligoni F, Albanese V, Bonelli G, Bozzao L, Inzitari D, Mariani F, Rasura M, Rognoni F, Sangiovanni G : *Italian multicenter study on reversible cerebral ischemic attacks : III-influence of age and risk factors on cerebrovascular atherosclerosis. Stroke 15 : 379-382, 1984*
 - 27) Ford CS, Crouse JR III, Howard G, Tooie JF, Ball MR, Frey J : *The role of plasma lipids in carotid bifurcation atherosclerosis. Ann Neurol 17 : 301-303, 1985*
 - 28) Rihal CS, Eagle KA, Mickel MC : *Surgical therapy for coronary artery disease among patients with combined coronary artery and peripheral vascular surgery. Circulation 91 : 46-50, 1995*
 - 29) Smith GD, Shipley MJ, Rose G : *Intermittent claudication, heart disease risk factors and mortality. The whitehall study. Circulation 82 : 1925-1931, 1990*
 - 30) Salasidis GC, Latter DA, Steinmetz OK, Blair JF, Graham AM : *Carotid duplex scanning in preoperative assessment for coronary artery disease revascularization : The association between peripheral vascular disease, carotid stenosis, and stroke. J Vasc Surg 21 : 154-160, 1995*
 - 31) Chang BB, Darling RC III, Shah DM, Party PS : *Carotid endarterectomy can be done safely with acceptable mortality and morbidity in patients requiring coronary artery bypass grafts. Am J Surg 168 : 94-96, 1994*
 - 32) Halpin DP, Riggins S, Carmichael D, Isobe H, Mathews L, Blackmore WS, Kahn R : *Management coexistent carotid and coronary artery disease. South Med J 87 : 187-189, 1994*
 - 33) Rizzo RJ, Whittemore AD, Couper GS, Donaldson MC, Aranki SF, Collins JJ Jr, Mannick JA, Cohn LH : *Combined carotid and coronary revascularization : The preferred approach to the severe vasculopathy. Ann Thorac Surg 54 : 1099-1109, 1992*