

Clinical and Coronary Angiographic Findings of 400 Korean Adults with Coronary Artery Disease

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The clinical and angiographic findings of Korean adults with coronary artery disease (obstructions exceeding 50% of the internal diameter of the lumen of one or more major coronary arteries) were studied in 400 of 670 patients on whom selective cinecoronary arteriograms were performed at the Department of Internal Medicine, Yonsei University, College of Medicine between January 1981 and August 1986.

Among the 400 cases with significant coronary atherosclerosis, a clinical diagnosis of unstable angina (including new-onset angina in which angina developed within 3 months) was made in 45.8%, stable angina in 16.0%, variant angina, 3.7%, acute myocardial infarction, 17.3%, and old myocardial infarction, 17.3%.

Single vessel disease was more prevalent in the group with unstable angina (53%) than with stable angina (47%). The incidence of multi-vessel involvement was low in patients with acute myocardial infarction (46%), in contrast to a much higher incidence in the group with old myocardial infarction with angina (76%).

An average of 2.2 lesions resulting in at least 50% luminal narrowing of the major arteries was found per patient. The anterior descending coronary artery was involved more frequently than other vessels.

Key Words: Coronary artery disease, Cinecoronary angiogram

INTRODUCTION

Symptoms of coronary artery disease generally occur in association with the obstruction of coronary arteries. The development of selective coronary cinearteriography has made possible the correlation of clinical syndromes and evidence of arterial obstruction during life.

The distribution and extent of atherosclerosis within the coronary arterial circulation is well known as an important determinant of treatment and prognosis, but reports of coronary artery disease confirmed by coronary arteriography are almost nonexistent in Korea.

We report, herein, clinical and coronary angiographic findings of 400 Korean adults with coronary artery disease which were confirmed by coronary angiography at the Department of Internal Medicine, Yonsei University College of Medicine.

MATERIALS AND METHODS

1. Patient Group

The clinical records of 670 patients who had selective cinecoronary arteriography between January 1, 1981, and August 31, 1986, were reviewed. Of these patients, the cases in whom the origin of their cardiac disease was considered to be primarily valvular or myocardial and not atherosclerotic were excluded from this study, and the cases whose findings of angiography revealed narrowing of less than 50 percent in luminal diameter were also excluded. The remaining 400 cases who had

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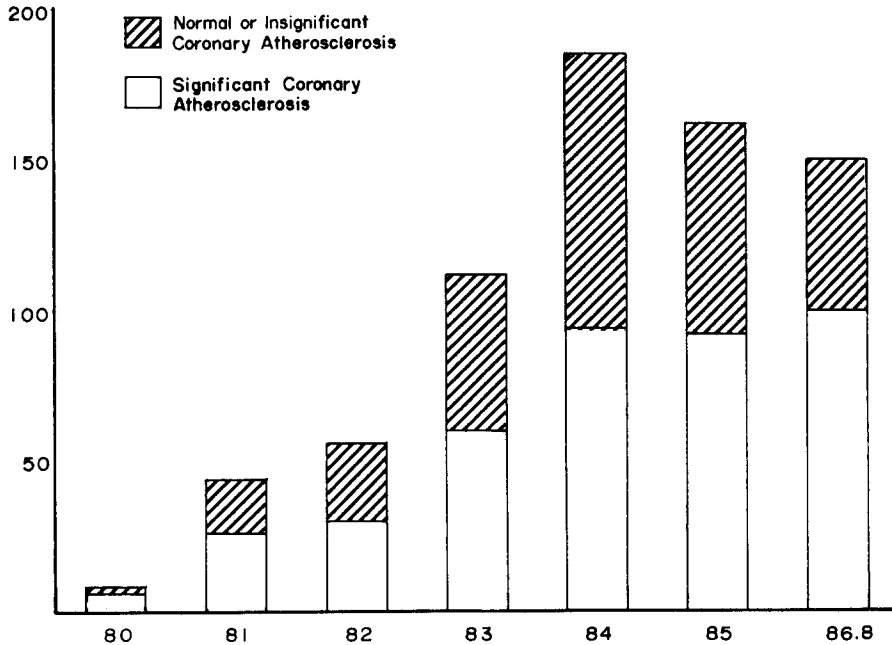


Fig. 1. Annual number of coronary angiogram (total 670 cases) performed at severance hospital in the period Jan. 1980 – Aug. 1986.

significant coronary artery disease (narrowed by 50 percent or more in luminal diameter) were analyzed with clinical and coronary angiographic findings (Fig. 1).

2. Catheterization and Angiographic Procedures

Left-heart catheterization and selective coronary arteriography by the percutaneous femoral approach were performed. Pressures were recorded on a Electronics for Medicine VR-12 oscillographic recorder using Statham P23D transducers and fluid-filled catheters. Single-plane left ventriculography was performed in the 30° right anterior oblique position. Coronary arteriograms were obtained in multiple projections, including angulated views in the sagittal plane. All angiographic images were recorded on 35-mm film at 30 frames per sec and reviewed on a Tagarno projector.

Angiograms were assessed by three independent observers, who independently measured the percent reduction in luminal diameter in the various projections, and discrepancies were resolved by averaging the observed values.

Table 1. Age and Sex Distribution

Age	Male	Female	Total
27 – 30	3	0	3
31 – 40	26	2	28
41 – 50	92	25	117
51 – 60	123	28	151
61 – 70	70	20	90
71 – 79	6	5	11
Total	320	80	400

Mean age : 53.6 ± 9.3

Male : Female = 4 : 1

RESULTS

1. Age and Sex Distribution

Of the 400 cases of significant coronary atherosclerosis, 320 were male and 80 female with the male preponderance at a ratio of 4 to 1. The ages ranged from 27 to 79 years. Preponderant age group of coronary artery disease were the sixth decade (37.8%) (Table 1).

2. Major Risk Factors

Of the 400 cases of significant coronary atherosclerosis, the common risk factors were smoking (60.5%), hypertension (38%), hypercholesterolemia (22.0%) and diabetes mellitus (13.8%) (Table 2).

3. Clinical Manifestation and Extent of Coronary Atherosclerosis

Among 400 cases of significant coronary atherosclerosis, clinical diagnosis of unstable angina (45.8%), stable angina (16.0%), variant angina (3.7%), acute myocardial infarction (17.3%) and old myocardial infarction (17.3%) were made. In the groups with unstable angina, variant angina and acute myocardial infarction, there was preponderance of single vessel disease. In old myocardial infarction group, multi-vessel disease was more prevalent than single vessel disease (Table 3). Of the 400 cases of coronary artery disease, single vessel involvement was observed in 188 cases (47

%), two vessel disease, 100 cases (25%), triple vessel disease, 87 cases (22%), and left main disease, 25 cases (6%) (Table 3).

4. Distribution of Atherosclerotic Lesions

Fig. 2 and 3 show the distribution of lesions in each of the four arteries. The total number of obstructed arteries in 400 patients was 895, an average of 2.2 per patient. The distribution for the four arteries was left anterior descending artery 46%, left circumflex artery 26%, right coronary artery 25% and left main artery 3%.

DISCUSSION

Since selective coronary arteriography was first performed by Sones¹¹ in 1958, there has been a remarkable development in the methodology of coronary arteriography²⁻⁶. Nowadays, selective coronary arteriography is essential for the diagnosis of coronary artery obstructive disease (CAOD), determining treatment modality and prognosis.

In the developed countries, the literature is replete with reports of the clinical and angiographic findings of coronary artery disease⁶⁻⁹. In Korea, however, reports of coronary artery disease confirmed by coronary arteriography are still rare.

Herein, we report the clinical and coronary angiographic findings of 400 Korean adults with coronary artery disease confirmed by coronary arteriography.

In our study the sex ratio was 4 to 1. This result is similar to those of Kim et al¹⁰ and Proudfit⁶. Age distribution of our cases was 38% in the 6th, 29%

Table 2. Major Risk Factors in 400 Patients with Coronary Artery Disease

Risk factors	No. of cases (%)
Cigarette smoking	242 (60.5)
Hypercholesterolemia *	88 (22.0)
Hypertension	142 (35.5)
Diabetes mellitus	55 (13.8)

* Higher than 220 mg%

Table 3. Clinical Manifestations and Severity of Angiographic Findings

Clinical diagnosis	Severity of disease				Total (%)
	1 vessel	2 vessel	3 vessel	LM	
Unstable angina pectoris	96	37	35	15	183 (45.8)
Stable angina pectoris	30	15	13	6	64 (16.0)
Variant angina	8	4	2	1	15 (3.7)
AMI	37	18	14	0	69 (17.3)
OMI	3	5	3	0	11 (2.8)
OMI with stable angina	6	6	5	2	19 (4.7)
OMI with unstable angina	8	15	15	1	39 (9.7)
Total	188	100	87	25	400 (100.0)

AMI : Acute myocardial infarction
 OMI : Old myocardial infarction
 LM : Left main disease

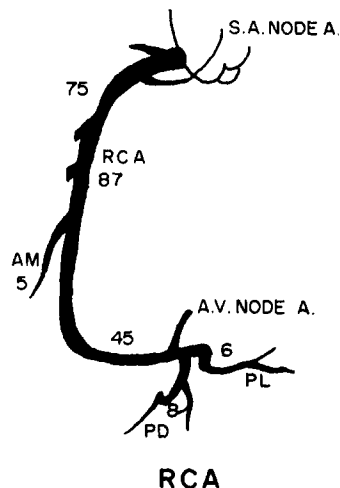
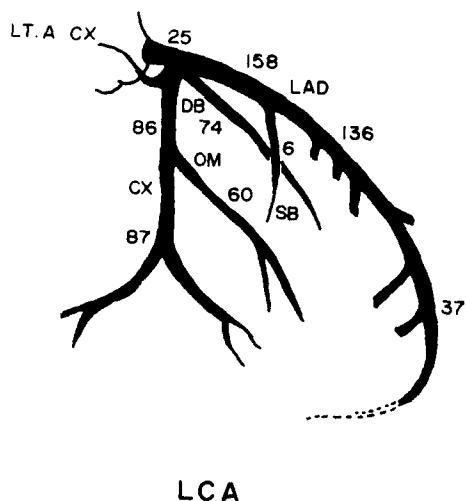


Fig. 2. Distribution of diseased vessels in left coronary artery.

* LAD : Left anterior descending artery

DB : Diagonal branch

SB : Septal branch

LT.A CX : Left atrial circumflex branch.

Fig. 3. Distribution of disease vessels in right coronary artery.

* RCA : Right coronary artery

AM : Acute marginal branch

PD : Posterior descending branch

PL : Posterolateral branch.

in the 5th and 23% in the 7th decades.

Major risk factors for coronary atherosclerosis in male patients were smoking, hypertension, hypercholesterolemia (≥ 220 mg%) and diabetes mellitus in the order mentioned, but in female patients they were hypertension, hypercholesterolemia, diabetes mellitus and smoking. Kannel et al¹¹⁾ reported that although the serum total cholesterol is still quite useful for ascertaining risk at ages younger than 50, and probably improved at any age, by an HD lipoprotein cholesterol measurement. Anderson et al¹²⁾ reported that the degree of coronary artery occlusion was positively related to elevated cholesterol, elevated triglyceride, diabetes, age and history of smoking for both male and female patients and hypertension was related to the degree of occlusion only for female patients.

In this study, single vessel disease was more prevalent in the group with unstable angina including new-onset angina (53%) than in the stable angina group (47%). Victor et al¹³⁾, Roberts et al¹⁴⁾ and Lawson et al¹⁵⁾ also reported that new-onset angina group had a higher incidence of single vessel disease than those with chronic angina. The incidence of multi-vessel involvement was low in patients who had acute myocardial infarction (46%), in contrast to a much higher incidence in old

myocardial infarction group, especially, with angina (76%). These findings were similar to that of Proudfit¹⁶⁾.

Among the 400 patients who had more than a 50% narrowing in luminal diameter in at least one vessel, 188 (47%) and single vessel involvement, 100 (25%), two vessel disease, 87 (22%), triple vessel disease and 25 (6%), left main disease. These findings were similar to those of Ljungberg et al¹⁷⁾, but Proudfit et al¹⁶⁾ and Brusckhe et al¹⁸⁾ reported that two vessel disease was most prevalent. The incidence of the left main disease was 6% in our cases, 12% in the study of Ljungberg et al¹⁷⁾ and 10.1% in that of Proudfit et al¹⁶⁾.

The total number of coronary atherosclerotic lesions among the 400 patients was 895. The average number of arteries affected by the lesions exceeding 50% of the luminal diameter was 2.2 in our study, 1.8 in that of Ljungberg¹⁷⁾ and 2.0 in that of Proudfit et al¹⁶⁾. The distribution for the four arteries was left anterior descending artery 46%, left circumflex artery 26%, right coronary artery 25%, left main 3%. These findings were similar to those of Proudfit et al¹⁶⁾.

Although in our study lesions were more common in the left anterior descending branch of the left coronary artery than at other sites, the difference in incidence in comparison with involvement

of the right coronary artery and the circumflex branch of the left coronary artery was not striking. Among 895 lesion sites, proximal (158) and mid (136) portions of left anterior descending coronary artery were the most prevalent sites.

Study of the distribution of severe arterial obstructions did not reveal a pattern characteristic of a clinical syndrome. Only limited conclusions can be reached. Lesions in the left main coronary artery were less common in patients who had myocardial infarction without angina pectoris than in the various groups of patients who had angina pectoris with or without myocardial infarction.

In the absence of anatomic patterns characteristic of a clinical syndrome, symptoms must depend on other variables such as collateral circulation, the presence of functional arterial constriction, the cardiac output, the viability of the myocardium distal to the obstruction, the arterial blood pressure, and the regional coronary blood flow. In this study the presence or absence of evidence of collateral circulation was not noted, because this information was difficult to tabulate.

In this study we suggest that in Korea the prevalent age of CAOD is older and the incidence of multivessel disease is lower than that in the developed countries.

REFERENCES

1. Sones FM, Shirey EK: *Cine coronary arteriography. Mod Concepts, Cardiovasc Dis* 31:735, 1962
2. Ricketts JH, Abrams HL: *Percutaneous selective coronary cine arteriography. J Am Med Assoc* 181:620, 1962
3. Seldinger SI: *Catheter replacement of the needle in percutaneous arteriography; A new technique. Acta Radiol* 39:368, 1953
4. Amplatz K, Formanck G, Stranger P, Wilson W: *Mechanics of selective coronary artery catheterization via femoral approach. Radiology* 89:1040, 1967
5. Judkins MP: *Selective coronary arteriography, Part I: A percutaneous transfemoral technic. Diology* 89:815, 1967
6. Proudifit WL, Shirey EK, Sones FM: *Selective cine coronary arteriography; Correlation with clinical findings in 1,000 patients. Circulation* 33:901, 1966
7. Cohen LS, Elliot WC, Klein MD, Gorlin R: *Coronary heart disease. Clinical, cineangiographic and metabolic correlations. Am J Cardiol* 17:153, 1966
8. Brusckhe AV, Proudifit WL, Sones FM: *Progress study on 590 consecutive non-surgical cases of coronary disease followed 5-9 years, I. Arteriographic circulation, 47:1147, 1973*
9. Welch CC, Proudifit WL, Sheldon WC: *Coronary arteriographic findings in 1,000 women under age 50. Am J Cardiol* 35:211, 1975
10. JM Kim, YC Kim, SA Kang, HS Shin, DH Kim, HC Lee: *Clinical observation of coronary heart disease. Korean J Int Med* 23:104, 1980
11. Kannel WB, Castelli WP, Gordon T: *Cholesterol in the prediction of atherosclerotic disease; New perspectives based on the framingham study. Ann Int Med* 90:85, 1979
12. Anderson AJ, Barboriak JJ, Rimm AA: *Risk factors and angiographically determined coronary occlusion. Am J Epidemiol* 107:8, 1978
13. Victor MF, Likoff MJ, Mintz GS, Likoff W: *Unstable angina pectoris of new onset: A prospective clinical and arteriographic study of 75 patients. Am J Cardiol* 47:228, 1981
14. Roberts KB, Califf RM, Harrell FE, Lee KL, Pryor DB, Rosati RA: *The prognosis for patients with new-onset angina who have undergone cardiac catheterization. Circulation* 68:970, 1983
15. Lawson M, Chapman R, Wood J, Starr A: *Acute coronary insufficiency: An urgent surgical condition. Br Heart J* 37:1053, 1975
16. Proudifit WL, Shirey EK, Sones FM: *Distribution of arterial lesions demonstrated by selective cinecoronary arteriography. Circulation* 36:54, 1967
17. Ljungberg S, Forsberg SA, Paulin S, Werko L: *Coronary arteriography in 486 patients-arteriographic pathology and prognosis. Acta Med Scand* 206:145, 1979