Coronary arteriography in patients with peripheral vascular disease

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Atherosclerosis is a degenerative vascular disease with a potential for widespread involvement of virtually any arterial segment. The clinical expression may be diffuse or local; but, however limited the disease, most persons evidencing it will die eventually of some form of the disease, most often, coronary heart disease.

Symptomatic coronary heart disease considerably increases the risk of major arterial reconstruction and severely limits both the early and late postoperative prognosis. In patients with unrecognized coronary disease, myocardial infarction is a common cause of operative death and remains the most common cause of late death in postoperative asymptomatic patients.

Although it is generally recognized that the incidence of coronary heart disease is increased in patients with peripheral vascular disease, there are little hard data relating incidence and severity of coronary artery disease, especially in the asymptomatic patient. Experience with evaluation and treatment of coronary artery disease during the past two decades proves that severe coronary artery disease is common not only in symptomatic, but also asymptomatic patients and the prognosis is poorly related to symptoms. The prognosis and the operative risk are best related to the extent of

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coronary disease and degree of left ventricular impairment. Knowledge of the coronary anatomy should improve patient selection and ultimate management; in suitable patients, myocardial revascularization may improve the operative risk and ultimate prognosis.

This report documents a 12-month prospective study in which all patients proposed for peripheral vascular reconstructive surgery underwent coronary arteriography as part of the vascular evaluation. Excluded were patients who were not candidates for surgery for other medical reasons, patients referred to the Cleveland Clinic for other reasons in whom significant peripheral vascular disease was diagnosed, patients who refused coronary arteriography, and patients who had previously undergone coronary bypass surgery.

Sixty-eight patients had abdominal aortic aneurysm; 71 patients, aortoiliac occlusive disease; and 144 patients, carotid artery arteriosclerosis. Multilevel disease was common as patients with carotid artery disease included 64 patients with isolated carotid disease, 23 with associated abdominal aortic aneurysm, and 56 with associated aortoiliac disease. The age ranges were similar, but the mean ages were 60 for aortoiliac disease, 63 for carotid artery disease, and 68 for abdominal aortic aneurysm.

The sex ratio was 65% male in both the aortoiliac and carotid groups, and 83% male in patients with abdominal aortic aneurysm. There was no significant difference in the incidence of hypertension, smoking, or hyperlipidemia in the three groups, but diabetes was less common in the patients with abdominal aortic aneurysm. Clinically, atherosclerosis was suspected in 37% of the patients with aortoiliac disease, 48% with pure carotid artery disease, and 60% in patients with abdominal aortic aneurysm (*Table 1*).

Overall, the incidence of significant coronary atherosclerosis was high (*Table 2*), with more than 50% of patients in every group showing 70% or more obstruction in at least one major coronary artery. There was no significant difference in the incidence between patients with aortoiliac or carotid artery atherosclerosis, but abdominal aortic aneurysm showed unusually severe coronary obstructive disease. In patients with suspected coronary atherosclerosis (*Table 3*), the diagnosis was usually confirmed, but significant coronary atherosclerosis was also frequent in patients in whom coronary artery disease was not suspected clinically (*Table 4*).

A functional analysis of the coronary anatomy was made by separating patients with severe coronary atherosclerosis into groups in which the coronary

Table 1. Clinical cardiac status

	Aortoiliac stenosis (71)		Pure carotid (64)		Abdominal aortic aneurysm (68)	
	No.	%	No.	%	No.	%
No clinical evidence	45	63	33	52	27	40
Suspected	26	37	31	48	41	60
Previous MI	9	13	21	33	17	25
Angina pectoris	12	17	17	27	19	28
CHF	1	1	2	3	3	4
Abnormal ECG	20	28	26	41	26	38

MI = myocardial infarction, CHF = congestive heart failure, ECG = electrocardiogram.

Table 2. Incidence: significant coronary artery disease in total group

	Aortoiliac stenosis (71)		Pure carotid (64)		Abdominal aortic aneurysm (68)	
	No.	%	No.	%	No.	%
Normal–mild	34	48	29	45	13	19
Severe	37	52	35	55	55	81
SVD	13	18	17	27	20	29
DVD	16	23	8	13	16	24
TVD	8	11	10	16	22	32
LMT	1	1.4	4	6	5	7
LV normal	52	73	51	80	41	60
LV abnormal	19	27	13	20	27	40

SVD = single-vessel disease, DVD = double-vessel disease, TVD = triple-vessel disease, LMT = left main trunk, LV = left ventricle.

Table 3. Incidence: suspected coronary artery disease

	Pure carotid (31)		Aortoiliac stenosis (26)		Abdominal aortic aneurysm (41)	
	No.	%	No.	%	No.	%
Normal–mild	9	29	4	15	2	5
Severe	22	71	22	85	39	95
SVD	9	29	5	19	11	27
DVD	4	13	10	39	11	27
TVD	9	29	7	27	17	41
LMT	2	6	1	4	5	12
LV normal	19	61	12	46	19	46
LV abnormal	12	39	14	54	22	54

Table 4. Incidence: unsuspected coronary artery disease

	Aortoiliac stenosis (45)		Pure carotid (33)		Abdominal aortic aneurysm (27)	
	No.	%	No.	%	No.	%
Normal–mild	30	67	20	61	11	41
Severe	15	33	13	39	16	59
SVD	8	18	8	24	9	33
DVD	6	13	4	12	5	19
TVD	1	2	1	3	2	7
LMT	0	0	2	6	0	0
LV normal	40	89	32	97	22	81
LV abnormal	5	11	1	3	5	19

disease was compensated by collateralization or prior myocardial infarction in the distribution of the obstructed artery, or uncompensated. The latter group included patients whose coronary arteries were either operable or inoperable depending upon the extent of distal coronary atherosclerosis (*Table 5*). More than 25% of patients with pure carotid and aortoiliac disease and almost 50% of patients with abdominal aortic aneurysm showed uncompensated severe coronary atherosclerosis; it is in these patients that surgical risk and long-term

Table 5. Functional analysis

	Pure carotid (64)		Aortoiliac stenosis (71)		Abdominal aortic aneurysm (68)	
	No.	%	No.	%	No.	%
Normal	7	11	6	8	1	1
Mild	22	34	28	39	12	18
Compensated	14	22	15	21	15	21
Operable	16	25	19	28	29	43
Inoperable	5	8	3	4	3	4

prognosis will most likely be affected by coronary atherosclerosis.

In summary, coronary arteriography documents a high incidence of severe coronary atherosclerosis not only in patients in whom the clinical diagnosis is suspected, but also in patients in whom no clinical indicators of coronary atherosclerosis are present. By identifying patients with uncompensated operable coronary artery disease, staging the patient for possible myocardial revascularization and peripheral vascular surgery may reduce the risk of peripheral vascular surgery and improve the prospect of long-term survival. By identifying nonoperable severe uncompensated coronary atherosclerosis, management of the peripheral vascular disease can be directed towards either surgical or conservative management to improve the ultimate outlook for the patient.