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Discrete Atherosclerotic Coronary Artery Aneurysms: A Study of 20 Patients

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The incidence, angiographic features and natural history of discrete atherosclerotic coronary aneurysms were evaluated in 20 patients with 22 aneurysms (0.2% of 8,422 patients referred for coronary angiography). Fifteen aneurysms (68%) were in the left anterior descending, four (18%) in the circumflex, two (9%) in the right and one (5%) in the left main coronary artery. Aneurysm diameter ranged from 4 to 35 mm (mean 8); 95% of aneurysms were adjacent to a severe obstruction.

Seventy-five percent of patients had severe triple vessel disease that included severe left main disease in 15%. Total obstruction of one or two arteries was present in 75%. In patients with wall motion abnormalities, 78% of the abnormalities were in the distribution of the aneurysm. Follow-up (range 1 to 90 months [mean 30]) was obtained in all 20 patients. There were two cardiac and two noncardiac deaths; 12 patients had coronary bypass surgery and of 16 survivors, 13 were angina-free.

In conclusion, discrete coronary aneurysms are much less common than diffuse ectasia. Unlike ectasia, they are never found in arteries without severe stenosis, and are most common in the left anterior descending coronary artery. Associated coronary artery disease is more severe in patients with discrete aneurysms than in those with diffuse ectasia. Discrete coronary aneurysms do not appear to rupture, and their resection is not warranted.

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The incidence and significance of aneurysmal disease of the coronary arteries have been subjects for debate. The reported incidence has ranged from 0.3% (1) to 4.9% (2) among patients undergoing coronary angiography for coronary artery disease. Management recommendations have differed, with one group (3) recommending repair of the aneurysm because of the propensity for rupture and thrombosis, and another (2) finding no difference in survival among patients with and without aneurysm and occlusive coronary artery disease. The latter investigators (2) concluded that coronary artery aneurysmal disease does not constitute a separate clinical entity but, rather, is a variant of coronary atherosclerosis. These apparent discrepancies may result from the varying definitions of coronary aneurysm employed.

We analyzed a group of 20 patients with 22 discrete, localized aneurysms of the coronary arteries, as recognized on coronary artery angiography.

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Methods

Selection of patients. From July 1981 to February 1987, 8,422 patients who underwent coronary angiography at our institution were found to have atherosclerotic coronary artery disease. For the purposes of this study, only patients with a discrete aneurysm were included for analysis. A discrete aneurysm was defined as a localized abnormal dilation of the coronary artery that is spherical or saccular (Fig. 1).

Specifically excluded from analysis were patients with fusiform aneurysms, defined elsewhere (4) as having a spindle shape that may involve a large segment of the artery. Such aneurysms have also been referred to as coronary artery ectasia. Although patients with ectasia have been grouped together with patients with discrete aneurysms in previous reports (2,5), they were not included in our study. We also excluded patients with luminal bulges or irregularities that did not exceed 1.5 times the diameter of the nearest adjacent normal segment.

Coronary angiography. The angiograms of all patients with localized, discrete aneurysms were analyzed to determine the size of the aneurysm and the extent and severity of associated coronary lesions. Lesions with ≥70% diameter

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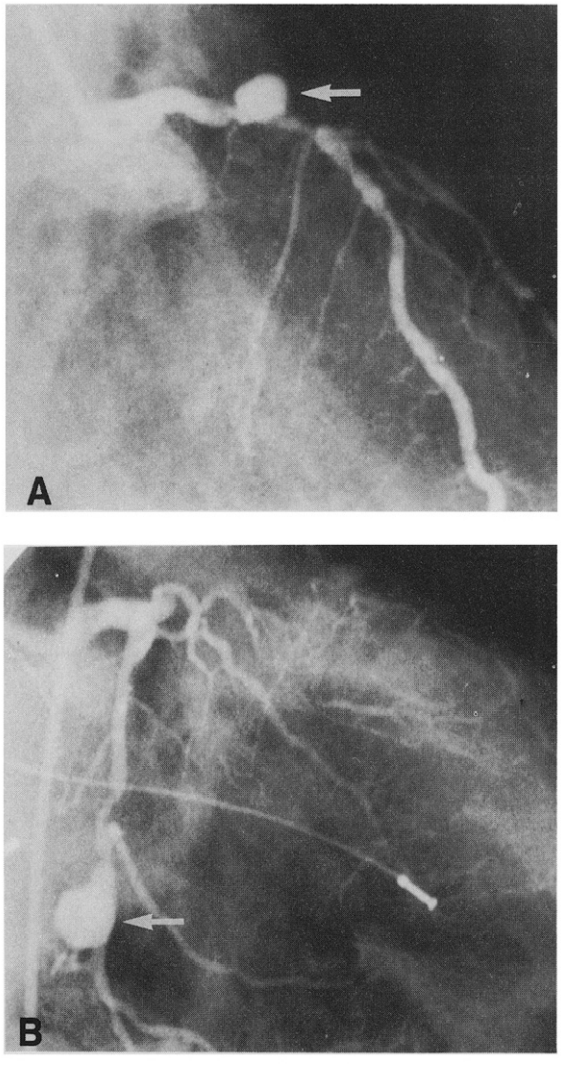

Figure 1. Left coronary angiogram of two patients in the right anterior oblique projection. **A,** Discrete aneurysm of the left anterior descending coronary artery (**arrow**). **B,** Discrete aneurysm of the left circumflex artery (**arrow**).

reduction were considered severe; this definition included lesions of the left main coronary artery. Left ventricular angiograms were reviewed to analyze regional wall motion.

Clinical follow-up was obtained on all 20 patients by contacting the patient or the patient's physician.

Results

Clinical features. The clinical characteristics and coronary anatomy of the patients are summarized in Table 1. There were 20 patients with a localized coronary aneurysm; 15 patients were male and 5 female. Their average age was 69 years (range 54 to 84). These 20 patients represented 0.2% of the 8,422 patients with angiographically apparent coronary artery disease during the study period.

Coronary aneurysms (Table 1). There were 22 aneurysms in the 20 patients (2 patients had 2 aneurysms each). Fifteen aneurysms (68%) were located in the left anterior descending, four (18%) in the left circumflex, two (9%) in the right, and one (5%) in the left main coronary artery. The diameter of the aneurysms ranged from 4 to 35 mm (average 8 mm). One previously reported patient (6) had two large aneurysms (25 and 35 mm). With exclusion of this patient, the average aneurysm diameter was 6 mm.

Associated coronary lesions (Table 1). Overall, 15 (75%) of the 20 patients had severe triple vessel disease, including 3 patients (15%) who also had severe obstruction of the left main coronary artery. The remaining five patients (25%) had double vessel disease, and none had single vessel disease. Fifteen patients (75%) had total obstruction of one or two coronary arteries, with four patients having two total obstructions. The discrete coronary aneurysm was directly adjacent to a severe coronary stenosis in 21 (95%) of the 22 aneurysms. The aneurysms occurred before or after the obstruction, and in one case between two obstructions. In no case did an aneurysm occur in an artery that was free of severe obstruction.

Left ventricular function (Table 1). Ten of the 20 patients had normal left ventricular wall motion. One patient had diffuse left ventricular hypokinesia (and was one of the two patients with severe aortic stenosis). In seven of the nine patients with one or more segmental wall motion abnormalities, at least one abnormality occurred in the distribution of the artery with the aneurysm. Four patients had one segmental wall motion abnormality, four had two and one had three such abnormalities.

Follow-up (Table 2). Follow-up obtained in all 20 patients, ranged from 1 to 90 months (mean 30). There were four deaths, at 1, 6, 12 and 33 months, respectively, after angiography. One patient died of a myocardial infarction related to a bleeding complication of angiography. The second died suddenly during an episode of high fever and urinary sepsis. The third died of uremia, and the fourth of transfusion-related acquired immunodeficiency syndrome (AIDS). Twelve patients (including two of the four who died) underwent coronary artery bypass surgery shortly after coronary angiography. In the total group, only 3 of the 16 surviving patients had angina at the time of follow-up; the rest were asymptomatic.

Discussion

Discrete aneurysms versus ectasia. Coronary aneurysms have been recognized since 1812 (7). Probably the most common cause is Kawasaki disease (8). Other reported causes include congenital anomalies, infections, syphilis and systemic lupus erythematosus (8,9). Coronary ectasia due to atherosclerotic disease has been reported in 2% (2) and 4.9% (5) of patients; the latter incidence rate was observed in 20,087 patients enrolled in the Coronary Artery Surgery Study (CASS) Registry. The 978 CASS patients with aneu-

Table 1. Summary of 20 Patients With a Coronary Aneurysm

Case	Age (yr) & Gender	Aneurysm(s)	Severity of Coronary Stenosis				Wall Motion	History
			L Main	LAD	LCx	RCA		
1	71M	LAD, 7 mm		Sev	Sev	Tot	N	Ang, 1 yr
2	54M	LAD, 5 mm		Sev	Tot	Sev	N	Ang, 20 yr
3	65F	LAD, 4 mm	Sev	Sev	Sev	Tot	N	CABG, 8 yr
4	76F	L main, 7 mm		Sev		Sev	AW-A	DOE, 3 yr, AS
5	66M	LAD, 8 mm		Sev	Tot (marg)	Tot	IW-H AW-H	MI, 23 yr MI, 13 yr Ang, 5 yr
6	84F	LAD, 7 mm		Sev		Sev	DH	CHF, AS
7	61M	LAD, 7 mm		Sev		Sev	N	DOE, 4 mo
8	66M	LAD, 7 mm		Sev	Sev (ramus)	Tot	N	Ang, 3 yr
9	77M	LAD, 4 mm		Tot	Sev	Tot	IW-H AX-H	MI, 5 mo
10	75F	LAD, 5 mm LAD, 7 mm	Sev	Sev	Sev	Tot	IW-D AW-H	Ang, 3 yr
11	78M	LCx, 8 mm		Sev	Sev	Tot	N	Ang, 2 yr
12	80M	LAD, 8 mm	Sev	Sev	Sev	Sev	N	MI, 11 yr Ang, 11 yr
13	72M	LAD, 8 mm		Sev	Mod	Tot	N	Ang, 4 yr
14	54M	LAD, 4 mm		Sev	Sev	Tot	AW-A	MI, 11 yr VF, 6 mo
15	68M	LCx, 6 mm		Tot	Sev	Sev	AW-H	Ang, 10 yr
16	66M	LCx, 4 mm		Sev	Sev	Sev	N	MI, 1 yr
17	69M	LAD, 5 mm		Sev	Tot (marg)	Tot	IW-H AW-H	Uremia, new ang
18	73M	LCx, 13 mm		Tot	Sev	Sev	IW-D AX-H AW-D	MI × 2, 3 yr Ang, 3 yr
19	60F	RCA, 4 mm		Sev		Tot	N	Ang, 10 yr
20	73M	LAD, 35 mm RCA, 25 mm		Tot	Tot (Marg)	Sev	AW-H	Ang, 1 yr AAA

A = akinetic; AAA = abdominal aortic aneurysm; Ang = angina, AS = aortic stenosis; AW = anterior wall; AX = apex; CABG = coronary artery bypass graft; CHF = congestive heart failure; D = dyskinetic; DH = diffuse hypokinesis; DOE = dyspnea on exertion; F = female; H = hypokinetic; IW = inferior wall; LAD = left anterior descending coronary artery; LCx = left circumflex artery; L-main = left main coronary artery; M = male; Marg = marginal; MI = myocardial infarction; Mod = moderate; N = normal; RCA = right coronary artery; Sev = severe; Tot = total occlusion; VF = ventricular fibrillation.

rysmal disease included those with fusiform disease or diffuse ectasia. An illustrated saccular aneurysm in that report (5) occurs in an artery that also demonstrates diffuse ectasia, whereas all of our discrete aneurysms occurred in arteries that were otherwise of normal or smaller than normal caliber and that did not demonstrate diffuse widening. Ninety of the CASS patients had aneurysmal disease in an artery without severe stenosis (no stenosis in 21 and <70% stenosis in 69). In contrast, in all of our patients the aneurysm occurred in an artery with severe or total obstruction.

There are two further distinctions between patients with discrete aneurysms and those with ectasia. Aneurysmal disease in the CASS Registry patients (5) was found most frequently in the right coronary artery, whereas 68% of the aneurysms in our study were in the left anterior descending artery, and only two aneurysms (9%) were in the right coronary artery. In addition, although among CASS Registry patients triple vessel disease was more common in those with than in those without aneurysmal disease (42% versus 34%), the severity of associated coronary disease was greater in our patients with discrete aneurysms. Seventy-five percent of our patients had severe triple vessel disease; furthermore, 15% had severe left main stenosis and 75% had total coronary occlusion.

Follow-up. Despite the severe occlusive disease present in our patients, the follow-up data do not indicate a grave prognosis. This finding probably reflects at least in part the efficacy of both medical and surgical therapy. In fact, no patient died directly as a complication of the aneurysm during the follow-up period, and there was no incidence of cardiac tamponade or even unexplained sudden death that could have been due to rupture of the aneurysm. Furthermore, no thrombus was visualized in the aneurysms during

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Table 2. Follow-Up Data in 20 Patients

Case	Age (yr) & Gender	CABG	Current Angina	Months of Follow-Up	Status
1	71M	Yes	No	90	A & W
2	54M	No	No	66	A & W
3	65F	Yes	Yes	55	A, mod. angina
4	76F	Yes	—	33	Died, AIDS
5	66M	Yes	No	45	A & W
6	84F	Yes	No	41	A & W
7	61M	No	No	40	A & W
8	66M	Yes	No	36	A & W
9	77M	Yes	No	33	A & W
10	75F	Yes	No	32	A & W
11	78M	No	—	1	Died, MI post-cath
12	80M	No	No	31	A & W
13	72M	No	No	6	A & W
14	54M	No	—	6	Died, sudden urinary sepsis
15	68M	No	Mod	23	A, symptomatic
16	66M	Yes	No	12	Died, uremia
17	69M	No	—	16	A & W
18	73M	Yes	No	16	A & W
19	60F	Yes	Mod	11	A, symptomatic
20	73M	Yes	No	4	A & W

A = alive; A & W = alive and well with no angina; AIDS = acquired immunodeficiency syndrome; post-cath = after cardiac catherization (bleeding episode). Other abbreviations as in Table 1.

angiography. Infarction of areas in the distribution of the aneurysm did occur, but wall motion abnormalities were not seen in the distribution of the aneurysm in 50% of the patients. Therefore, although no statement can be made about the incidence of distal embolization from the discrete aneurysms, associated coronary stenosis and occlusion were present to a sufficient degree to account for the incidence of infarction.

Conclusions. Discrete atherosclerotic coronary aneurysms are rare and occur much less commonly than diffuse coronary ectasia. Unlike ectasia, they never occur in arteries that do not have a severe stenosis and they occur most commonly in the left anterior descending artery (rarely in the right coronary artery). Furthermore, associated coronary disease is more severe than in patients with diffuse ectasia. Discrete atherosclerotic coronary aneurysms do not rupture, and their resection is not warranted.

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