PAPERS AND SHORT REPORTS

Accelerated progression of coronary artery disease

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Abstract

Atheromatous disease of the arteries is progressive and often results in untimely morbidity and premature death. The pathogenesis of the arterial lesion is as complex as its rate of progression is variable and ill understood. In six patients undergoing coronary arteriography, who were being restudied before percutaneous transluminal coronary angioplasty, the angiographic appearance deteriorated considerably over a fairly short period (mean 3.6 months).

Although early detection and preventive measures have lowered the incidence of atheromatous disease and improved survival in some patients, rapid progression of the disease remains a serious hazard in others, who, as a group, remain at present unidentifiable.

Introduction

Little has been reported about the rate of progression of coronary arterial lesions since the advent of coronary arteriography. Factors influencing the development of arterial stenoses include the passage of time, the severity of pre-existing narrowing, and coronary surgery itself.¹ We report our findings in six men destined to have percutaneous transluminal coronary angioplasty.

Case histories

The table summarises the details of the six men. The figures show the results of coronary arteriography in three of the men; in each case the finding on initial catheterisation is compared with that when patients were restudied

before angioplasty. All patients were middle aged men from similar socioeconomic backgrounds, and all but one were smokers. All had a short history of arterial disease but most had a family history. Biochemical risk factors were evident in only two. All patients were treated conventionally. In none was left ventricular function greatly impaired. Four patients were treated medically, and two died subsequently. Two underwent coronary artery bypass grafting. In one patient (case 4) a totally new occlusion developed in the right coronary artery after successful percutaneous transluminal coronary angioplasty to the left anterior descending artery.

Discussion

The annual mortality of patients with angina is 4%² and, as reported in the European trial and coronary artery surgery study (1982-3), ranges from 1.6 to 3.5% in those treated medically. We now know that arterial disease is not a uniform entity. Coronary stenoses are morphologically heterogeneous.³ Vascular territories can be affected separately and independently: in patients with peripheral vascular disease the incidence of coronary disease ranges from 25 to 62%.⁴ Within the coronary circulation disease patterns vary: angiographic progression of stenosis is increased after episodes of unstable compared with stable angina.⁵ As survival bears a constant relation to the rate of progression of arterial disease it is important to obtain as much information as possible as a clearer understanding of the pathogenesis may result in improved long term patency.

Venous grafts have been in use for two decades. They occlude at a rate of 2% a year in the first five years and at over 5% between five and 10 years; the overall 10 year graft patency ranges from 40% to 50%.⁶ By contrast, internal mammary arterial grafts show continued high patency with little evidence of atherosclerosis.⁷ Arterial lesions proximal to a venous graft deteriorate at a faster rate than corresponding stenoses in medically treated patients.⁷ Surgery causes accelerated reactions in minimally narrowed arteries compared with the natural progression in vessels not bypassed.⁸ Percutaneous transluminal coronary angioplasty has a rate of restenosis at six months of 33%.⁹

In patients managed medically progression of coronary stenosis, as determined by angiographic studies, is measured in years.¹⁰ More recently use of videodensitometry has confirmed substantial progression over two to three years in patients with worsening symptoms.¹¹ Since the advent of percutaneous transluminal coronary

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Summary of case histories

Case No	Age (years) and sex	Socioeconomic class	Duration of symptoms (months)	Family history	Smoker	Blood pressure (mm Hg)	Results of electrocardiography	Results of chest radiography	Glucose	Cholesterol	Triglyceride
1 (fig 1)	46 M	Working	4	+	+	140/80	Inferior myocardial infarction, right bundle branch block	Normal	Increased	Increased	Increased
2	50 M	Working	6	+	+	150/90	Normal	Normal	Normal	Normal	Normal
3 (fig 2)	60 M	Working	1.5		+	140/80	Depressed T wave (inferior)	Normal	Normal	Increased	Not known
4 (fig 3)	42 M	White collar	1	+	+	150/90	Normal	Normal	Normal	Normal	Normal
5	54 M	White collar	4	+		110/80	Normal	Normal	Normal	Normal	Normal
6	40 M	Working	2		+	120/90	Depressed T wave (inferior and lateral)	Normal	Normal	Normal	Normal
Mean	48.5		3

FIG 1—Case 1. Circumflex lesion initially (left) and after seven months (right), showing considerable deterioration.

FIG 2—Case 3. Tight mid-right coronary artery stenosis (left), which progressed to total occlusion after three months (right).

Interval between studies (months)	Left ventricular function	Artery studied by arteriography		Drug treatment	Procedure	Outcome
		Initial study	Restudy			
7	Normal	Circumflex	Circumflex	Calcium antagonist, nitrate	Medical	Alive and well
3	Normal	Right coronary artery	Right coronary artery	β Blocker, nitrate, calcium antagonist	Percutaneous transluminal coronary angioplasty (not successful)	Died
3	Normal	Right coronary artery	Right coronary artery	β Blocker, nitrate, calcium antagonist	Medical	Died
4	Decreased	Left anterior descending	Right coronary artery	β Blocker, calcium antagonist, dipyridamole, aspirin	Percutaneous transluminal coronary angioplasty of left anterior descending artery	Alive and well, inferior myocardial infarction
2	Normal	Left anterior descending	Right coronary artery	Calcium antagonist, nitrate	Coronary artery bypass graft	Alive and well
2	Decreased	Right coronary artery	Right coronary artery	Calcium antagonist, β blocker, nitrate, dipyridamole	Coronary artery bypass graft	Alive and well
3-6						2 Deaths

FIG 3—Case 4. Findings on initial catheterisation (left), with total mid-occlusion of right coronary artery after four months (right).

angioplasty a second angiographic study has been mandatory, but owing to limited hospital resources this can be undertaken only after a deferred period.

The relation between recognised risk factors and progression of atheromatous lesions is unclear: some studies have found them to be unrelated,⁸ while others have found a positive association in men and smokers¹² and in those with raised cholesterol concentrations.¹¹

It is impossible to derive any conclusive evidence about the rate of progression of atheromatous disease from the accumulated information provided to date. In this small series, out of six patients destined to undergo percutaneous transluminal coronary angioplasty only two did so. One operation was successful and one abandoned, and the total mortality amounted to 33%. We believe, like others, that aggressive management should not be delayed in patients with confirmed tight coronary stenoses.¹³

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