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Aneurysmal dilatation of the coronary arteries: diagnostic patterns and clinical significance

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In order to define the clinical features, clinical patterns and significance of aneurysmal dilatation of the coronary arteries, five cases are presented which were diagnosed by coronary angiography. Three cases presented with left ventricular dysfunction secondary to coronary arterial occlusive disease and the fourth patient presented with thromboembolic cerebrovascular disease. The fifth case presented with manifestations of acute myocardial infarction.

Key words: Coronary artery aneurysm; Coronary angiography; Coronary arterial occlusive disease

Introduction

Few diseases in medicine produce as much diagnostic and therapeutic consternation as the problem of coronary arterial aneurysms. In 1963, Daoud et al. stated that no case of coronary aneurysm had yet been diagnosed during life [1]. Within ten years, several cases were diagnosed by means of angiography [2–5]. But, even with the wide-spread use of coronary angiography, coronary arterial aneurysms remain an uncommon condition. In this presentation, we discuss the features of five patients we recently encountered with coronary arterial aneurysms. All our patients were young and without major cardiac risk factors, which make the possibilities of fixed coronary arterial disease less likely.

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Materials and Methods

Patients

Four patients were sent for evaluation of central chest tightness while the fifth patient presented with left hemiplegia but the electrocardiogram showed wide-spread T-wave changes. They were four males and one female. All were Saudis, and their ages ranged from 26 to 34 years with a mean of 30 years. On questioning, all patients had no serious illness in their childhood other than the usual common ailments.

Case 1

A 27-year-old male was sent for further evaluation of chest pain and tightness. A few weeks prior

to admission, he had sustained a transmural anteroseptal myocardial infarction. The patient experienced chest tightness thereafter, and he was labelled as a case of post-myocardial infarction angina. The patient was evaluated by non-invasive techniques, where his exercise thallium as well as the Muga scan were reported to be positive for ischaemic heart disease. His coronary angiography showed 100% obstruction of the left anterior descending artery, which filled in retrograde fashion indicating total obstruction. In the distal end of the second marginal branch of the circumflex artery there was interruption of continuity 2 cm in length, probably due to aneurysmal dilatation.

The right coronary artery showed three large aneurysmal dilatations of different diameters and several centimeters in length (Fig. 1). Left ventricular function study was impaired, with an ejection fraction of 44%, whereas left ventricular angiography demonstrated anteroapical hypokinesia. The possibility of surgical intervention was remote and the patient was treated with anticoagulants and vasodilators.

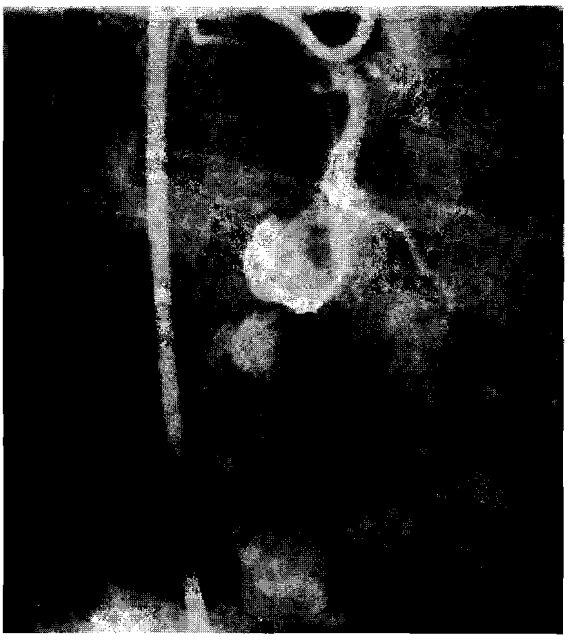

Fig. 1. Coronary angiogram showing multiple aneurysmal dilatation in the right coronary artery.

Case 2

A 32-year-old male was seen in the Casualty department with severe chest pain associated with sweating and hypotension. Electrocardiography showed extensive anterior myocardial infarction and the patient was admitted to the coronary care unit, where his condition was satisfactory. A few months later, haemodynamic and angiographic investigations were performed. There was moderate to severe left ventricular dysfunction secondary to extensive anterior myocardial infarction. There was also aneurysmal disease of the left anterior descending artery in its proximal portion. The mid-segment of the left anterior descending artery had an irregular margin and attained overall a caliber of more than 1.5 cm. The other coronary arteries and their branches were essentially normal. After one year of follow-up, the patient had no further chest pain and was well controlled on treatment with oral anticoagulant, coronary vasodilators and angiotensin-converting enzyme inhibitors.

Case 3

A 34-year-old male was admitted to the hospital with exertional anginal attacks that progressed to occur at slightest effort. His cardiac enzyme were within normal limits at this stage. Cardiac catheterization was performed, when left ventriculography showed mild, anteroapical hypokinesia with good overall left ventricular function and an ejection fraction of 68%. Coronary angiography revealed the left main, circumflex and right coronary arteries all to be patent and normal. In the proximal segment of the left anterior descending artery, however, just below its origin, there was subtotal obstruction with an aneurysmal irregular dilatation of more than 2 cm where thrombus had been formed and obstructed the artery. The question of angioplasty as well as coronary bypass grafting were discussed. The agreement was to continue with antianginal medical treatment and anticoagulants were added to this treatment.

Case 4

A young Saudi housewife 26 years of age was seen in the Casualty department with left hemiplegia. Here electrocardiogram showed widespread T-wave changes. The patient was admitted for further evaluation. Non-invasive investigation yielded a positive resting thallium scan and cross-sectional echocardiography demonstrated gross abnormalities of wall motion. Coronary angiography showed complete obstruction of the left main coronary artery prior to its bifurcation, with suspicion of an aneurysmal dilatation about 0.5 cm in length. Evaluation of left ventricular function was not possible because of high risk at the time of catheterization, but significant evidence for irreversible left ventricular dysfunction was established based on non-invasive methods. The patient was stabilized with medical therapy, as her hemiplegia limited any further measures.

Case 5

A 33-year-old patient, known to have had myocardial infarction one year ago, not on any medication, complained of chest pain with tightness, which was continuous and was not relieved by any medication. The patient was admitted to the hospital with suspicion of acute myocardial infarction, subsequently proven by electrocardiographic features and elevated cardiac enzymes. Cross-sectional echocardiography revealed dilatation of the left ventricle with hypokinesia of the inferolateral wall. Bilateral selective coronary arteriography showed aneurysmal dilatation of the circumflex artery at the origin of the second marginal branch (Fig. 2). It was noted that the dye persisted in the aneurysm after being cleared from the distal artery. The distal circumflex artery was totally blocked and filled by collateral flow from the right coronary artery. An aneurysmal dilatation was noted at the site of the blockage, while the right coronary artery also showed aneurysmal dilatations in its proximal and mid-segments. It was thought that these aneurysmal dilatations could be congenital in origin, since there was no evidence of fixed atherosclerotic disease. He was given beta-blockers as well as antiplatelet agents, and is now followed-up at our out-patient clinic.

Fig. 2. Selective coronary angiography demonstrating aneurysmal dilatation of the circumflex artery at the second marginal branch.

Discussion

Aneurysmal dilatation of the coronary arteries can be either a localised or diffuse dilatation which exceeds the diameter of adjacent segments. Destruction of the medial wall of the artery is the usual histological feature. Frequently, aneurysmal dilatation co-exists with coronary atherosclerosis. This has raised the question of whether aneurysmal disease is a variant of atherosclerotic ischaemic heart disease or a distinct entity [6]. Coronary aneurysms may vary in number, being single as in our cases 2–4 or multiple as in our cases 1 and 5. Congenital aneurysmal dilatations are generally large and noted on one coronary artery, generally the right as in case 1. In this, as in cases 3 and 5, diffuse atherosclerotic changes were absent along the affected artery, again supporting a congenital rather than an atheromatous aetiology.

The aneurysms may also have an inflammatory basis, such as is seen in young children in the so-called mucocutaneous lymph node syndrome described by Kawasaki et al. [7,8]. This is especially common in Japan, and is most prevalent in

male children under age of 5 years. Kawasaki disease is unlikely to be an aetiological factor in the cases of our series, as there was no past history of any serious illness during childhood other than the usual ones. Recently, Mousa et al. [9] described Kawasaki syndrome in four Saudi children admitted to the Maternity and Children's Hospital in Riyadh. They concluded that the disease is by no means rare in the Middle East, including Saudi Arabia [9].

In all the young patients in our series, aneurysmal dilatation co-existed with ischaemic heart disease, and resulted in significant obstruction that led to myocardial infarction. It is tempting to suggest that an aneurysmal segment with its altered blood flow may predispose to myocardial infarction. In our patients, the clinical manifestations and the presenting pictures were in no way suggestive of the diagnosis of coronary arterial aneurysm, but the diagnosis was made after angiography. Glickel and associates speculated that aneurysmal dilatation of coronary arteries may lead to thrombosis and embolism [10]. This can explain the fact that all our patients had no fixed coronary arterial disease. The prognosis of our patients would be expected to be different from those with coronary atherosclerosis.

Swaye et al. [6] computed figures for survival over 5 years, comparing patients with coronary aneurysms and co-existent coronary arterial disease to non-aneurysmal coronary disease, but they could not find any differences in survival. These findings suggest that aneurysmal coronary arterial disease does not represent a distinct clinical entity but is, rather a variant of coronary atherosclerosis. Sievert et al. [11] reported, after follow-up for 6 years of these cases with aneurysmal dilatation, an unfavourable prognosis which is determined by accompanying stenosing coronary sclerosis and the danger of thrombosis. In contrast, Palmer [12] related the prognosis of an aneurysm to its aetiology, demonstrating fatal rupture of mycotic aneurysms of the right coronary artery due to caseous granulomas that were observed in the wall of the aneurysms. This fatal outcome was confirmed by Jervinene et al. [13], who found that large aneurysms may interfere with flow of blood, causing compression or even rupture.

In conclusion, in the presented patients, aneurysmal dilatation of coronary arteries co-exists with occlusive coronary arterial disease that ends with myocardial infarction. The current study points to the fact that younger patients with aneurysmal dilatation of the coronary arteries may present as acute myocardial infarction or left ventricular dysfunction leading to thromboembolic phenomena.

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