Aneurysm of the main stem of the left coronary artery associated with aortic insufficiency and aneurysm of the ascending aorta. Report of a case with successful surgical repair

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Surgical repair included isolation of the coronary aneurysm and replacement of the ascending aorta and aortic valve, combined with triple aortocoronary saphenous vein bypass grafts.

A review of the aetiology, clinical features, and surgical management of coronary artery aneurysms is presented.

Aneurysm of a coronary artery was first described by Morgagni in 1761. It was not until 1958, however, that Munkner et al (1958) diagnosed this uncommon condition in a living patient. Kaufman et al (1970) and Ebert et al (1971) reported the first two instances of surgical repair. Subsequently, Falsetti and Carroll (1976) found 34 published cases, of whom only 15 were treated surgically.

In our case the aneurysm of the main stem of the left coronary artery was overshadowed by the presence of aortic regurgitation associated with an aneurysm of the ascending aorta.

Case report

The patient was a 43-year-old woman in whom a cardiac murmur had been present since childhood, but it was only in 1970, after three uneventful pregnancies, that she began to experience any symptoms. At that time she complained of constricting chest pain at rest radiating into the left arm, and exertional dyspnoea. On auscultation there was a loud, 4/6 early diastolic murmur along the left sternal border.

Despite medical treatment her condition deteriorated, and in July 1975 she was referred to the department of cardiology for assessment. Her symptoms then were angina at rest, exertional dyspnoea, syncopal attacks, and palpitations. On examination the blood pressure was 160/45 mmHg with no clinical evidence of cardiac failure. The electrocardiogram was within normal limits, and the chest radiograph showed a cardiothoracic ratio of 0.53 (fig 1) but no calcification in the region of the aorta.

Cardiac catheterisation produced the following results. At rest the mean pulmonary artery pressure was 14 mmHg and the mean pulmonary capillary wedge pressure was 9.5 mmHg. These figures increased to 26 and 20 mmHg respectively after angiography despite the absence of mitral regurgitation. The cardiac index was 3.51/min/m².

An aortogram showed severe aortic regurgitation, a slightly dilated left ventricle, a large aneurysm of the ascending aorta, and a round para-aortic shadow. Coronary angiography showed this latter opacity to be an aneurysm situated between the left coronary ostium and the bifurcation of the left coronary artery (fig 2). These findings were confirmed at operation in September 1976.

The operative procedure was as follows. Two
A Leguerrier, M Bercot, and A Piwnica

Fig 2 Coronary arteriogram showing aneurysm of main stem of left coronary artery.

saphenous vein grafts were sutured to the aorta distal to its aneurysmal dilatation. Total cardiopulmonary bypass was initiated between the right femoral artery and both vena cavae. The left ventricle was vented via the right upper pulmonary vein. After lowering the patient's core temperature to $25^\circ$C (oesophageal), ischaemic cardiac arrest was achieved by clamping the ascending aorta. A transverse incision in the aorta showed a dilated aortic annulus with retraction of the valve cusps accompanied by gross dilatation of the left coronary ostium. Behind the main pulmonary artery, a heavily calcified fusiform aneurysm of the main left coronary artery, measuring $1 \times 1.5$ cm in diameter was seen. Since its resection would have been too dangerous, a single ligature was tied immediately proximal to the bifurcation of the left coronary artery, thus isolating the coronary aneurysm. The two saphenous vein grafts were anastomosed distally to the anterior descending and circumflex branches of the left coronary artery respectively. After removal of the clamps from these grafts, the right coronary artery was intubated and perfused to rewarm the myocardium to a temperature of $32^\circ$C (oesophageal). The aortic valve and ascending aortic aneurysm were replaced with a $31$ mm Björk-Shiley mitral valve prosthesis, mounted in a $30$ mm diameter woven Dacron tube. This prosthetic tube extended from the aortic annulus proximally to the distal ascending aorta. All sutures were buttressed with Teflon felt.

As technical difficulties were anticipated with reimplantation of the right coronary ostium, a third saphenous vein graft was placed between the ascending aorta and the main stem of the right coronary artery. Finally, the Dacron prosthesis was enveloped in the remaining wall of the aortic aneurysm and cardiopulmonary bypass was discontinued without incident.

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Aneurysm of the main stem of the left coronary artery with aortic insufficiency

Aneurysm of the main stem of the left coronary artery with aortic insufficiency occurred one hour after operation and responded to a single external DC discharge. The later post-operative course was uneventful, and the patient was discharged after 15 days.

One year after the operation she was asymptomatic with a blood pressure of 110/70 mmHg, a cardiothoracic ratio of 0.51, and no evidence of prosthetic valve dysfunction.

Discussion

Coronary artery aneurysms are rare, and for many years they were encountered only in post-mortem studies (Packard and Wechsler, 1929; Daoud et al., 1963). With the development of coronary angiography, however, they have been recognised more often and during life. Recently, Falsetti et al. (1976) reviewed reports of 34 cases, and Markis et al. (1976) reported on a further 30 patients.

Coronary angiography is the most useful single investigation for diagnosing this condition. It has usually been performed because of a history of myocardial infarction (Ebert et al., 1971; Konecke et al., 1971; Ghahramani et al., 1972; Crook et al., 1973; Toussaint et al., 1976), on account of angina pectoris (Markis et al., 1976), unexplained dys-rhythmias, or because of calcification observed on plain chest radiographs or during aortography (present report).

The aetiology in most case reports has been atherosclerosis (Daoud et al., 1963, 52%, Falsetti et al., 1976, 50%). The aneurysms are usually located on the left coronary artery and tend to be associated with other manifestations of arterial disease, for example: (1) obstructive lesions of the coronary arteries. In these instances poststenotic haemodynamic changes may be involved in the pathogenesis (Anabtawi and de Lion, 1974); (2) aneurysms of the abdominal aorta. These were responsible for the majority of deaths in Daoud's series (Daoud et al., 1963); (3) aneurysms of the thoracic aorta. The association with this condition is illustrated by our case and those of Falsetti et al. (1976); and (4) arterial hypertension, which has been found to be frequent in all studies.

Apart from atherosclerotic coronary aneurysms, other varieties have been encountered. Congenital aneurysms (Seabra-Gomes et al., 1974), when present, are usually located on the right coronary artery (Frithz et al., 1968) and most have been associated with arteriovenous fistulae (Munkner et al., 1958; Seabra-Gomes et al., 1974). Traumatic (Konecke et al., 1971) and mycotic (Crook et al., 1973; Toussaint et al., 1976) aneurysms are much more unusual.

Surgical management of coronary aneurysms has continued to develop since the first cases described by Kaufman et al. (1970) and Ebert et al. (1971). The operative procedures have included reconstructive endo-aneurysmorrhaphy (David et al., 1972), or more commonly, resection of the aneurysm and its replacement with an autologous vein graft (Ebert et al., 1971; Ghahramani et al., 1972; Seabra-Gomes et al., 1974; Kitamura et al., 1975; Falsetti et al., 1976; Markis et al., 1976).

No generalisation about operative management can be made. For example, excision of an aneurysm is not a reasonable proposition in the presence of multiple collaterals originating from the diseased vessel (Kitamura et al., 1975). However, as suggested by Toussaint et al. (1976), mere isolation of the aneurysm is acceptable if an associated ventricular aneurysm in the area supplied by the vessel concerned is to be resected.

In our patient the combination of a coronary and an aortic aneurysm complicated the surgical management. Extensive calcification in the wall of the former precluded any procedure except exclusion of this aneurysm. Furthermore, this had to be combined with replacement of the ascending aorta and the aortic valve and a double aorto-coronary saphenous vein bypass graft. Reimplantation of the right coronary ostium into the Dacron prosthesis (Bentall and De Bono, 1968) was not attempted because of the risk of haemorrhage. This led us to undertake a third aorto-coronary graft as suggested by Zubiate and Kay (1976).

References


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