SINGLE CORONARY ARTERY WITH UNUSUAL INTRAMURAL COURSE IN INTERVENTRICULAR SEPTUM

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The occurrence of coronary anomalies has no morphogenetic relationship to other congenital cardiac defects. Such anomalies do not usually reduce the life expectancy apart from coronary arterio-venous, arterio-atrial and arterio-ventricular fistulas, and those coronaries arising from the pulmonary artery. (Reemtsma et al., 1961, Barder, 1963).

However, serious problems may arise in patients with coronary anomalies such as single coronary artery and intramural coronary artery. Intramural coronary artery may simulate a focal organic stenosis in cardiac angiography (Porstmann et al., 1960, Bloor et al., 1963). Death has followed division of the anomalous coronary arteries during cardiotomy (Senning 1959, Kirklin et al. 1959, Friedman et al. 1960, Derrick et al. 1963).

A case of a single coronary artery with a long intramural segment in the intraventricular septum is reported below:

CASE REPORT

S.L., a 59 year old Chinese woman was admitted to General Hospital in 1958 and 1959 for pyelitis, latent syphilis and meningitis.

She was readmitted in 1966 with breathlessness on exertion and ankle swelling for 2 months. Physical examination showed that she was anaemic and in congestive heart failure. There was a rough systolic murmur over the precordium radiating to the axilla. She was mentally lucid; neurological examination revealed no abnormalities.

In spite of successful treatment of her cardiac failure, her mental state deteriorated. She became very drowsy with loss of sphincteric control, a right facial palsy, right hemiplegia and a right positive Barbinski reflex. The right optic fundi showed haemorrhage and exudate. Her temperature rose to 102°F. before death.

NECROPSY FINDINGS

The heart weighed 300 gm, the right ventricular wall measuring 0·2 cm. and the left ventricular wall 1·2 cm. A roughened patch 2 × 1 cm. was present on the medial wall of the left atrium above the mitral valve. The mitral valve was thickened; the anterior cusp had ulcerated and was studded with multiple large friable vegetations of subacute bacterial endocarditis.

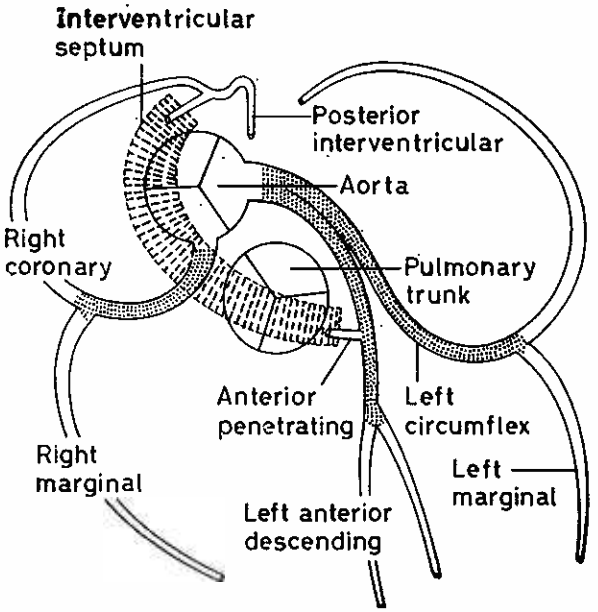

Fig. 1. Diagram of distribution of main coronary arteries. The stippled areas are those most commonly affected by atheroma. (After Hudson 1965).

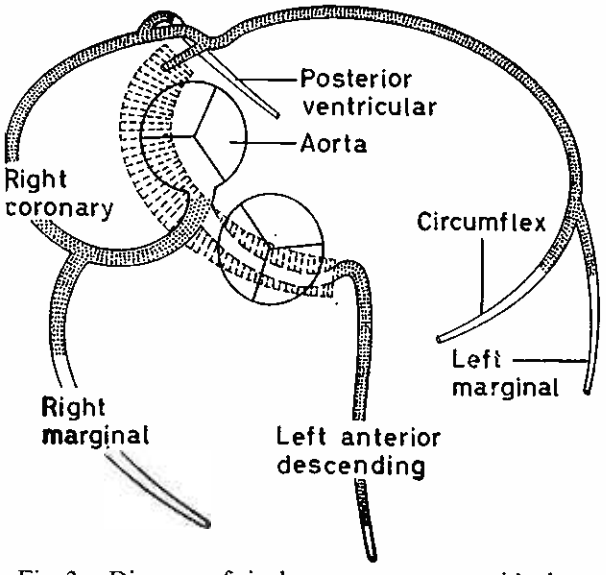

Fig. 2. Diagram of single coronary artery with along intramural segment in the interventricular septum. Note that this segment is free from atheromatous involvement.

Only one coronary ostium was present—that in the right coronary sinus. The main trunk followed the course of the right coronary artery, but continued round the left border of the heart supplying the areas normally supplied by the left marginal and circumflex arteries (Fig. 2). Its wall was severely atheromatous. About 2 mm. from the ostial opening, a large branch arose which nearly immediately penetrated the interventricular septum and thereafter remained intramurally within the interventricular septum for 37 mm. about 5 mm. below the pulmonary valve ring. After making an S bend within the cardiac muscle, it emerged on the superficial epicardium at the usual point on the interventricular groove to become the anterior descending branch. The wall of the intramural segment of the artery was thin and free from atheromatous involvement, in contrast to the epicardial anterior descending portion which was nearly cmopletely occluded by atheroma. A whitish fibrotic area (1 × 1 cm.) was present near the apex on the left side of the interventricular septum.

Other findings were rheumatic valvulitis, multiple cerebral softenings, splenic infarctions, chronic pyelonephritis, cholelithiasis and chronic cholecystitis.

DISCUSSION

A single coronary artery is one in which the entire myocardium is nourished by an artery, regardless of distribution, that arises by one ostium from an arterial trunk (Smith, 1950). Smith classified the anomaly into three main types:

1. A single artery following the usual course of either the right or the left coronary artery and supplying first one ventricle and then the other.
2. A single artery arising from a common trunk, which soon divides to be distributed to the right and left ventricle.
3. Very atypical, so that neither right nor left artery distribution is represented.

Three cases of the third type have been reported in Singapore (Muir 1959). The present case is of the second type. In cases of the second type which have been reported, the left coronary artery may pass behind the aorta or the pulmonary artery; some pass in front of the pulmonary trunk and in this position they are very liable to be divided during cardiotomy with fatal outcome (Senning 1959). The intramural course of the single left coronary artery within the interventricular septum which was seen in this case, does not seem to have been described hitherto.

Normally distributed coronary arteries may have an intramural segment over some 3 to 10 mm. The myocardium overlying the intramural segment is said to confer support and protection to the segment, thus preventing atheromatous involvement (Geiringer 1951). The portion of the artery proximal to the intramural segment may be a site of predilection for a sclerotic process (Polacek et al. 1961). However, Edwards et al. (1956) did not observe any difference in type and incidence of atherosclerotic process between the intramural and extramural portions of the coronary arteries. In the present case, the wall of the intramural coronary was thin and completely free from atheroma, but the distal portion was severely involved to the extent of causing severe myocardial fibrosis.

SUMMARY

A case of single coronary artery with a long intramural segment within the interventricular septum is reported. The significance of intramural and single coronary artery in cardiac angiography and cardiac surgery is noted. The significance of the absence of atheroma in the intramural segment of the otherwise severely atheromatous artery is discussed.

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