A Survey of Uncommon Forms of Coronary Arteries

Abdolhamid SHEIKHZADEH, M.D. and Parviz GHABUSI, M.D.

SUMMARY

Among 854 coronary angiograms, we found the following abnormalities of the coronary arteries. Three cases had nonatherosclerotic coronary artery aneurysms. One case, a 27-year-old man with a diffuse lesion, expired after two episodes of myocardial infarction. In 2 other cases the lesions were localized and the patients underwent successful coronary bypass surgery. In 2 cases, a small vascular network was found: a 23-year-old man with pheochromocytoma who also had myocardial injury and pulmonary edema, and a case with contusio cordis who had angina pectoris but had normal coronary arteries. In 3 cases the coronary arteries originated abnormally from the aorta. A congenital right coronary artery-right ventricular fistula was detected in a 17-year-old female with multiple cardiac abnormalities. Abnormally wide coronary arteries were also found in 17 cases with apical hypertrophy, a form of hypertrophic nonobstructive cardiomyopathy.

Additional Indexing Words:

Coronary artery aneurysm	Ectasia	Coronary angioma
Coronary fistula	Coronary dilatation	Anomalous origin of coronary arteries

THE most common form of coronary artery disease is segmental or diffuse atherosclerosis of one or more vessels. The purpose of this report is to demonstrate unusual and uncommon forms of coronary artery disease, whether or not the etiology is known.

MATERIALS AND RESULTS

This paper is based upon the examination of 854 coronary angiograms. All cases with atherosclerotic changes, atherosclerotic aneurysms and abnormal origin of coronary arteries were excluded.

From the Department of Adult Cardiology, Cardiovascular Medical and Research Center, Teheran, Iran.

Address for reprint: A. Sheikhzadeh, M.D., Cardiovascular Medical and Research Center, PO Box 33-423, Shemiran, Teheran, Iran.

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Table I. Summary of Coronary Artery Abnormalities

Case No	Coronary Arterial (CA)-Angiogram	Clinical Findings	Etiology
1	CA-Aneurysm, Diffuse	Myocardial infarction	Congenital
2	CA-Aneurysm, LAD, RCA	Angina pectoris	Congenital
3	CA-Aneurysm, LAD, Circumflex	Angina pectoris	Congenital
4	CA (myocardial) angioma	High blood pressure Myocardial infarction Pulmonary edema	Pheochromocytoma
5	CA (myocardial) angioma	Angina pectoris, ST-T changes	History of contusio cordis
6	RCA-Right ventricular fistula	Heart failure & murmur	Congenital
7	Abnormally wide coronary arteries (17 cases)	Chest pain, Giant negative T-waves	Apical hypertrophy
8	Abnormal origin of coronary arteries from the aorta (3 cases)		Congenital

In discussing the different types of abnormal coronary arteries originating from aorta, it is most useful to demonstrate the representative coronary angiograms and corresponding clinical findings. The abnormalities found in our sample are summarized in Table I.

Non-atherosclerotic aneurysm:

Three patients had a non-atherosclerotic coronary artery aneurysm and ectasia. Their ages were 27, 34, and 57 years respectively. All patients had typical angina pectoris, and electrocardiographic changes compatible with myocardial infarction. One patient, a 27-year-old man with diffuse, inoperable lesions expired after two attacks of myocardial infarction. In the other 2, the lesions were localized and adequate coronary artery bypass surgery with anticoagulation therapy was successful and the patients did well. See Fig. 1 and clinical data summarized in Table I.

Coronary angioma:

In 2 cases, we found small coronary arteries and a capillary network compatible with angioma. A 23-year-old man in this group had a large pheochromocytoma, which caused attacks of myocardial injury associated with enzyme elevation (CPK 24U, SGOT 70U, SGPT 93U, and LDH 1,720U) and electrocardiographic changes compatible with myocardial injury and pulmonary edema. The second case was a 53-year-old man with typical angina pectoris, ST-T changes in the ECG and a positive exercise test. He had a history of severe blunt chest trauma and contusio cordis 2 years before coronary angiography. There was no other coronary lesion in this case.

Anomalous origin of coronary arteries from aorta:

In 2 cases, the circumflex artery originated from the right coronary artery, and in 1 case both coronary arteries originated above the left coronary

Fig. 1. Non-atherosclerotic coronary aneurysms (a-diffuse, b and c-localized).

cuspid with a single ostium in the sinus of Valsalva.

Coronary artery fistula:

A right coronary artery-to-right ventricular fistula was present in an 18-year-old girl with Ebstein's anomaly of the tricuspid valve, who also had val-

Fig. 2. Coronary angioma (arteriolar-capillary networks) in a patient with pheochromocytoma.

Table II. Clinical, Hemodynamic, and Electrocardiographic Findings in 3 Cases with Coronary Aneurysms (Ectasia)

Case No	Age/Sex	Symptoms	ECG	LVEDP mmHg	LV-Angio	Coronary Aneurysm
1	27/m	Sudden severe chest pain	Anterior MI	18	Antero-apical dyskinesia	Diffuse
2	34/m	Atypical angina pectoris	Normal, positive exercise test	8	Normal	LAD, RCA
3	57/f	Typical angina pectoris	ST-T changes	10	Normal	LAD Circumflex

MI=myocardial infarction; LAD=left anterior descending branch; RCA=right coronary artery; LV-angio=left-ventricular angiogram; LVEDP=left ventricular end-diastolic pressure.

vular, subvalvular and peripheral pulmonary artery stenosis.

Coronary artery dilation:

Finally, in 17 cases with left ventricular apical hypertrophy (a form of hypertrophic non-obstructive cardiomyopathy), abnormally wide and tortuous coronary arteries were observed. The leading findings in these cases were chest pain and giant negative T-waves in the ECG. Left ventricular cavity elimination was present in left ventriculograms.

Fig. 3. Right coronary artery-right ventricular fistula in a 17-year-old girl with multiple congenital heart defects.

DISCUSSION

Atherosclerotic coronary artery disease is the most common type of coronary artery disease. This may be complicated by atherosclerotic aneurysmal changes.¹⁾⁻³⁾ In some cases the coronary artery is congenitally aneurysmal. These aneurysms may be diffuse or segmental.^{4),5)} The leading symptom in these cases is chest pain, due to ischemia or infarction secondary to a milking phenomenon, coronary steal syndrome, or thrombosis of the coronary arteries.⁶⁾

Myocardial damage may also be produced by either pheochromocytoma

Fig. 4. Diffuse dilation of coronary arteries in hypertrophic cardiomyopathy (apical hypertrophy).

or cardiac trauma. However, the small coronary arteries are intact in these cases. Occasionally myocardial networks of capillaries or arterioles are encountered in these patients.

Patients with an abnormal origin of the coronary arteries from the aorta remain asymptomatic if coronary atherosclerosis is not present. The incidence of this condition is one in 200 coronary arterial angiograms.⁷⁾ This congenital abnormality is most commonly encountered in tetralogy of Fallot,⁸⁾ which is excluded from our material. Our case with a right coronary artery-right ventricular fistula with segmental aneurysmal dilation of the right coronary is most probably congenital in origin in view of concomitant congenital cardiac abnormalities.^{7),9)}

We have previously reported significantly dilated coronary arteries in patients with apical hypertrophy and giant negative T-waves. This condition is a form of hypertrophic, nonobstructive cardiomyopathy and is most probably a genetic disease.¹⁰⁾

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