

References

- 1 Pritchard RW. Tumors of the heart. *Arch Pathol* 1951;51:98-128.
- 2 McAllister HA. Primary tumors and cysts of the heart and pericardium, In: Harvey WP, ed. *Current problems in cardiology*. New York: Yearbook Medical Publishers Inc., 1979;6-51.
- 3 Silverman NA. Primary cardiac tumors. *Ann Surg* 1980;191:127-138.
- 4 Dong E, Hurley EJ and Shumway NE. Primary cardiac sarcoma. *Am J Cardiol* 1962;10:871-878.
- 5 Goldstein S, Mahoney EB. Right ventricular fibrosarcoma causing pulmonic stenosis. *Am J Cardiol* 1966;17:570-578.

IJC 0314C

Anomalous origin of the left coronary arterial tree through three stems – one from the pulmonary trunk

Charles E. Wheatley, N.V. Chalam and K.C. Demetropoulos

University of Michigan, School of Medicine, Division of Cardiology, Ann Arbor, Michigan and Oakwood Hospital, Departments of Medicine and Radiology, Dearborn, Michigan

(Received 6 February 1985; revision accepted 28 March 1985)

In an 18-year-old asymptomatic male athlete, the left anterior descending coronary artery was found to arise from the pulmonary trunk. The remainder of the left coronary arterial tree arose through two stems from the aorta. Collateral retrograde filling of the left anterior descending coronary artery from the right coronary artery and the left circumflex coronary artery was demonstrated, but we found no evidence of left-to-right shunting into the pulmonary trunk. The patient has chosen conservative treatment, thus offering an unusual opportunity to follow the natural course of this lesion, which may increase understanding of its natural history.

(Key words: anomalous left coronary artery; conservative treatment)

Introduction

The diagnosis of abnormalities of the left coronary artery are now made more frequently during life since coronary arteriography and echocardiography have become widely utilized. The frequency of diagnosis is not matched by understanding of the natural history with or without surgery. This is a report of a young athlete with three separate origins of his left coronary arterial tree who has elected non-surgical treatment. He is being monitored with exercise testing and nuclear imaging. We present his case in the hope of stimulating further

Reprint requests to: Charles E. Wheatley, M.D., Cardiology Division, University of Michigan Hospital, Ann Arbor, MI 48109, U.S.A.

studies so as to determine the proper treatment for patients with anomalous origin of the left coronary artery with demonstrable collaterals who are known to have extended survival with or without surgery.

Case Report

A heart murmur was heard first when D.D., a 16-year-old highschool athlete underwent a physical examination in 1976. His past history was unremarkable and the family history was negative for heart disease and murmurs. The electrocardiogram and chest radiograph were normal. Cardiac catheterization, which did not include dye-dilution curves, was normal except for an anomalous origin of the left coronary artery tree (Table 1). The circumflex coronary artery arose from the aorta at the anticipated location for the left main stem. Another smaller artery arose by a common ostia or an ostia very near that of the circumflex branch (Fig. 1). The left anterior descending coronary artery arose from the pulmonary trunk and was filled in retrograde fashion from the right and circumflex coronary arteries (Fig. 2). The small right coronary artery and the left aortic arch were normal. Left ventricular function was normal (Table 1). A graded bicycle ergometer stress test was normal in 1977. A further test in March, 1980, failed to induce chest pain or arrhythmia during treadmill exercise to Bruce Stage V with a pressure-rate product of 420. Inversion of T waves occurred, however

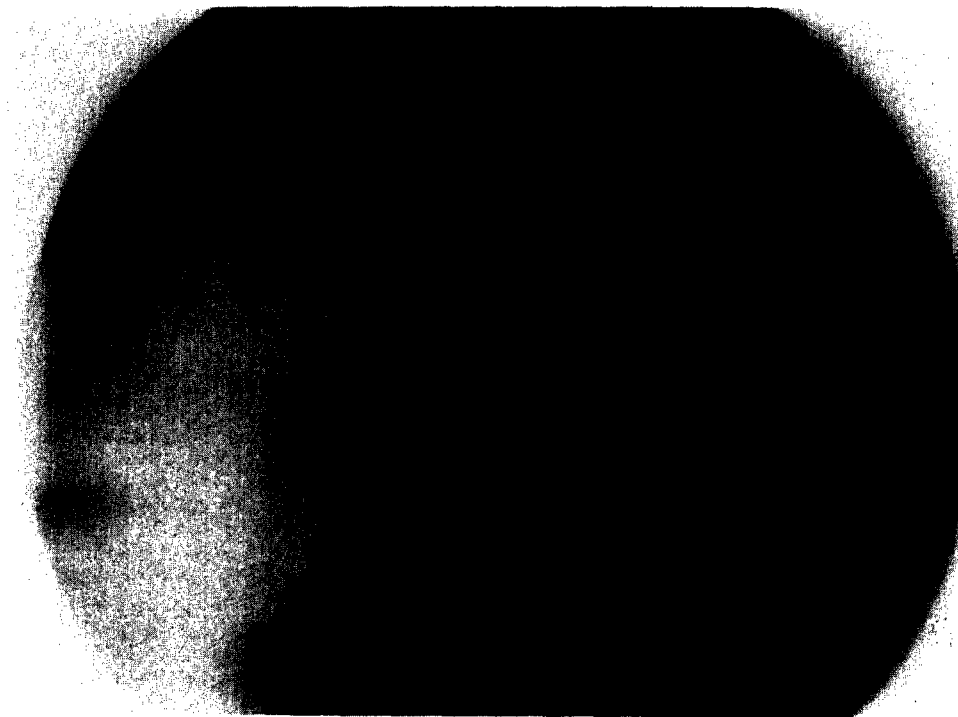


Fig. 1. The circumflex (larger) and intermediate branches of the left coronary artery. Early right anterior oblique.

TABLE 1

Catheterization data.

Cath Loc.	Pressure (mm Hg)	O ² Sat. %	Est. O ²	Cont. Vol. %
High SCV	–	78	17.4	–
Mid RA	8	81	18.1	–
Mid RV	29/3–8	79	–	17.4
Outflow RV	–	81	18.1	–
PT	29/13	80	17.8	–
Right PA	22/7	81	18.1	–
LV	120/0–10	–	–	–
Asc Ao	116/70	99	–	19.9

Cardiac output (l/min) 6.52 (thermodilution); cardiac index (l/min per m²) 3.56; SCV = superior caval vein; RA = right atrium; RV = right ventricle; PA = pulmonary artery; PT = pulmonary trunk; LV = left ventricle; Asc Ao = ascending aorta.

with standing and hyperventilation these changes persisted throughout exercise to a heart rate of 200. Similar changes were observed on a 24-hr electrocardiographic recording during lunch, defecation and weight lifting. Thallium-201 myocardial scans were normal both at rest and with exercise. A shunt was not demonstrated by nuclear angiocardiograms.

Our patient continues athletic activity without symptoms nine years after detection of the abnormal origin of his coronary artery.

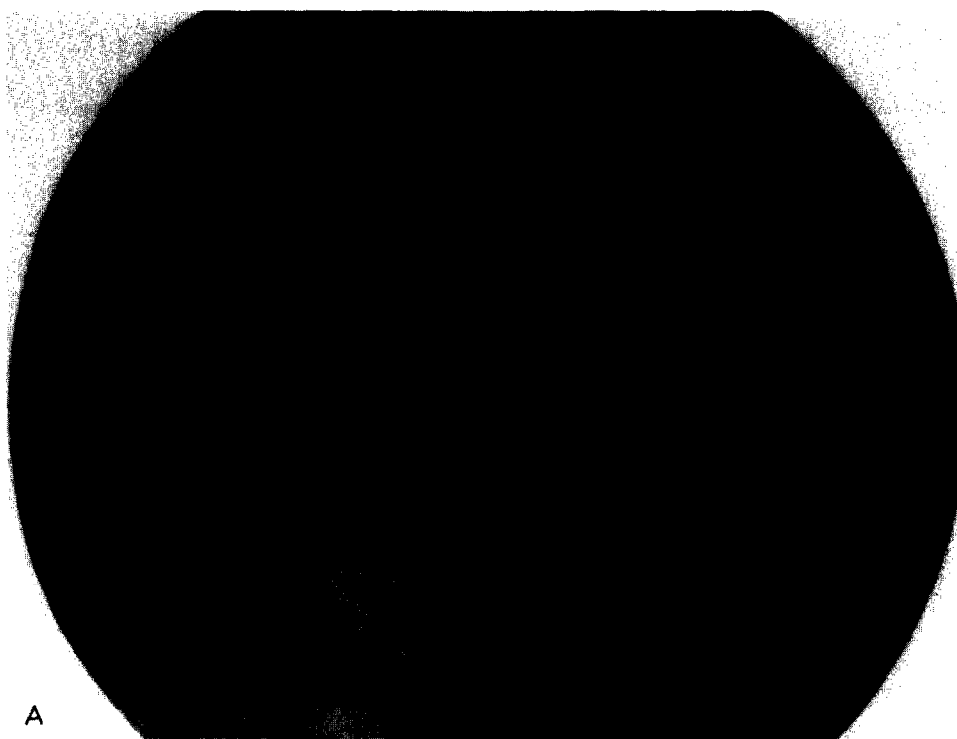


Fig. 2A. For legend see opposite page.

Discussion

A search of the English literature suggests that our patient is the eighth reported case of the left anterior descending coronary artery arising from the pulmonary trunk with the circumflex coronary artery arising from the aorta, but the first with this combination along with another artery arising from the expected site of the left main stem [1-4].

The great majority of symptomatic infants with anomalous origin of the left main stem from the pulmonary trunk die from 3 to 12 months of age. As demonstrated by this report, solitary origin of the anterior descending artery from the pulmonary trunk is compatible with survival into adulthood.

Two or three coronary arteries arising from the aorta would provide greater arterial flow to the left ventricular myocardium and potential for collateral circulation. This would probably be the most favorable prognostic circumstance and is the condition of our patient who would seem to be unusually protected at this time from ischemia due to demonstrated collaterals from three coronary arteries arising from the aorta.

A well developed collateral circulation does not necessarily prevent myocardial ischemia [4]. Angina-like symptoms may occur in patients with well-developed anastomoses. Rowe and Young demonstrated by dye-injections that blood which enters the anomalous left coronary artery via collaterals tends to flow into the pulmonary trunk because of lower resistance there

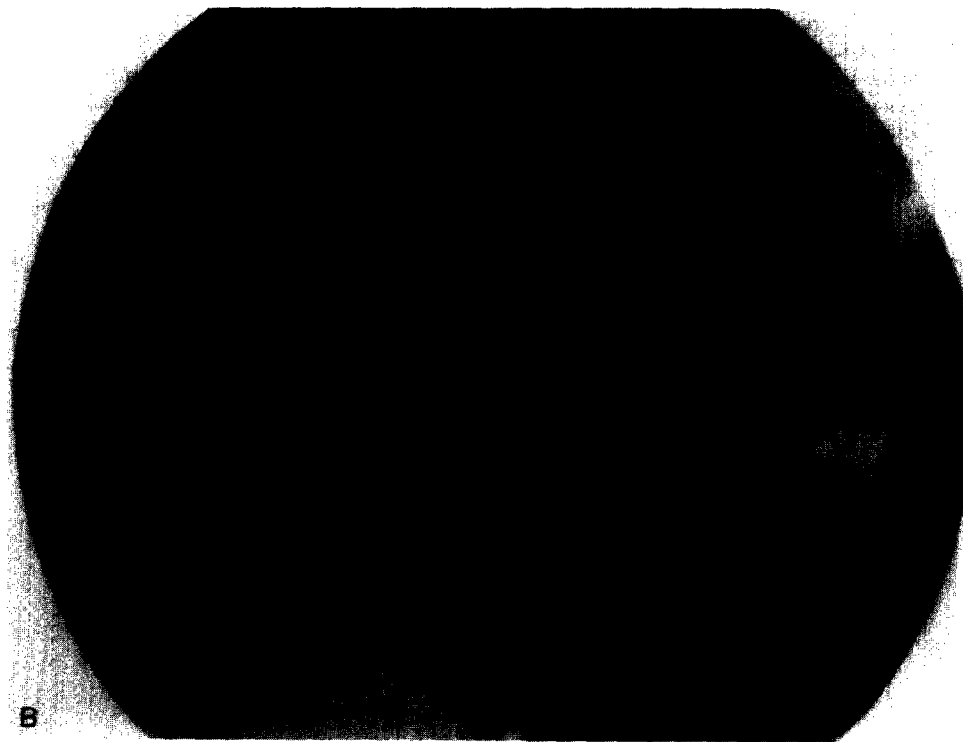


Fig. 2. The anterior descending coronary artery fills retrogradely (arrows) from the right coronary artery (right anterior oblique) (A) and also from the circumflex coronary artery (B). It empties into the pulmonary trunk (left anterior oblique).

as compared to that in the myocardial distribution of the anomalous left coronary artery [5]. The development of coronary atherosclerotic disease with aging might jeopardize the flow of oxygenated blood from the aorta into the collaterals and increase the opportunity for ischemia. Sudden deaths in adults with anomalous left coronary artery have been reported.

Considerable controversy exists about the value of prophylactic surgery for those patients to prevent sudden death. Although we believe that prophylactic surgery may have been justified in the past, the recent availability of reliable non-invasive tests for myocardial ischemia may allow better selection of the need and timing of surgery [6,7]. Our plan is to allow this patient normal activity and to observe his progress with periodic exercise testing and radionuclide studies. If evidence of ischemia develops which suggests inadequacy of the collateral circulation, we will again advise surgery. Only with additional descriptive reporting of such cases as ours will the natural history of the disease be determined in this modern diagnostic and surgical era.

References

- 1 Wesselhoeft H, Fawcett JS, Johnson AL. Anomalous origin of the left coronary artery from the pulmonary trunk. *Circulation* 1968;38:403-425.
 - 2 Wilson CL, Diabal PW, Holleyfield RW, et al. Anomalous origin of the left coronary artery from pulmonary artery. *J Thorac Cardiovasc Surg* 1977;73:887-893.
 - 3 Wilson CL, Diabal PW, McGuire SA. *Am Heart J* 1979;98:440-446.
 - 4 Roberts WC, Robinowitz M. Anomalous origin of the left anterior descending coronary artery from the pulmonary trunk with origin of the right and left circumflex coronary arteries from the aorta. *Am J Cardiol* 1984;54:1381-1383.
 - 5 Rowe GG, Young WP. Anomalous origin of the coronary arteries with special reference to surgical treatment. *J Thorac Cardiovasc Surg* 1960;39:777-780.
 - 6 Raiffer, SI, Oetgen WJ, Weeks KD, et al. Thallium²⁰¹ scintigraphy after surgical repair of hemodynamically significant primary coronary artery anomalies. *Chest* 1982;81:687-692.
 - 7 Yoshikawa J, Owaki T, Kato H, et al. Ultrasonic features of the left coronary artery from the pulmonary artery. *Jpn Heart J* 1978;19:46-57.
-