
Continuous Heart Murmur following Aorto-Coronary Bypass Surgery

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A patient is described with a continuous heart murmur which appeared following aorto-coronary bypass graft surgery. Previously reported causes of a continuous murmur were virtually excluded by clinical, angiographic and hemodynamic data. We speculate that the murmur is produced by turbulent flow related to the patent graft.

The detection of a continuous murmur in a patient who had undergone aorto-coronary bypass surgery stimulated the following case report.

CASE REPORT

A 55-year-old man was first seen in September, 1968 because of increasing angina pectoris. He had well documented myocardial infarctions in 1965 and again in early 1968, and began to note angina pectoris in 1966. A coronary arteriogram performed in May, 1969 was interpreted as showing severe obstruction of both the right and left anterior descending coronary arteries. The distal portions of these vessels were considered unsuitable for bypass grafting, and because of incapacitating angina both internal mammary arteries were implanted into the left ventricle (Vineberg procedure) in July, 1969. Postoperatively, the patient was unimproved. High grade obstruction of the distal right and proximal obtuse marginal arteries was again noted on coronary arteriography on January 19, 1971, and, in addition, the proximal portion of the anterior descending artery was completely occluded. Attempts to visualize the internal mammary implants arteriographically were unsuccessful. The left ventricular cavity was judged by ventriculography to be slightly enlarged with a small area of paradoxical pulsation in the anterior wall. On reevaluation of the patient's coronary lesions bypass grafting was thought to be feasible, and on November 16, 1971 saphenous vein bypass grafts were interposed between the ascending aorta and the distal portions of the right and left anterior descending coronary arteries. The right internal mammary implant was found to be occluded, and this vessel was ligated and divided. No trace of the left internal mammary implant could be found in the myocardium, and it is postulated that the vessel pulled out of the ventricle and retracted.

Between September, 1968 and his bypass graft surgery in November, 1971 the patient had a total of 28 cardiovascular examinations recorded by 25 different observers, three of whom were senior staff cardiologists. A short grade 1/6 systolic ejection murmur at the apex and lower left sternal border was recorded on approximately one-third of these examinations. In no case was a diastolic or continuous murmur described.

Following recovery from bypass graft surgery, the patient noted a definite decrease in the frequency of his angina. Upon admission to the Veterans Administration Hospital for follow-up study in April, 1972, he had a regular pulse of 82/minute and a brachial blood pressure of 146/80 mm Hg. The first and second heart sounds were normal, with physiologic splitting of the second sound. A continuous murmur of grade 1-2/6 intensity was quite well localized to the apex and heard best in the left lateral position. The murmur was heard by three different observers and was high-pitched and blowing in quality, beginning in the middle third of systole, reaching a peak at the second heart sound and continuing approximately half the way through diastole. At cardiac catheterization on April 27, 1972, both bypass grafts were selectively catheterized and shown to be patent. The site of distal anastomosis appeared significantly narrowed for the graft to the right, but not to the left anterior descending coronary artery. The ratio of the diameter of the graft to that of the anastomosis and the artery distal to the anastomosis was approximately 3:1.2 for the right and 2:1.1 for the left anterior descending coronary artery. Contrast material injected into the anterior descending graft filled this artery in both an antegrade and retrograde fashion. Retrograde filling occurred across an area of severe narrowing adjacent to the anastomosis. The angiographically estimated site of anastomosis was at the level of the fourth intercostal space anteriorly for both grafts, and appeared to be approximately 3 cm to the right of the mid sternal line for the right and 7 cm to the left of the mid sternal line for the anterior descending graft. The location of the murmur thus corresponded closely to the estimated site of anastomosis of the anterior descending graft. The coronary arteriograms were unchanged from the study of January, 1971. There was no evidence of a coronary arteriovenous fistula or communication between a coronary artery or sinus of Valsalva and any other cardiac chamber. Slight dilatation of the left ventricular cavity and a small aneurysm of the anterior wall were still present. Resting pulmonary artery wedge pressure was 11 mm Hg and there were no valvular gradients. The contour of indicator dilution curves obtained by injecting indocyanine green dye into the pulmonary artery and sampling from the brachial artery was normal.

DISCUSSION

There have been several case reports" of diastolic
murmurs thought to be secondary to coronary artery obstruction, but we were unable to find reports of a continuous murmur associated either with coronary artery obstruction or aorto-coronary bypass surgery.

Karpman⁴ recently reported a series of patients with short systolic murmurs noted after bypass graft surgery in whom the presence of such a murmur was correlated with graft patency for grafts to the left anterior descending but not to the right coronary artery. No diastolic murmurs were noted.

Virtually all of the commonly reported causes of continuous murmurs⁵-⁶ can be excluded in our patient by a combination of hemodynamic and angiographic data, the clinical course and the location of the murmur. Thus, an anomalous left coronary artery, a coronary arteriovenous fistula and communications between the coronary arteries or sinuses of Valsalva and any of the cardiac chambers can all be excluded on the basis of angiography. The absence of a diastolic mitral valve gradient and normal pulmonary artery wedge pressure and indicator dilution curve argue against the combination of an interatrial communication associated with mitral valve obstruction⁷ as a mechanism for production of the murmur. Failure to hear the murmur on numerous previous examinations argues against the possibility of a patent ductus arteriosus, coarctation of the aorta or aortopulmonary septal defect, and the normal indicator dilution curve is evidence against significant left-to-right shunting from anomalous pulmonary venous drainage. The location of the murmur is also inconsistent with these diagnoses. While a pulmonary arteriovenous fistula or pulmonary artery branch stenosis cannot be completely excluded, the location of the murmur (well localized to the apex and not heard peripherally) argues strongly against these possibilities. Ligation of the right internal mammary artery and failure to find the left internal mammary artery at surgery is evidence against a fistulous communication involving this system as a mechanism producing the murmur. Finally, there is no evidence to suggest a chest wall fistula.

While we cannot exclude the possibility that the murmur is related to the coronary obstructive lesions rather than to the bypass graft, this seems unlikely for the following reasons: 1) the murmur was not detected in numerous careful examinations performed over a three-year period prior to bypass graft surgery; 2) the location of the murmur argues against it emanating from the right coronary artery; 3) all previous diastolic murmurs reported in association with coronary artery disease have been related to high grade stenosis of the left anterior descending artery. In the present case the proximal portion of this vessel is totally occluded and therefore seems an unlikely source for the generation of vascular sound.

The possibility that the murmur is related to the presence of the small aneurysm of the anterior wall of the left ventricle must also be considered. Systolic and diastolic murmurs have been described with such lesions,⁸,⁹,10 possibly related to phasic blood flow into and out of the defect corresponding to the phases of the cardiac cycle. However, continuous murmurs have not been described in association with these lesions, and in our patient the murmur was not detected on serial examinations until after bypass graft surgery. The angiographic appearance of the aneurysm was identical in studies done before (January, 1971) and after (April, 1972) the detection of the murmur.

The mechanism of the murmur is unknown. We speculate that it reflects turbulent flow related to the bypass graft, possibly resulting either from the discrepancy in size between the saphenous vein and the left anterior descending artery at the site of distal anastomosis or from retrograde filling via the bypass graft of the severely obstructed segment of the anterior descending artery.

REFERENCES


Total Dextroposition of the Great Vessels with Obstruction of the Left Ventricular Outlet*

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A case of total dextroposition of the great vessels, with one of the most severe degrees of obstruction of the left ventricular outlet ever reported is presented. The embryological disturbance that causes the malformation is the lack of alignment of the conoventricular flange with the primitive ventricular septum. Similar published cases are reviewed.

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