DIAGNOSIS AND TREATMENT OF LEFT VENTRICULAR FALSE ANEURYSM

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Three patients are presented in whom a false aneurysm of the left ventricle was surgically treated. False aneurysm of the left ventricle is an unusual consequence of ventricular wall rupture with containment of the resulting hematoma. Most false aneurysms of the left ventricle develop following myocardial infarction. The false aneurysm wall contains no myocardium. The false aneurysm has a great tendency to rupture, regardless of its size. One patient developed progressive congestive heart failure following a myocardial infarction. The other two patients were asymptomatic following myocardial infarction. Preoperative magnetic resonance imaging showed characteristics of a false aneurysm. These included a distinct discontinuance of the myocardium at the neck of the aneurysm and a narrow neck relative to the diameter of the aneurysm. Two patients underwent successful closure of the orifice of the false aneurysms. One patient underwent emergency surgery because of acute rupture while awaiting surgery but died of cerebral damage. Surgical correction of a false aneurysm is clearly advisable even in the absence of symptoms.

FALSE aneurysm of the left ventricle is a rare consequence of ventricular wall rupture following myocardial infarction! Either the epicardium or adherent parietal pericardium prevents the development of acute hemopericardium. False aneurysms have a great tendency to rupture, both during the early stages of development, and after establishment of fibrosis. Resection of false aneurysm is clearly advisable with or without coronary artery bypass grafting. This report describes our surgical experience with 3 cases of left ventricular false aneurysm.

CASE REPORTS

Patient 1. A 58-year-old man sustained a posterior myocardial infarction. Coronary angiogram revealed total occlusion of the left circumflex coronary artery. Left ventriculogram showed a small aneurysm of the posterior wall. Magnetic resonance imaging showed a posterior aneurysm communicating with the left ventricle through a narrow orifice (Fig. 1). At the operation which was performed 2 months after the infarction, the pericardial space was entirely free of adhesions. The aneurysm, which measured 3 cm at its greatest diameter, was found in the posterior wall of the left ventricle. The aneurysmal sac was opened and the thrombus was removed. An orifice measuring 1×1 cm was identified. The aneurysm was excised and the defect was closed directly over Teflon felt. The postoperative course was uneventful. Microscopic examination of the aneurysmal wall revealed no myocardial cellular elements (Fig. 2).
Patient 2. A 57-year-old man was admitted for severe chest pain. An electrocardiogram indicated an acute inferior myocardial infarction. The patient was in cardiogenic shock and was treated with an intra-aortic balloon pump. Coronary angiography performed soon after the admission showed a total occlusion of the right posterior descending artery. Left ventriculography performed 3 weeks later demonstrated a large aneurysm communicating with the posterior wall of the left ventricle via a narrow neck (Fig. 3). The aneurysm ruptured while the patient was awaiting surgery. A considerable amount of blood was seen in the pericardial space at emergency surgery. A ruptured aneurysm communicating with the inferior wall of the left ventricle was identified. Under cardiopulmonary bypass the orifice was closed using mattress sutures with Teflon felt. The patient recovered cardiac function but died on the 21st postoperative day.
due to cerebral damage.

Patient 3: A 65-year-old man sustained a posterior myocardial infarction one year prior to surgery. The patient was readmitted to a local community hospital for dysnea and signs of heart failure. Physical examination revealed a systolic murmur (2/6) at the cardiac apex. Chest X-ray showed a prominence along the left cardiac border. An echocardiogram showed a huge posterior aneurysm of the left ventricle. At cardiac catheterization, the left ventricular end-diastolic pressure was 25 mmHg. Coronary angiography revealed total occlusion of both the right coronary artery and the left circumflex artery, with 75% stenosis of the proximal left anterior descending coronary artery. Left ventriculogram showed a jet of contrast medium passing through a small perforation in the posterior wall of the left ventricle and into the huge mass, as well as mild mitral regurgitation. Magnetic resonance imaging showed a huge aneurysm containing thrombus, communicating with the posterior wall of the left ventricle. The aneurysm undermined deeply into the diaphragmatic surface of the liver (Fig. 4). At operation, the heart showed diffuse adhesions with the pericardium. The huge posterior aneurysm was densely adherent to the pericardium. The aneurysmal sac was entered and a large thrombus was removed. An opening in the inferior wall of the left ventricle between the bases of the papillary muscles measuring 4 × 2 cm was identified. The edge of the orifice was densely fibrotic. To avoid bleeding from the pericardial adhesions, the wall of the aneurysm was not resected. The defect was closed with mattress sutures over Teflon felt and a segment of saphenous vein was grafted to the left anterior descending coronary artery. The postoperative course was uneventful. Microscopic examination of the aneurysmal wall showed no myocardial cellular elements.

DISCUSSION

Acute rupture of an infarcted area of the heart often causes cardiac tamponade and is usually fatal. False aneurysm is an unusual consequence of ventricular wall rupture with containment of the resulting hematoma. The periphery of the hematoma becomes organic into fibrous tissue with time. The presence of an abrupt interruption of the myocardium that comprises the neck of the aneurysm distinguishes false aneurysm from true aneurysm, in which the wall contains myocardial elements. The initial hemorrhagic dissection itself does not enlarge as the aneurysm enlarges. Characteristically, the mouth of a false aneurysm is narrow compared with the diameter of the aneurysm. Previous descriptions of false aneurysm have stressed that their wall consists of pericardium and mural thrombus and lacks identifiable epicardial or myocardial elements. However, a review of the literature revealed a pathologic heterogeneity of the wall of false aneurysms. Containment of the hematoma following ventricular rupture seems to be accomplished by the epicardium or adhesion with the parietal pericardium. Epstein and Hutchins proposed a concept of subepicardial aneurysm, characterized by an abrupt interruption of the myocardium at the neck of the aneurysm, a narrow neck relative to the diameter of the aneurysm, and a propensity to rupture regardless of the wall components. The aneurysmal wall in our third patient consisted of adhesions with the pericardium. The aneurysmal walls of patients 1 and 2 consisted of the epicardium and had no pericardial adhesions. These two aneurysms were considered subepicardial aneurysms and one of them ruptured.

False aneurysms of any size have a propensity to rupture, in marked contrast to true aneurysms. Vlodaver et al reported two cases of ruptured false aneurysms measuring 2.0 cm in greatest diameter. Epstein and Hutchins reported that two thirds of the ruptured aneurysms measured less than 5 cm in their greatest diameter. In their report, the interval from clinically documented myocardial infarction to rupture ranged from 10 days to 3 months. A small number of patients have been described who underwent surgery a year or more after myocardial infarction. This fact illustrates the need for early recognition of the false aneurysm. One of our patients had symptoms of congestive heart failure and the other two patients were asymptomatic, but the aneurysm ruptured in one of them. Surgery is indicated even in the absence of symptoms.

The diagnosis of false aneurysm is con-
firmed by left ventriculography. Two-dimensional echocardiography is a good method for noninvasive diagnosis of these aneurysms. Catherwood et al.\textsuperscript{10} reported 3 characteristics of the false aneurysm: sharp discontinuity of the endocardial image at the site of communication between the false aneurysm and the left ventricular cavity, a saccular or globular contour of the false aneurysmal chamber, and the presence of a relatively narrow orifice in comparison with the diameter of the aneurysm. Magnetic resonance imaging is a new useful noninvasive method for identifying false aneurysms of the left ventricle. It reveals sharp discontinuity of the myocardial image at the site of communication with the left ventricle. Magnetic resonance imaging provides three-dimensional information about the aneurysm itself and its relationship with the surrounding tissue, which are very important for preoperative evaluation. The operative management of false aneurysms of the left ventricle is often less complex than that of true aneurysms. Under cardiopulmonary bypass, the aneurysm is opened, the thrombotic debris is removed, and the orifice is closed directly. Removal of the wall of the false aneurysm is not necessary and may be harmful.

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