

Pseudoaneurysm of the Free Wall of the Left Ventricle

without Obstruction of Major Coronary Arteries

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We report a case of a 63-year-old woman who presented with pseudoaneurysm of the free wall of the left ventricle secondary to myocardial infarction, in the presence of angiographically normal major coronary arteries. This is the only such case we know of, in which the patient underwent successful surgical correction. At last follow-up, the patient was in good condition with no evidence of cardiac disease, at 9 years after surgery. (*Tex Heart Inst J* 1996;23:58-61)

Rupture of the left ventricle is one of the most common and most lethal complications of myocardial infarction,^{1,5} and it is usually secondary to atherosclerotic coronary artery disease. In rare instances, the rupture of the heart is contained by pericardial adhesions that confine the bleeding and prevent cardiac tamponade. When this occurs, the localized hematoma organizes to constitute the fibrous wall of a pseudoaneurysm of the left ventricle.^{1,2,6,7} Myocardial infarction with normal coronary arteries is rare,^{8,9} and cardiac rupture in such cases has been reported only exceptionally.^{10,11} The development of a pseudoaneurysm of the left ventricle under these circumstances is extremely rare. We present the case of a patient with pseudoaneurysm of the free wall of the heart arising from a myocardial infarction in the presence of angiographically normal major coronary arteries. This patient underwent successful surgical correction, followed by long-term survival.

Case Report

In December of 1986, a 63-year-old woman was admitted with recurrent severe chest pain radiating to the neck and shoulders; 6 months earlier, she had sustained an apparently uncomplicated acute anterolateral myocardial infarction. Auscultation revealed a diffuse ectopic cardiac impulse in the 3rd and 4th intercostal spaces in the left lateral decubitus position and a grade 3/6 systolic murmur at the apex of the heart. An electrocardiogram (Fig. 1) showed sinus rhythm. S-T segment elevation in leads V₄ through V₆, and S-T segment depression in leads II, III, and aVF. Standard chest radiography (Fig. 2) manifested a grossly abnormal cardiac silhouette, with a large mass protruding from the left border of the heart. Two-dimensional echocardiography revealed a large saccular cavity connected to the left ventricle through a relatively small opening of the anterolateral wall. A left ventriculogram in the right anterior oblique projection (Fig. 3) showed a large pulsating saccular cavity communicating directly with the left ventricle via a narrow opening. Left ventricular function was normal. Selective coronary arteriography in multiple projections (Fig. 4) showed angiographically normal major coronary arteries, but a totally occluded diagonal branch in the right anterior oblique projection (Fig. 4C). The patient was taken to surgery and a median sternotomy was performed. After careful sharp dissection of the densely adherent mass from the pericardium, the boundary between the fibrous tissue and the myocardium was identified, cardiopulmonary bypass was instituted, and the fibrous wall was incised longitudinally. A large amount of clotted blood was removed from the interior of the pseudoaneurysm, and the tear in the ventricular wall was exposed. The pseudoaneurysm was excised, and a rim of firm, fibrous tissue was

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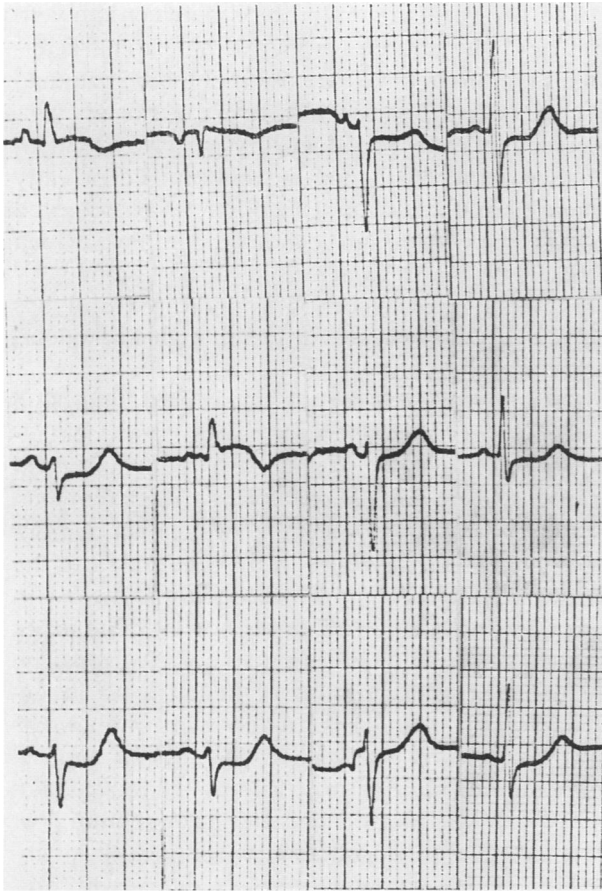


Fig. 1 Twelve-lead preoperative electrocardiogram showing sinus rhythm, S-T segment elevation in leads V_4 through V_6 , and S-T segment depression in leads II, III, and aVF.

left in place to lend stability to the suture line. Reconstruction of the left ventricular wall was performed with 2 layers of continuous heavy sutures. Histologic examination of the resected wall showed fibrous and dense hyaline material without any identifiable myocardial elements. The postoperative course was uneventful and the patient was discharged on the 10th postoperative day. Follow-up has been performed by the hospital's outpatient department. At our last examination, 5 years after the operation, she was in New York Heart Association class I, with no evidence of recurrent cardiac disease. At this writing, 9 years after surgery, follow-up is being performed by the hometown doctor, and the patient (who takes no medications and attends without difficulty to the lighter house chores) has no apparent heart problems.

Discussion

Rupture of the left ventricle is said to account for 10% to 24% of the hospital mortality for myocardial infarction.^{1-5,12,13} In most cases, the clinical presentation of myocardial rupture is dramatic, with signs

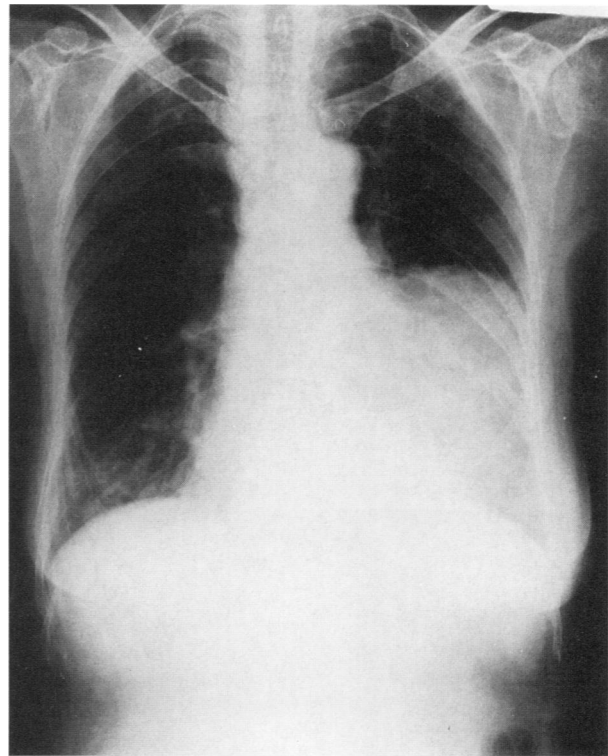


Fig. 2 Standard chest radiograph, showing a prominent bulge in the left cardiac silhouette.

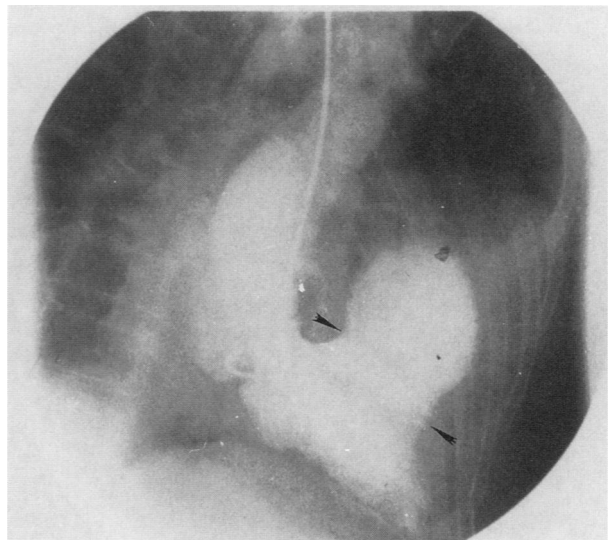


Fig. 3 Left ventriculogram in the right anterior oblique projection, showing a large saccular chamber originating from the free wall of the left ventricle and communicating directly with the left ventricular cavity. Arrows mark the neck of the pseudoaneurysm.

and symptoms of pericardial tamponade, which rapidly evolve into cardiogenic shock, electromechanical dissociation, and death. Occasionally, the hemorrhage from the parietal rupture is contained by adherent pericardium, after which the periphery

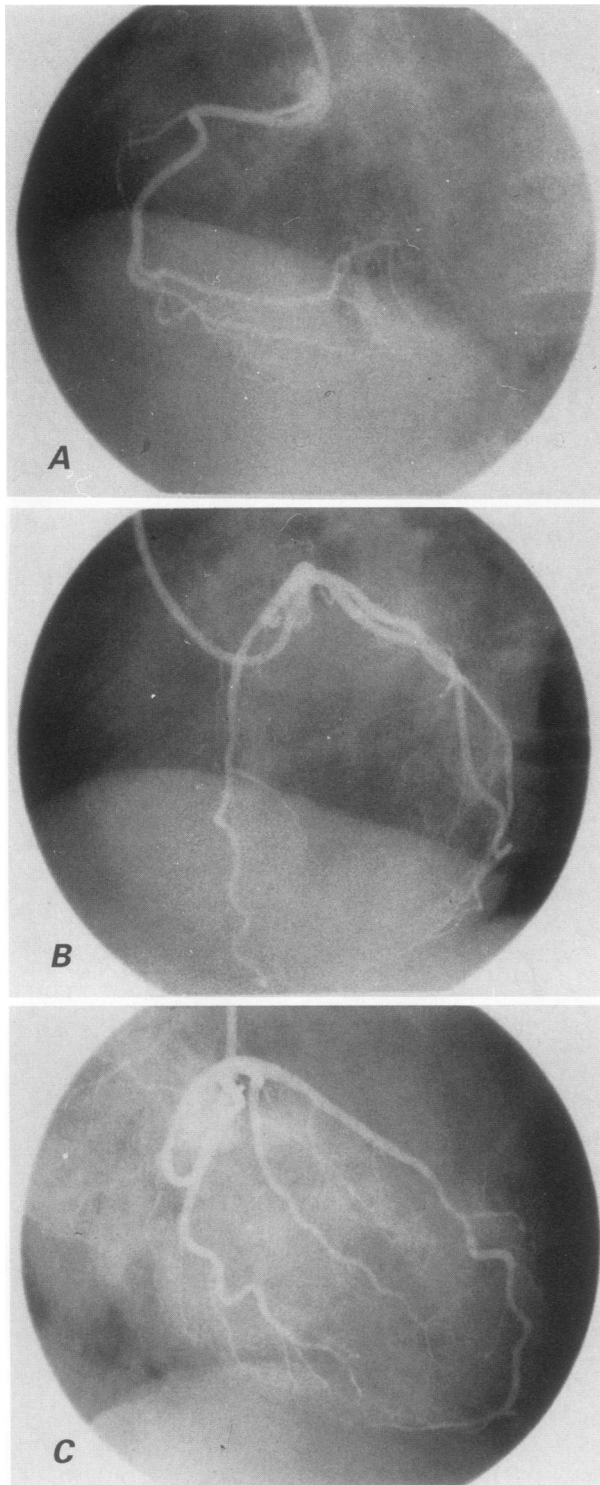


Fig. 4 Coronary angiograms showing normal major coronary arteries and suggestive of an occluded diagonal branch in the right anterior oblique projection (C).

of the hematoma organizes to constitute the fibrous wall of a pseudoaneurysm.^{1,2,6,7} Most pseudoaneurysms of the left ventricle arise from the posterior aspect of the heart; the involvement of the free wall is rare.^{7,14}

The persistent communication between the ventricular cavity and the contained hematoma determines the progressive expansion of the hematoma.² In contrast to the natural history of the true left ventricular aneurysm, pseudoaneurysms have a tendency to rupture^{6,15}—hence the importance of early diagnosis and treatment. Diagnosis can be achieved noninvasively through echocardiography, which produces images characteristic of the lesion.^{7,14,16-19} Prompt surgical correction is indicated and has been performed successfully, although infrequently.^{3,4,7,12,15,20,21}

Documented transmural myocardial infarction without obstruction in major coronary arteries has rarely been reported,^{8,9} and it has generally been attributed to coronary spasm,²²⁻²⁵ particularly when occurring in young women.^{26,27} We cannot demonstrate with certainty that, in the present case, the myocardial rupture was not secondary to the occlusion of a small diagonal branch; however, the major coronary arteries were definitely not involved. The incidence of cardiac rupture of the left ventricle secondary to myocardial infarction with normal coronary arteries is not known. Reports of surgical correction of postinfarction rupture of the free left ventricular wall¹⁰ or of the ventricular septum,¹¹ or of resection of true postinfarction left ventricular aneurysms,²⁸ are extremely rare in patients with normal coronary arteries. Indeed we have not found in the world literature another case of a pseudoaneurysm of the free wall of the left ventricle secondary to myocardial infarction, in the presence of normal major coronary arteries, which was surgically corrected with success. The integrity of our patient's major coronary artery branches probably enabled the preservation of good left ventricular function and thus contributed to the favorable surgical outcome and long-term survival.

References

1. Hurst CO, Fine G, Keyes JW. Pseudoaneurysm of the heart: report of a case and review of literature. *Circulation* 1963; 28:427-36.
2. Chesler E, Korns ME, Semba T, Edwards JE. False aneurysms of the left ventricle following myocardial infarction. *Am J Cardiol* 1969;23:76-82.
3. Coma-Canella I, Lopez-Sendon J, Nunez Gonzalez L, Ferrufino O. Subacute left ventricular free wall rupture following acute myocardial infarction: bedside hemodynamics, differential diagnosis, and treatment. *Am Heart J* 1983;106: 278-84.
4. Feneley MP, Chang VP, O'Rourke MF. Myocardial rupture after acute myocardial infarction. Ten year review. *Br Heart J* 1983;49:550-6.
5. Bates RJ, Beutler S, Resnekov L, Anagnostopoulos CE. Cardiac rupture—challenge in diagnosis and management. *Am J Cardiol* 1977;40:429-37.

6. Vlodayer Z, Coe JI, Edwards JE. True and false left ventricular aneurysms. Propensity for the latter to rupture. *Circulation* 1975;51:567-72.
7. Stewart S, Huddle R, Stuard I, Schreiner BF, DeWeese JA. False aneurysm and pseudo-false aneurysm of the left ventricle: etiology, pathology, diagnosis, and operative management. *Ann Thorac Surg* 1981;31:259-65.
8. Betriu A, Pare JC, Sanz GA, Casals F, Magrina J, Castaner A, et al. Myocardial infarction with normal coronary arteries: a prospective clinical-angiographic study. *Am J Cardiol* 1981;48:28-32.
9. Lindsay J Jr, Pichard AD. Acute myocardial infarction with normal coronary arteries [editorial]. *Am J Cardiol* 1984;54:902-4.
10. Trigano JA, Mourot F, Remond JM, Cabibel JP, Jouven JC, Torresani J. Free ventricular wall rupture in acute myocardial infarction with normal coronary arteries. *Am Heart J* 1987;113:1027-9.
11. St. Louis P, Rippe JM, Benotti JR, Frankel PW, Vandersalm T, Alpert JS. Myocardial infarction with normal coronary arteries complicated by ventricular septal rupture. *Am Heart J* 1984;107:1259-63.
12. Gueron M, Wanderman KL, Hirsch M, Borman J. Pseudoaneurysm of the left ventricle after myocardial infarction: a curable form of myocardial rupture. *J Thorac Cardiovasc Surg* 1975;69:736-42.
13. Spiekerman RE, Brandenburg JT, Achor RWP, Edwards JE. The spectrum of coronary heart disease in a community of 30,000: a clinicopathologic study. *Circulation* 1962;25:57-65.
14. Saner HE, Asinger RW, Daniel JA, Olson J. Two-dimensional echocardiographic identification of left ventricular pseudoaneurysm. *Am Heart J* 1986;112:977-85.
15. Steffenino G, Trincherio R, Di Summa M. [Rupture of left ventricular pseudoaneurysm in a patient with diagnosis of unstable angina]. [Italian] *G Ital Cardiol* 1990;20:158-60.
16. Catherwood E, Mintz GS, Kotler MN, Parry WR, Segal BL. Two-dimensional echocardiographic recognition of left ventricular pseudoaneurysm. *Circulation* 1980;62:294-303.
17. Gatewood RP Jr, Nanda NC. Differentiation of left ventricular pseudoaneurysm from true aneurysm with two dimensional echocardiography. *Am J Cardiol* 1980;46:869-78.
18. Roelandt J, Brand M, Vletter WB, Nauta J, Hugenholtz PG. Echocardiographic diagnosis of pseudoaneurysm of the left ventricle. *Circulation* 1975;52:466-72.
19. Pomini G, Lupia M, Milano A, Gribaldo R. [Pseudoaneurysm of the left ventricle: a report of 2 cases]. [Italian] *G Ital Cardiol* 1993;23:289-93.
20. Harper RW, Sloman G, Westlake G. Successful surgical resection of a chronic false aneurysm of the left ventricle. *Chest* 1975;67:359-61.
21. Brienza A, Correale E. [Pseudoaneurysm of the left ventricle: a clinical case]. [Italian] *G Ital Cardiol* 1993;23:285-7.
22. Bentivoglio LG, Ablaza SG, Greenberg LF. Bypass surgery for Prinzmetal angina. *Arch Intern Med* 1974;134:313-6.
23. Hamada Y, Matsuda Y, Takashiba K, Ebihara H, Ohno H, Hyakuna E. Multivessel coronary artery spasm causing myocardial infarction and postinfarction angina. *Am Heart J* 1987;113:1024-6.
24. Maseri A, L'Abbate A, Baroldi G, Chierchia S, Marzilli M, Ballestra AM, et al. Coronary vasospasm as a possible cause of myocardial infarction. A conclusion derived from the study of "preinfarction" angina. *N Engl J Med* 1978;299:1271-7.
25. Oliva PB, Breckinridge JC. Acute myocardial infarction with normal and near normal coronary arteries. Documentation with coronary arteriography within 12½ hours of the onset of symptoms in two cases (three episodes). *Am J Cardiol* 1977;40:1000-7.
26. Janosik DL, Labovitz AJ, Kennedy HL. Anterior and inferior myocardial infarction in a young woman with angiographically normal coronary arteries. *Am Heart J* 1986;112:606-9.
27. Jugdutt BI, Stevens GF, Zacks DJ, Lee SJ, Taylor RF. Myocardial infarction, oral contraception, cigarette smoking, and coronary artery spasm in young women. *Am Heart J* 1983;106(4 Pt 1):757-61.
28. Nappi GA, Piazza L, Letizia G, Fondacone C, Farina G, Cotrufo M. Aneurisma del ventricolo sinistro con coronarie integre. Esperienza di un caso trattato chirurgicamente con successo. *Arch Chir Torac Cardiovasc* 1989;11:201-4.