False Aneurysm (Pseudoaneurysm) of Lateral Ventricular Wall

M. Chinikar MD*, A. M. Sadeghi Meybodi MD, and F. Hoseini MD*****

Abstract

Pseudoaneurysms of the left ventricle are a rare complication that may occur after myocardial infarction (MI), cardiac surgery, and trauma.
Available data indicate that the most common presentation is by an incidental finding. This case of post-MI pseudoaneurysm presented herein was discovered by left ventriculography after two months following MI *(Iranian Heart Journal 2008; 9 (4):42 -46).*

Key words: **aneurysm ■ myocardial infarction ■ ventricle, left**

Pseudoaneurysms (contained rupture) are a rare complication of myocardial infarction (MI).[1,2] The wall of a pseudoaneurysm consists of fibrous tissue and lacks the structural elements found in the normal cardiac wall. This predisposes it to further rupture and a fatal outcome.[2-6] The location of a pseudoaneurysm is primarily related to its cause. We hereby report a case of the pseudoaneurysm of the lateral wall of the left ventricle (LV), which had some unusual characteristics.

Case report

A 70-year-old male patient presented with inferolateral wall MI and was referred to our clinic for a further invasive evaluation due to low functional capacity.
The patient's hospital and post-discharge course in the early two weeks of the post-MI phase was uncomplicated.
Echocardiography data revealed a left ventricular ejection fraction (LVEF) of 45%, inferoseptal hypokinesia, lateral wall akinesia, and 2+ mitral regurgitation (MR).
Coronary angiography and catheterization were scheduled for the patient, but he refused further evaluations.
84 days later, he came back for coronary angiography and he had no new symptoms except for low functional capacity during his daily activities.
Echocardiography was not repeated before selective coronary angiography. Coronary angiography showed a total cut-off of a prominent obtuse marginal branch (Fig. 1).

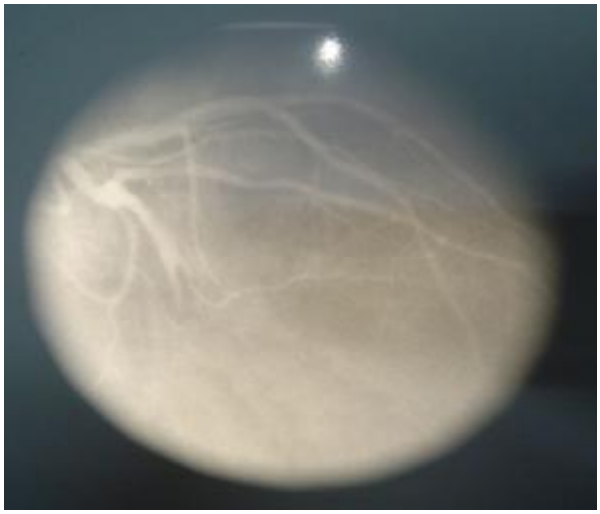

Fig. 1. **Coronary angiography showing total cut-off of large obtuse marginal branch of left circumflex artery.**

Received April. 5, 2006; Accepted for publication Oct. 20, 2008.
***Assistant Professor of Cardiology, **Assistant Professor of Cardiac Surgery, and ***Assistant Professor of Medicine, Dr. Heshmat Hospital, Gilan University of Medical Sciences, Rasht, Iran.
Address for correspondence: M. Chinikar, MD, Dr. Heshmat Hospital, Gilan University of Medical Sciences, Imam Khomeini Blvd., Biani St., Rasht, Iran.
Email : mchinikar@ vahoo.com Mobile : 0098 9121969577 Tel : 0098 1317729215, 0098 1316663070 Fax : 0098 1316668718

LV injection showed a large cavity at the lateral wall, which seemed to be a pseudoaneurysm (Fig. 2).

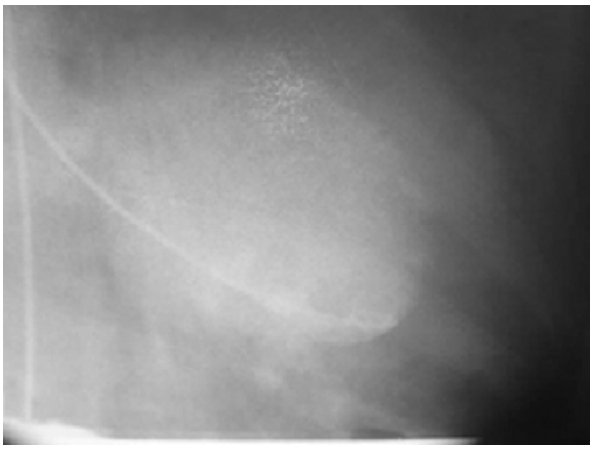

Fig. 2. **LV injection showing a large cavity at the lateral wall.**

Echocardiographic evaluation showed a large cavity at the lateral wall that had a wide neck (Fig. 3).

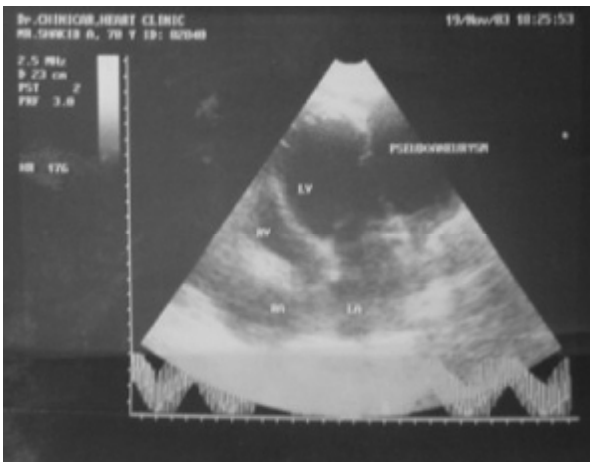

Fig.3. **Four-chamber echocardiography view showing a large cavity attached to the lateral wall with a wide neck.**

Due to the nature of this complication, the patient was operated on and the resected area was repaired with a Dacron patch. Pathological data confirmed that the cavity wall contained only thrombus and pericardium without any myocardial elements.

The patient's post-operative course and follow-up after 6 months were uneventful.

Discussion

Pseudoaneurysms are the result of an incomplete rupture of the myocardium, whereby pericardium, organizing thrombus and hematoma[1,2] seal the rupture and prevent the catastrophic presentation of tamponade and electromechanical dissociation seen in free-wall rupture.

According to anatomical and pathological studies, it is a type of cardiac rupture contained by the pericardium and pericardial inflammation and adhesions due to a slow extracardiac leak.[7]

Knowledge of the clinical profile and natural history of cardiac pseudoaneurysms is limited because of their low incidence. Cardiac pseudoaneurysms can occur after MI, cardiac surgery, infectious endocarditis, and trauma to the chest.[1,3] Surgical procedures frequently associated with pseudoaneurysms include mitral valve replacement,[3, 8, 9] aortic valve replacement,[10,12] and surgical correction of congenital heart disease.[11] These pseudoaneurysms tend to occur in the areas of surgical manipulation or the sites of incisions such as the site of a ventriculotomy or vent placement.[13,14]

Unlike a true aneurysm, a pseudoaneurysm has a narrow base (neck diameter < 50% of fundus diameter) and its wall is composed only of thrombus and pericardium, thus explaining the high risk of rupture compared to a true aneurysm.

The pseudoaneurysms that occur after MI are typically diagnosed within 6 months after the infarction, although intervals as long as 12 years have been reported.[7] In the largest clinical series,[15] the median time to diagnosis after MI was 3.9 months; 55% of patients presented within the first 6 months. These pseudoaneurysms were usually located in the inferior or posterolateral walls, a finding consistent with previous reports.[7,8] The reason

for this predominance is unclear. In comparison, fatal cardiac ruptures tend to occur more often in the anterior and lateral left ventricular walls. Thus, anterior-wall rupture tends to be characterized by a more acute hemodynamic effect and catastrophic outcome, whereas the rupture of the inferior or posterior wall tends to be contained; this difference explains the observed incidences.[16]

The progression of pseudoaneurysms may develop a large cavity, even larger than the ventricle itself.

It may be asymptomatic in most cases (48%), but there are other clinical presentations like congestive heart failure (15%), chest pain (13%), syncope or arrhythmia (10%), and systemic embolism (6%).[15]

Systolic murmurs, persistent ST elevation, abnormal bulge of the cardiac border, progressive heart failure, and chest pain are the other presentations.[17] Various imaging methods have been used to diagnose pseudoaneurysms, including two-dimensional echocardiography, computed tomography, magnetic resonance imaging, and left ventricular angiography.[18-31] Chest radiography sometimes shows a localized bulge on the cardiac silhouette.[28] Contrast angiography was the first imaging method used to detect pseudoaneurysms. The presence of a periventricular sac that communicates with the left ventricle through a narrow orifice is considered most suggestive of a pseudoaneurysm. This finding differs from findings in a true aneurysm, which typically has a large communicating neck. In addition, pseudoaneurysms appear avascular on coronary angiography.[28,33] The echocardiographic detection of pseudoaneurysms was first reported in 1975.[19] The echocardiographic features typical of pseudoaneurysms include the sharp discontinuity of the endocardial image at the site of communication of the pseudoaneurysm with the left ventricular cavity and an orifice that is relatively narrow in comparison with the diameter of the pseudoaneurysm.[19] Pulsed-wave and color flow Doppler echocardiography have been useful in visualizing the high-velocity, turbulent, bi-directional flow between the left ventricle and a pseudoaneurysm.[21,26] On computed tomography, pseudoaneurysms are characterized by an abrupt disappearance of the myocardial wall at the border of the pseudoaneurysm.[29,31] Magnetic resonance imaging shows the low signal of the pericardium, which constitutes the only wall of the pseudoaneurysm.[34]

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. Van Tassel RA, Edwards JE. Rupture of heart complicating myocardial infarction. Analysis of 40 cases including nine examples of left ventricular false aneurysm. Chest 1972; 61:104-16.

3. Davidson KH, Parisi AF, Harrington JJ, Barsamian EM, Fishbein MC. Pseudoaneurysm of the left ventricle: an unusual echocardiographic presentation. Review of the literature. Ann Intern Med 1977; 86: 430-3.

4. Vlodaver Z, Coe JI, Edwards JE. True and false left ventricular aneurysms. Propensity for the latter to rupture. Circulation 1975; 51: 567-72.

5. 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.

6. McIlmoyle G, McLoughlin MJ, Silver MD. Massive false aneurysm of the left ventricle with dysphagia. Can Med Assoc J 1973; 109: 388-9.

7. Milgalter E, Uretzky G, Levy P, Appelbaum A, Borman JB. Pseudoaneurysm of the left ventricle. Thorac Cardiovasc Surg 1987; 35:20-5

8. Adamick R, Sprecher D, Coleman RE, Kisslo J. Pseudoaneurysm of the left ventricle. Echocardiography 1986; 3: 237-51.

9. Sakai K, Nakamura K, Ishizuka N, Nakagawa M, Hosoda S. Echocardiographic findings and clinical features of left ventricular pseudoaneurysm after mitral valve replacement. Am Heart J 1992; 124: 975-82.

10. Borman JB, Hellman-Hakohaen A, Weiss AT. Sub-valvular pseudoaneurysm after aortic valve replacement. A case report. Scand J Thorac Cardiovasc Surg 1982; 16: 125-7.

11. Bross W. Pseudoaneurysm of the heart following cardiotomy for total correction of tetralogy of Fallot. J Cardiovasc Surg (Torino) 1967; 8: 256-9.

12. Rittoo D, Sutherland GR. Posterior left ventricular pseudoaneurysm after aortic valve replacement in a patient with rheumatoid arthritis: diagnosis by transesophageal echocardiography. J Am Soc Echocardiogr 1994; 7: 429-33

13. Kerr WF, Wilcken DE, Steiner RE. Incisional aneurysms of the left ventricle. Br Heart J 1961; 23: 88-102.

14. Lee SJ, Ko PT, Hendin ID, Sterns LP. False left ventricular aneurysm as a complication of open heart surgery. Can Med Assoc J 1976; 115: 45-6.

15. Yeo TC, Malouf, JF, Oh JK, Seward JB. Clinical profile and outcome in 52 patients with cardiac pseudoaneurysm. Ann Int Med 1998; 128: 299-305.

16. Natarajan MK, Salerno TA, Burke B, Chiu B, Armstrong PW. Chronic false aneurysms of the left ventricle: management revisited. Can J Cardiol 1994; 10: 927-31

17. Martin RH, Almind CH, Saab S, et al. True and false aueurysms of the left ventricle following myocardial infarction: Am J Med 1977; 62: 418 – 424.

18. March KL, Sawada SG, Tarver RD, Kesler KA, Armstrong WF. Current concepts of left ventricular pseudoaneurysm: pathophysiology, therapy, and diagnostic imaging methods. Clin Cardiol 1989; 12: 531-40.

19. Catherwood E, Mintz GS, Kotler MN, Parry WR, Segal BL. Two-dimensional echocardiographic recognition of left ventricular pseudoaneurysm. Circulation 1980; 62: 294-303

20. Gatewood RP Jr, Nanda NC. Differentiation of left ventricular pseudoaneurysm from true aneurysm with two dimensional echocardiography. Am J Cardiol 1980; 46: 869-78.

21. Grube E, Redel D, Janson R. Non-invasive diagnosis of a false left ventricular aneurysm by echocardiography and pulsed Doppler echocardiography. Br Heart J 1980; 43: 232-6.

22. Kupari M, Verkkala K, Maamies T, Hartel G. Value of combined cross sectional and Doppler echocardiography in the detection of left ventricular pseudoaneurysm after mitral valve replacement. Br Heart J 1987; 58: 52-6.

23. Roelandt JR, Sutherland GR, Yoshida K, Yoshikawa J. Improved diagnosis and characterization of left ventricular pseudoaneurysm by Doppler color flow imaging. J Am Coll Cardiol 1988; 12: 807-11

24. Schwarz J, Hamad N, Hernandez G, DeCastro C, Beard E, Cooley D, et al. Doppler color-flow echocardiographic recognition of left ventricular pseudoaneurysm. Am Heart J 1988; 116: 1353-5

25. Alam M, Rosman HS, Lewis JW, Brymer JF. Color Doppler features of left ventricular pseudoaneurysm. Chest 1989; 95: 231-2

26. Sutherland GR, Smyllie JH, Roelandt JR. Advantages of colour flow imaging in the diagnosis of left ventricular pseudoaneurysm. Br Heart J 1989; 61: 59-64

27. Roelandt J, Brand M, Vletter WB, Nauta J, Hugenholtz PG. Echocardiographic diagnosis of pseudoaneurysm of the left ventricle. Circulation 1975; 52: 466-72

28. Spindola-Franco H, Kronacher N. Pseudoaneurysm of the left ventricle. Radiographic and angiocardiographic diagnosis. Radiology 1978; 127: 29-34.

29. Stosiek M, Klose KC, Rustige J. [Computed tomography diagnosis of a large pseudoaneurysm of the heart]. ROFO Fortschr Geb Rontgenstr Nuklearmed 1986; 145: 728-30.

30. Lanzarini L, Parenti L, Blone G, Corradi L. [Calcified pseudoaneurysm of the left ventricle. Non-invasive diagnosis in an elderly patient with episodes of acute transient cerebrovascular insufficiency]. Recenti Prog Med 1987; 78: 402-5.

31. Malara D, Cesarani F, Ottino GM, Agaccio G. [Pseudoaneurysm of the left ventricle. CT diagnosis and surgical treatment.] Radiol Med (Torino) 1987; 74: 577-80.

32. Mackenzie JW, Lemole GM. Pseudoaneurysm of the left ventricle. Tex Heart Inst J 1994; 21: 296-301.

33. Martin RH, Almond CH, Saab S, Watson LE. True and false aneurysms of the left ventricle following myocardial infarction. Am J Med 1977; 62: 418-424.

34. Kahn J, Fisher MR. MRI of cardiac pseudoaneurysm and other complications of myocardial infarction. Magn Reson Imaging 1991; 9: 159-6.