

Left Ventricular Pseudo-Aneurysm

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INTRODUCTION

Left ventricular pseudo aneurysm is formed when cardiac rupture is contained by the adherent pericardium or scar tissue. It is termed as pseudo because its wall does not contain any myocardial tissue. Commonest cause of cardiac rupture is post infarction thinning of the myocardium¹. Free intra pericardial rupture of LV results in cardiac tamponade & instant death. Less frequently, the rupture is contained by the pericardium & LV pseudo aneurysm is formed. Blood flows in & out of this pseudo aneurysm into left ventricle with systole & diastole. This condition is rare and can also be seen after chest trauma, cardiac surgery & endocarditis. It needs immediate surgical repair, otherwise can lead to death.¹

Myocardial rupture²

Acute myocardial infarction is the most common etiology of myocardial rupture. Ischemic rupture may involve the left ventricular (LV) & right ventricular (RV) free walls, interventricular septum or papillary muscles in decreasing order of frequency. Myo. rupture rarely involves left or right atrial walls.

The consequences of myo. rupture in the setting of AMI include pericardial tamponade, VSD with Lt to Rt shunt, acute mitral regurg or formation of a pseudo aneurysm.

Both, haemodynamic factors (\uparrow intra cavitory pressure) and regional myocardial structural weakness (myocyte necrosis, collagen matrix resolution, intense inflammation) are important contributory factors to myocardial rupture in the setting of AMI

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In some patients who suffer free wall rupture following AMI, the rupture can be sealed by the epicardium (visceral pericardium) or by a haematoma on epicardial surface of the heart.

This entity has been referred to as LV diverticulum, a sub acute pathologic condition between free rupture into the pericardial cavity and formation of a pseudo aneurysm.

A "pseudo aneurysm" is formed if the area of rupture is contained locally by parietal pericardium & represents the chronic stage of LV free wall rupture³. LV pseudoaneurysm is twice as common with inferior poster rather than ant AMI. Causes of myocardial rupture other than AMI include blunt trauma as in automobile accident or penetrating myo. injury as in gunshot wound or stabbing, infective endocarditis (rupture of abscess transmurally) or rarely infective pericarditis.⁴

Distinguishing Lt ventricular true aneurysm from pseudo aneurysm⁵

True aneurysm of LV that develops after AMI is thinned area of scarred myocardium that moves dyskinetically. Pseudo aneurysm is free wall rupture of LV contained by overlying pericardium & does not have any myocardial tissue in its wall. The true LV aneurysm can lead to CCF or embolic event or ventricular arrhythmias because of the effect of ventricular scarring on conduction, LV pseudo aneurysm can also give rise to CCF as the cavity is noncontractile or to embolic events because of the stagnant flow. The true aneurysm usually ruptures in peri infarct period, pseudo aneurysm may rupture even late after infarction.

While pseudo aneurysm requires surgical resection because of likelihood of rupture, true aneurysms can often be managed medically. This difference makes an accurate diagnosis imperative. Unfortunately the characteristics of the two entities as recorded with

various imaging modalities are quite similar. Contrast ventriculography, radionuclide ventriculography, MRI, Transthoracic Echo and trans esophageal Echo have all been studied as approaches to distinguish between the two entities.

Clinically

Pseudo aneurysms are often asymptomatic and discovered incidentally on imaging tests. Symptoms include recurrent chest pain which may be associated with hypotension. Signs include diminished heart sounds, pericardial friction rub, sinus bradycardia or functional rhythm. A large pseudo aneurysm may produce an apical impulse. A pansystolic to and fro murmur may be produced by flow across the mouth of the pseudo aneurysm.

ECG often shows persistent ST segment elevation in the area of infarct. Unfortunately many of these symptoms and signs are also characteristic of true LV aneurysm.

Location

True LV aneurysms are more common in anterior location while pseudo are more common in posterior or inferior locations.

The probable causes of clinical preponderance of anterior wall true aneurysms are as follows:

Extensive infero posterior MI are more often fatal than extensive anterior MI. so that patients with extensive infer posterior MI die rather than develop true aneurysm.

Another explanation for greater prevalence of posterior LV pseudo aneurysm is that the rupture of anterior wall usually results in tamponade and immediate death, only rarely being contained by pericardium. In contrast posterior rupture is more often contained by pericardium to allow pseudo aneurysm formation.

In any case since true LV aneurysms in any location are much more common than pseudo aneurysms, location in an individual patient is not an adequate criterion for clinical decision making.

Surgical treatment

Surgical treatment of pseudo aneurysm is simpler because myocardium does not need to be excised or excluded. Risk of pseudo repair is less than that of unrepaired pseudo aneurysm. Comparative risk rating between true aneurysm repair & pseudo. repair is difficult because of rarity of pseudo aneurysm.

MRI

Advantages: Because of high spatial resolution and ability to image the entire heart, MRI is highly accurate in determining the size & location of pseudo aneurysm. It also distinguishes between pericardium, myocardium, thrombus and also visualizes disruption of the epicardial fat layer by the pseudo aneurysm.

ECHO

It is the most widely used imaging method to study aneurysm. Based on ECHO studies, ratio of maximum diameter of orifice to maximum internal diameter of the cavity was 0.25 to 0.50 for pseudo & 0.90 to 1.0 for true aneurysm in one large study.

The nature of flow within a pseudo. has been used to distinguish it from true aneurysm based on echocardiography Doppler techniques. Presence of turbulent flow at neck or within the cavity itself suggests a pseudo aneurysm.

Presence of bi directional colour flow Doppler between an extra cardiac echo free space & the LV allows distinction between LV pseudo & simple pericardial effusion.

A review of 290 cases of LV pseudo aneurysms based on data collected from 201 articles upto the year 1998 was published by Craig Frances et al⁶. The inferences were as follows:

Etiology

AMI accounted for most of LV pseudo aneurysms, followed by cardiac surgery, trauma & infections. Inferior MI accounted for approximately twice as many cases of pseudo. as anterior MI while only about 4% true aneurysms were located on infero posterior surface.

Because hospitalized patients are mostly in recumbent position, an inflammatory reaction to posterior pericardium may result in pericardial adhesions & formation of posterior wall pseudo aneurysm rather than tamponade.

Clinical presentation

More than 10% patients of pseudo aneurysm were asymptomatic

Common symptoms noted were chest pain, dyspnea, heart failure

Non specific symptoms were cough, dizziness, altered mental status.

On examination – To a fro murmurs were present in some & absent in some patients or confused with MR murmur.

In 30% patients, murmur was not detected.

Investigations

ECG & XRC changes were seen in more than 95% patients. ECG changes were nonspecific & XRC also showed nonspecific enlargement of heart. LV angiography, coronary angiography, 2-D ECHO & MRI were the imaging modalities used for diagnosis & LV angiography was found to be most useful for distinguishing true from pseudo aneurysm.

Treatment & prognosis

If untreated, 30-45% risk of pseudo aneurysm rupture was estimated & surgery was advised to all. 23% mortality was found in patients who underwent surgery for pseudo aneurysm, while 48% mortality was found in patients who were treated conservatively. (In recent years, due to improved surgical techniques, operative mortality is much less than till 1998) Prolonged survival was also observed in few patients who did not undergo surgery.

REFERENCES

- 1 Left ventricular Pseudo aneurysm case report - Asha Mahilaraman, Pradeep Nayar et al Tex Heart Inst J 2002;29:122-5
- 2 Myocardial rupture:- Author: Jamshid Shirani, chief Editor : Eric H. Yang et al
<http://emedicine.medscape.com/article/156455-overview>
- 3 Ventricular pseudo aneurysm with coronary ecstasia – Case report by Dipankar Mukherjee, Goutam Datta et al- JAPI, April 2011 Vol. 59
- 4 LV pseudo aneurysm complicating infective pericarditis – case report – A do Nascimento Moraes et al, Heart 1999;82:393-394
- 5 Distinguishing LV aneurysm from pseudo aneurysm. A review of literature – Steven L. Brown, Robert J. Gropler & Kevin M. Harris chest 1997; 111; 1403-1409
- 6 Left ventricular pseudo aneurysm – Craig Frances, Antony Romero & Deborah Grady J. Am Coll. Cardio. 1998;32;557-561