



# HEALTHY HEART

VOLUME-11 | ISSUE-132 | NOVEMBER 05, 2020



**Wishes you and your family**

*Happy Diwali and a Prosperous New Year*

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Dear Friends,

Namaskar

**Happy Diwali & New Year** to all my friends. We all know that ischaemic heart disease is still number one disease leading to morbidity & mortality. One of the rare complication of myocardial infarction is left ventricular aneurysm (true / pseudo). Early detection & treatment can save the patient with very good long term outcomes.

Detail Evaluation & Heart Team approach helps in early detection, prevention of this deadly complication of myocardial infarction.

## Post Myocardial Infarction Left Ventricular Aneurysm : An enigma

Pseudoaneurysm



True Aneurysm



### Introduction

We all know that Acute Myocardial infarction is one of the leading cause of morbidity and mortality in India . Several complications, such as ischemic, mechanical, arrhythmic, embolic, or inflammatory complications, are associated with acute myocardial infarction. The development of mechanical complications after acute myocardial infarction is associated with significantly reduced short-term and long-term survival. One of the most common complications occurring post-infarction is a ventricular aneurysm. LV aneurysm was first reported in 1951 by angiographic evidence.

The natural course leading to the formation

of a ventricular aneurysm involves a full-thickness infarct that has been replaced by fibrous tissue. This inert portion cannot take part in the contraction and herniates outward during systole. It leads to an expansion of a dyskinetic area and forms a thin circumscribed, fibrous and non-contractile outpouching.

A significant left ventricular (LV) aneurysm can be seen in 30% to 35% of acute transmural myocardial infarction. The two major risk factors for the development of LV aneurysm includes total occlusion of the left anterior descending artery, and failure to achieve patency of infarct site artery. Ventricular aneurysms can be true or false aneurysms.

A true aneurysm is formed by full-thickness bulging of the ventricular wall

# CIMS HOSPITAL

Gujarat's First & Only Heart Transplant Centre

# 12<sup>TH</sup>

## HEART TRANSPLANT

OCTOBER 29, 2020

# CIMS HOSPITAL



Glad to announce the discharge of the **Longest COVID hospitalised patient in India and Asia (101 days hospitalisation including 51 days on ventilator)**

We thank and congratulate CIMS COVID Team for their continuous commitment and dedication towards COVID Care.



A false ventricular aneurysm is formed by the rupture of the ventricular wall, which is contained by the surrounding pericardium. 85% of a true LV aneurysms location at the apical and anteroseptal wall. The incidence of an inferior-posterior or lateral wall aneurysm is very low, about 5% to 10%. This preference for the apical site may be explained by the fact that there are only three layers of muscle at the apex compared with four layers at the base. False aneurysms tend to involve the posterior or diaphragmatic surface more commonly than the apical or lateral wall.

### Epidemiology

In the Coronary Artery Surgery Study (CASS), 7.6% of patients had a left ventricular aneurysm in a total population of 15000 patients. The LV aneurysm was found in 22% of the anterior wall myocardial infarction within 3 months of infarction. Ventricular wall aneurysm is associated with high cardiac mortality that can be around 67% and 80% for 3 months and 1 year, respectively.

### Pathophysiology:

The factors contributing to the formation of the left ventricular aneurysm in the early phase of MI i.e within 2-3 weeks include:

- Preserved contractility of the surrounding myocardium
- Transmural infarction
- Lack of collateral circulation
- Lack of reperfusion
- Elevated wall stress
- Hypertension
- Ventricular dilatation
- Wall thinning

About 2 to 4 weeks post-infarction, remodeling of the myocardium begins with the appearance of highly vascularized

granulation tissue. This is called late phase of Aneurysm formation . It is replaced by fibrous tissue 6 to 8 weeks post-infarction. As myocardium becomes replaced by fibrous tissue, it greatly decreases the ventricular wall thickness due to the loss of myocytes.

### Clinical signs and symptoms :

Apart from routine Heart failure symptoms very specific complication and signs of LV aneurysms are

**Heart Failure and Ischemia :** The LV dilation, paradoxical motion, and high end-diastolic pressure due to aneurysm results in ischemia and heart failure secondary to loss of cardiac output. The long-standing volume overload can further cause worsening of LV aneurysm entering a loop that enforces worsening heart failure and ischemia with worsening LV aneurysm.

**Ventricular Arrhythmias:** The LV aneurysm can generate severe ventricular tachyarrhythmias leading to sudden cardiac death. The fibrous tissue at LV aneurysm site or the transition zone of normal myocardium and the aneurysmal wall can be arrhythmia focus.

**Thromboembolization :** Stasis of blood at the aneurysmal site can increase the formation of a mural thrombus that can eventually dislodge and put the patient at risk of embolization to any organs of the body, including the brain, to cause a stroke.

Ventricular Rupture and Cardiac.

**Tamponade :** Mature LV aneurysms have fewer chances of rupture due to dense fibrous tissue, but early immature aneurysm can rupture with the potential to cause cardiac tamponade, and shock.

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### Routine Investigations

#### 1. Electrocardiogram

There are three key electrocardiographic features of LV aneurysm after acute myocardial infarction includes: 1) Tall R wave in lead AvR known as Goldberger's sign. 2) Persistent ST-segment elevation with T wave inversion. 3) Small R waves in leads in the distribution of the left ventricular wall. Other EKG findings can include ventricular arrhythmias that can be complications of LV aneurysm.

#### 2. Chest Radiograph

In anteroposterior or slightly oblique view of chest x-ray, a ventricular aneurysm forms a well-circumscribed opacity projecting beyond the regular cardiac outline. In contrast, in the lateral view, it forms a rounded or oval shadow, partially or entirely superimposed upon that of the heart.

#### 3. Computed Tomography

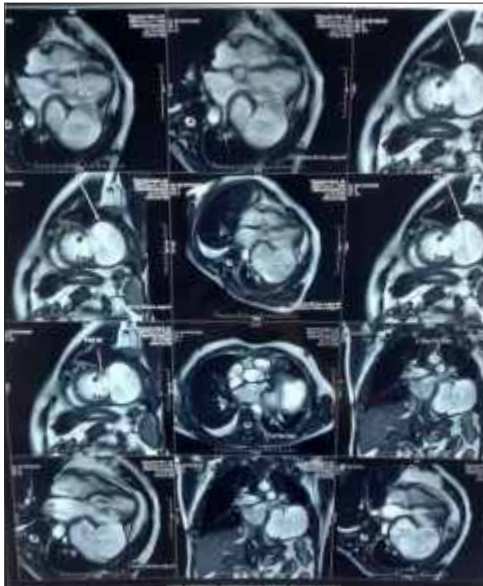
CT scan is another reliable imaging modality for LV aneurysms. Cardiac CT can give a better view of the aneurysm wall and the presence of mural thrombus at the cost of risk of contrast-induced nephropathy (CIN).

#### 4. Magnetic Resonance Imaging

The use of MRI as a noninvasive modality for identifying LV aneurysms and for assessing resectability makes it a reliable test. Also helps in delineating the exact anatomy of Left Ventricle in relation to



aneurysm. For this purpose, dark-blood imaging may be employed to define the anatomy. It helps in delineating the bulging of the aneurysm. The blood pool motion in the aneurysm is characterized by dynamic bright-blood imaging.



**MRI image of Lateral Wall LV aneurysm**

### 5. Echocardiography

Two-dimensional echocardiography aids in a clear demonstration of a ventricular aneurysm. It may also assist in differentiating between a true and false type aneurysm by depicting a narrow neck as compared to the size of the cavity. Color-flow echocardiographic imaging may identify abnormal flow within the aneurysm. This information may help identify a thrombus. A pulsed Doppler imaging can reveal an oscillatory to and fro motion of aneurysm that changes its variation with inspiration and expiration. The calculation of LV systolic function and LV volume can be done with the 3-D tomographic echocardiography. An echocardiographic assessment of the mitral valve should be done.

### Treatment / Management :

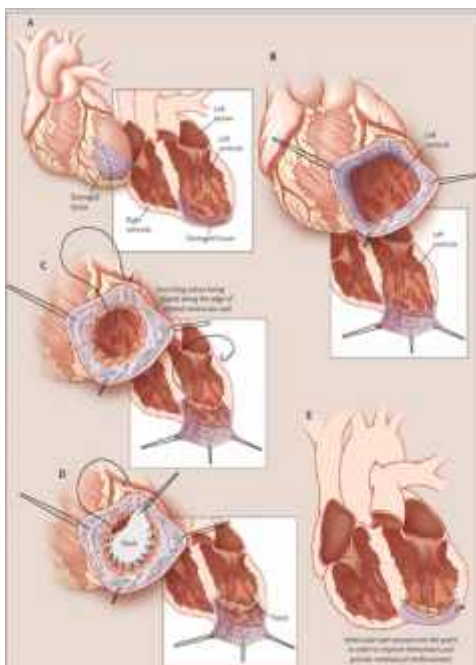
#### Medical management

Small or medium LV aneurysm with no symptoms can be safely monitored with expected five-year survival up to 90%. The management can include optimization of coronary artery disease risk factors for ischemia prevention, afterload reduction with angiotensin-converting enzyme inhibitors or angiotensin receptor blockers, and anticoagulation to prevent thromboembolism.

#### Surgical Management

Relative indications for ventricular aneurysm operation include:

- Documented expansion
- Large size
- Angina
- Congestive heart failure
- Arrhythmia
- Rupture
- Pseudoaneurysm
- Congenital aneurysm
- Embolism



**Surgical Repair of Aneurysms**

### Aim of the Surgical Resection

is to reduce and restore the LV size and remove the dyskinetic tissue, hence improving the forward output of LV, reduce the chances of arrhythmias due to scar tissue and stretching of normal myocardium. The aim of the surgery is to reduce the final diastolic volume and restore the geometric cavity, leading to an increased ejection fraction. Surgery should usually be performed 6 weeks of the acute event. After that period, the myocardium muscle will have been remodeled, presenting areas of fibrosis, and at this point the aneurysm is more clearly delimited and effective surgery can be planned.

The early surgical approaches, consists of an aneurysmectomy, along with excision of a 2-3 mm thick layer of subendocardial peri-infarcted tissue. With such an approach, the tachycardia can be eliminated in 90% of patients with an operative mortality of about 10%. Approaches are DOR procedure for apical aneurysm, or Septal patch exclusion , or Patch closure of the neck of the aneurysm.

Pseudoaneurysm ; Untreated LV pseudoaneurysm can have mortality of up to 50%. Surgery is the preferred treatment for pseudoaneurysm and holds perioperative mortality up to 10%. Percutaneous transcatheter device closure is preferred over open surgery.

### Prognosis

The natural history and prognosis of ventricular aneurysms are not well defined because most of the reports are based on retrospective data and autopsy studies. In two autopsy studies, in which the age of the aneurysm had to be estimated from a



retrospective analysis of case notes, the 5-year mortality rates were 30 and 80%. The most common cause of death was recurrent myocardial infarction and not congestive heart failure. In clinical studies, the prognosis depends on the size of the aneurysm, as well as the presence of symptoms. In the study of Mourdjinis et al., the 5-year mortality was 50% overall, but only 10% in patients with small aneurysms.

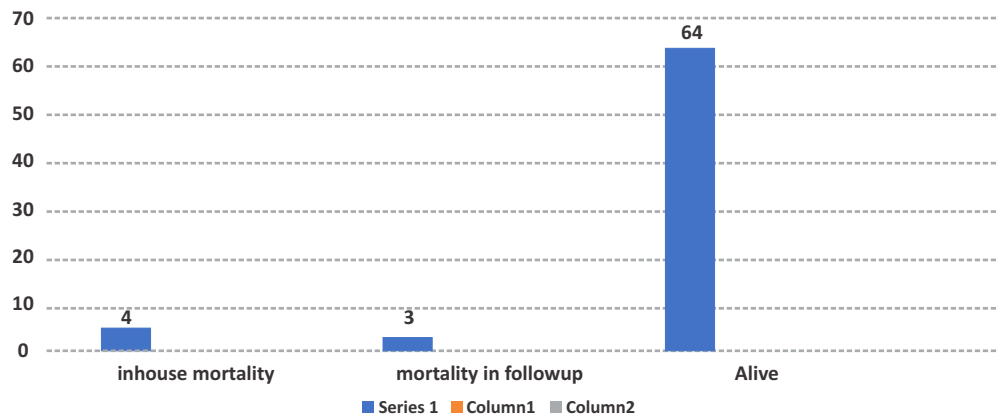
The majority of patients experience an improvement in quality of life, with freedom from readmission and improvement of their ejection fraction. Although the Surgical Treatment for Ischemic Heart Failure (STICH) trial did not report such benefits, the common consensus is that a 30% reduction of the ventricular cavity should be the aim of surgery.

Previous studies report a 5-year survival of 68% after ventricular restoration and a significant improvement in heart failure symptoms [8]. A 10-year survival rate of 59% was reported in a more recent study, which associated surgical anterior ventricular endocardial restoration (SAVER) with total arterial grafts, and showed the clear benefits of the procedure. The international RESTORE Group performed SAVER with an overall hospital mortality of 7.7%. Once patients who underwent CABG and ventricular correction (without mitral approach) were taken into consideration a lower mortality rate of 4.9%, was observed

**Some Wisdom Pearls :**

For the better outcomes in patients with Myocardial infarction and its complication Heart Team Approach with following responsibilities is important.,

Long Term Result of last 10 years of total 71 cases



**A cardiologist** has an essential role in the management of the patients presenting with acute myocardial infarction and subsequent follow-up to monitor for post-infarction complications.

**An interventional cardiologist** is involved in the decision-making process for the management that encompasses revascularization therapies for patients with ischemic heart disease.

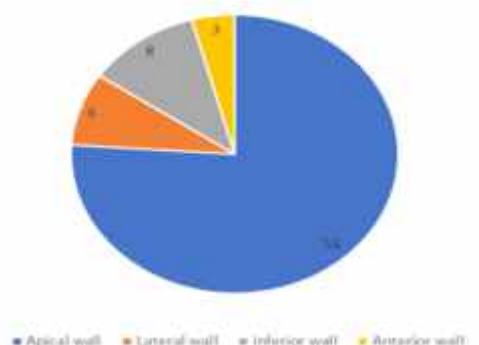
**The cardiac surgeon's** role in the heart-team involves deciding the optimal timing of the surgery.

**An anesthetist** holds an integral position in the team for the evaluation of anesthetic risks in the perioperative management of the patient.

**Our CIMS Experince :**

In last 10 years data of our Post MI LV aneurysm Surgery are as follows :

Bifurcation of LV Aneurysm cases N= 71



The Average EF was 22.5 %. Overall mortality is 10% , of which 4 where in house mortality and 3 died in followup , of which 2 death where due non cardiac cause and 1 died because of sudden cardiac death.

Rest all patients are doing fine. AICD implantation was performed only in 3 patient s . Rest all patients had uneventful recovery and are in NYHA class I/II. Patients with 20% EF and Aneurysm repair have completed 9-10 years follow-up also.

**Take Home Message :**

LV aneurysm post Myocardial infarction is dreaded complication and if diagnosed early can be treated surgically . Surgical treatment is indicated only in patients with Big aneurysm or with S/S of heart failure or arrhythmias.



CASE PRESENTATION

Successful COVID-19 Care Outcomes in a 90 Year Old Male Patient at CIMS

Background:

Severe acute respiratory syndrome (SARS)-CoV-2, is responsible for the COVID 19 pandemic that is affecting human health and economy across the world[1,2]. Older adults more so males with co-morbidities and individuals with complex underlying health conditions suffer the severest COVID-19 outcomes in terms of complications and higher mortality rates. Evidence suggests that advanced age is the most important predictor for fatal outcome.

We detail here clinical course of a male aged, 90 years with co morbidities who was well treated and recovered from COVID-19 at CIMS.

Case Presentation:

A 90-year-old (corrected age: 90 years and 9 months) gentleman (nonagenarian), known case of hypertension (on regular medications) and peripheral neuropathy, had complaints of cough, weakness, low grade fever and headache since last 4-5 days. Report of RT- PCR for COVID-19 was positive. The gentleman had no history of travel or close contact with a patient suspected of or diagnosed with severe acute respiratory syndrome (SARS).The patient was hospitalized at Care Institute of Medical Sciences (CIMS hospital), Ahmedabad, Gujarat, India under CIMS COVID Care Group.

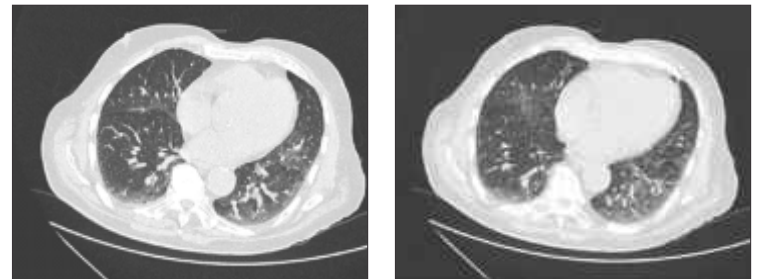
On admission, the patient was awake and alert with a temperature of 99.8° Fahrenheit, blood pressure of 138/86 mmHg, pulse rate of 64 beats per minute, respiratory rate of 21 cycles per minute, and pulse oxygen saturation of 97% on room air.

A multi-slice high resolution computed tomography (HRCT) scan showed few patchy areas of ground glass densities with interstitial septal thickening seen through it (s/o crazy paving pattern) in bilateral lungs with peripheral predominance and CT severity score was 3 out of 40 (Figure 1). Findings were suggestive of typical Covid-19 pneumonia; CORAD: 6 - PCR positive. Blood investigations including inflammatory markers for Covid -19 were also performed.

The patient was isolated and treatment was started as per Indian council of medical research (ICMR) guidelines for COVID 19.

Figure 1:

Images of High Resolution Computed Tomography (HRCT)



Initial testing revealed D-Dimer -737.40 ng/ml, along with slight elevated levels of Troponin - T (0.022 ng/ml).Aspartate aminotransferase and alanine aminotransferase, C - reactive protein (CRP) 2.24 mg/dl, Ferritin 257 ng/ml, Lactate Dehydrogenase (LDH) 159 u/l, Bilirubin and Urea 31.0 mg/dl were within normal range (Table 1).

Table 1: Laboratory Investigations

Table with 4 columns: Lab Parameters, Day-1, Day-4, Normal Range. Rows include Hemoglobin, Total count, Polymorphs, Lymphocytes, Eosinophil's, Monocytes, Platelet count, C - reactive protein (CRP), D-Dimer, Ferritin, Sodium (Na+), Potassium (K+), Creatinine, SGPT, SGOT, Alk. Phosphatase, T. Protein, Albumin, and Globulin.

Treatment :

Inj. Remdisivir 200 mg for 1 day and subsequently 100 mg for 4 days, Inj Clexane 60mcg SC Od for 5 days, Tab Zincovit, Tab Vit -C and other supportive medications for treatment of pneumonia were started. SpO2 was maintained between 96% - 99%



throughout hospitalization. Except generalized weakness, no other clinical signs and symptoms or complications were observed during hospitalization. After 5 days of treatment patient was discharged in a haemodynamically stable condition.

**Discussion:**

Elderly patients are particularly susceptible to adverse clinical outcomes in SARS Cov-2 infection and assessment and treatment is challenging. Respiratory diseases and pneumonia per se are among the major causes of hospitalization in the older population with a marked higher mortality rate compared to the adult population. Older adults of the 70–80-year-old age group have a case fatality rate of 8.0%, and older adults above age 80 have a case fatality rate of 14.8% .[3] With age come additional pre-existing conditions, which makes older adults susceptible to severe infection. Male sex and comorbidities such as cardiovascular disease, diabetes mellitus, hypertension, chronic kidney disease, obesity, and chronic lung disease are associated with the development of severe disease [4, 5]. Critically ill patients develop significant complications such as acute respiratory distress syndrome (ARDS), cardiac injury, cardiac rhythm disorders, shock requiring prolonged ventilator support.

The virus’ predilection for the lower respiratory tract is especially problematic for frail older adults who receive direct contact and care by asymptomatic healthcare workers, a feature that is a set-up for a period of clinically silent spread within long-term care facilities before clinical presentation of COVID-19. [6]Advanced age, decreased lymphocytes, and D-Dimer elevation are important characteristics of patients with severe COVID-19. Clinicians should focus on these characteristics to identify high-risk patients at an early stage.

In older individuals, immunodeficiency and comorbid disorders are more likely to promote viral-induced cytokine storm resulting in life-threatening respiratory failure and multi-systemic

involvement. Early diagnosis and individualized therapeutic management should be developed for elderly subjects based on personal medical history and timely use of anti-viral Remdesivir.

**Conclusion:**

Timely screening and treatment are crucial concerns when treating elderly patients with COVID-19 besides the routine antiviral therapy. Until more progress in specific treatment is achieved, it is recommended that the elderly population should remain shielded during COVID-19 outbreaks.

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## HEALTHY HEART

VOLUME-11 | ISSUE-132 | NOVEMBER 05, 2020

Healthy Heart Registered under **RNI No. GUJENG/2008/28043**

Published on 5<sup>th</sup> of every month

Permitted to post at PSO, Ahmedabad-380002 on the 12<sup>th</sup> to 17<sup>th</sup> of every month under  
Postal Registration No. **GAMC-1725/2018-2020** issued by SSP Ahmedabad valid upto 31<sup>st</sup> December, 2020  
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Printed, Published and Edited by Dr. Keyur Parikh on behalf of the CIMS Hospital  
Printed at Hari Om Printery, 15/1, Nagori Estate, Opp. E.S.I. Dispensary, Dudheshwar Road, Ahmedabad-380004.  
Published from CIMS Hospital, Nr. Shukan Mall, Off Science City Road, Sola, Ahmedabad-380060.