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Giant ventricular pseudoaneurysm following inferior myocardial infarction: insights from multimodal imaging approach

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Learning points

- Left ventricular pseudoaneurysm is defined as a contained rupture of the myocardial wall with blood flow passing into a cavity contained by pericardium, thrombus, or adhesions.
- Left ventricular pseudoaneurysm is a rare complication of myocardial infarction with an incidence <0.3%.
- Complications include: rupture, ventricular arrhythmias, heart failure, and systemic thromboembolism.
- Surgery is considered first-line treatment option for myocardial pseudoaneurysm even in high-risk patients since mortality rates are greater with conservative management.

Case summary

We describe the case of an 85-year-old woman with a fast growing ventricular pseudoaneurysm after an acute inferior myocardial infarction (MI). A multimodal imaging approach including transthoracic echocardiography (TTE) and computed tomography (CT) was essential to guide diagnostic and therapeutic strategies in this very rare situation.

Case description

An 85-year-old woman was referred to our institution because of inferior ST-segment elevation myocardial infarction (STEMI) with a moderate troponin peak of 10.88 μg/L ($N < 0.04$ μg/L). Angiographic data showed a two-vessel coronary artery disease with a proximal occlusion of the right coronary artery (RCA) and a complex highly calcified bifurcation stenosis involving the left anterior descending artery (LAD segment 2) and the ostium of the second diagonal branch. The patient underwent angioplasty of the infarct-related RCA. Decision was made to refer the patient within a month to our cath lab for secondary treatment of the LAD bifurcation lesion. The discharge TTE disclosed inferior wall akinesia, small basal inferior aneurysm, and normal left ventricular ejection fraction (LVEF). The patient was readmitted 17 days after discharge due to recurrent acute anterior STEMI and cardiogenic shock (severe left ventricular (LV) dysfunction with LVEF of 25% at the time of admission in the cath lab).

Urgent coronary angiography was performed 4 h after symptoms onset and showed a complete occlusion of the proximal LAD, well above the bifurcation lesion. Percutaneous coronary intervention with stenting of the culprit lesion was performed, but revascularization of the bifurcation lesion was considered too high risk. Transthoracic echocardiography disclosed a large defect (8.5 mm) of the basal inferior wall (*Figure 1A*), with extension in to a pseudoaneurysm. A colour Doppler analysis (*Figure 1B*) showed shunt flows passing from the LV to the aneurysmal pouch.

2D and 3D maximum intensity projection (MIP) multiphasic cardiac CT images provided a non-invasive modality for the evaluation of the pseudoaneurysm. It helped to define the anatomy, size, course, relationship of the pseudoaneurysm and determine further therapeutic strategies. Cardiac CT revealed a giant pseudoaneurysm (31×47 mm) running the length of the right ventricle (*Figure 2*). The final diagnosis was cardiogenic shock related to recurrent anterior STEMI and the fast growing development of an inferior pseudoaneurysm.

Discussion

Left ventricular pseudoaneurysm is defined as a contained rupture of the myocardial wall with blood flow passing into a cavity contained

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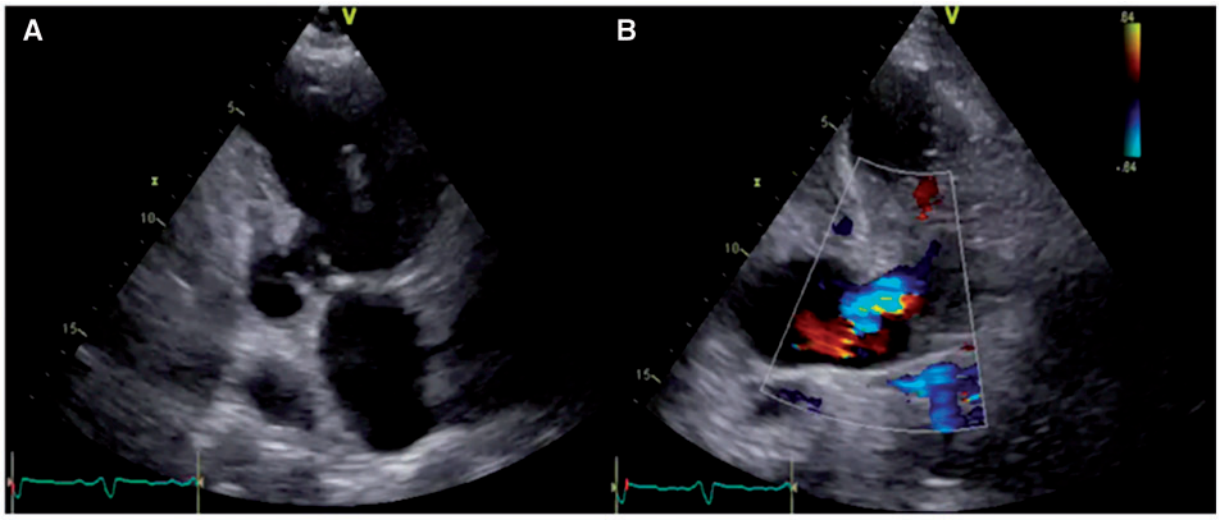

Figure 1 (*A*) Apical two-chamber view showing (A2C) a pseudoaneurysm at the basal inferior wall of the left ventricle (LV) with a communication neck of 8.5 mm. (*B*) Apical two-chamber view with colour Doppler imaging showing blood circulation between the left ventricle and the pseudoaneurysm.

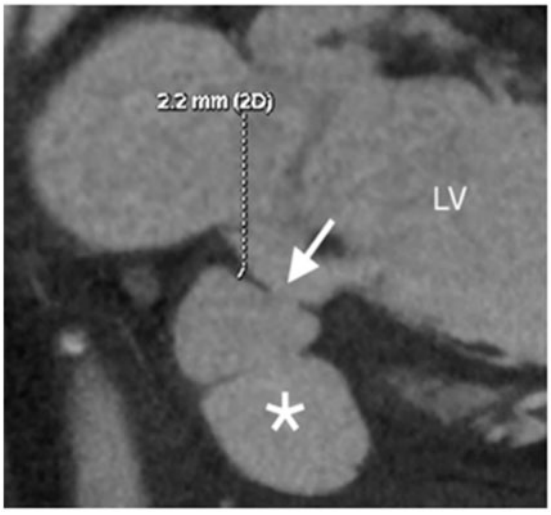

Figure 2 Computed tomographic-imaging showed a narrow neck (white arrow) between the left ventricle (LV) and the pseudoaneurysm (white star).

by pericardium, thrombus, or adhesions. Left ventricular pseudoaneurysm remains a very uncommon complication usually occurring in the subacute or chronic phase of MI with an incidence <0.3%.[1–4] As anterior rupture is more likely to result in the fast growing development of the pouch, haemopericardium and death where posterior rupture is more likely to remain contained[5]; posterior pseudoaneurysms show higher incidence in the literature compared to anterior counterparts. Operative mortality of either primary repair or patch closure ranges from 10% to 30% in the pre- and perioperative period.[1,6,7] Symptomatic and acute ventricular pseudoaneurysms are considered to confer a high risk of rupture ranging from 30% to 45%.[1,8] Regarding the dismal prognosis of an enlarging LV pseudoaneurysm, early surgical repair was considered by the local heart team but rejected due to a high procedural risks (Logistic Euroscore II: 43.53%), the proximity to the mitral annulus and the high probability for mitral valve replacement while performing excision of surgical aneurysm and finally frailty state of the patient. Percutaneous closure by an Amplatzer occluder device faced unfavourable anatomy with a large mouth of the pseudoaneurysm and a predictive lack of adherence along its neck.

Despite the importance of relying on evidence-based clinical practice guidelines, adaptation to the local context was mandatory in this case. Standard of care according to 2017 ESC guidelines for the management of STEMI[9] include routine revascularization of non-infarct-related artery lesions in STEMI patients with multivessel disease before discharge. Due to the nature of an heavily calcified complex bifurcation LAD lesion, the onset of acute congestive heart failure and the need for non-invasive ventilation during procedure, chronic kidney disease (estimated glomerular filtration rate 35 mL/min/1.73 m^2) and concerns about contrast-induced nephropathy; optimal coronary stenting within a month with rotational atherectomy of this complex stenosis [±intravascular ultrasound (IVUS) -guided therapy] appeared as the best option at the time of first hospitalization.

After stabilization under initial inotropic support and in the absence of in-hospital complications; the patient was discharged from hospital on Day 32 with optimal medical therapy. Iterative TTE re-evaluation revealed stability of the pseudoaneurysm and the overall survival was 3 months after discharge. As autopsy was not performed, we can only speculate the cause of death from either pseudoaneurysm rupture, recurrent MI involving the calcified LAD bifurcation lesion or ventricular arrhythmia.

Conclusion

Left ventricular pseudoaneurysm is a rare complication of MI with several cardiovascular complications such as: rupture, ventricular arrhythmias, heart failure and systemic thromboembolism. Surgery should always be considered as the first option and remains a standard of care for myocardial pseudoaneurysm even in high-risk patient.

Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: none declared.

Author Contributions: B.M. and U.C. wrote the manuscript. S.E.G. contributed in the analysis and interpretation of imaging data. O.M. supervised the development of work and helped in manuscript evaluation. All authors contributed to the final manuscript. All authors were active caregivers involved with the patient in the diagnostic, therapeutic and decision process presented in this case report.

References

1. Frances C, Romero A, Grady D. Left ventricular pseudoaneurysm. *J Am Coll Cardiol* 1998;**32**:557–561.
2. Hulten EA, Blankstein R. Pseudoaneurysms of the heart. *Circulation* 2012;**125**: 1920–1925.
3. Muller I, Andrassy P, Firschke C. Left ventricular pseudoaneurysm: a mechanical complication of acute myocardial infarction. *Heart* 2002;**87**:569.
4. Nakashim R, Yamaguchi K, Yoshitomi H, Okada T, Endo A, Tanabe K. A case of myocardial infarction and left ventricular pseudo-false aneurysm perforating the right ventricle. *J Echocardiogr* 2017;**15**:91–92.
5. Kumar PV, Alli O, Bjarnason H, Hagler DJ, Sundt TM, Rihal CS. Percutaneous therapeutic approaches to closure of cardiac pseudoaneurysms. *Catheter Cardiovasc Intervent* 2012; **80**:687–699.
6. Yeo TC, Malouf JF, Oh JK, Seward JB. Clinical profile and outcome in 52 patients with cardiac pseudoaneurysm. *Ann Intern Med* 1998; **128**:299–305.
7. Prifti E, Bonacchi M, Baboci A, Giunti G, Veshti A, Demiraj A, Zeka M, Rruci E, Bejko E. Surgical treatment of post-infarction left ventricular pseudoaneurysm: case series highlighting various surgical strategies. *Ann Med Surg* 2017;**16**:44–51.
8. Vlodaver Z, Coe JI, Edwards JE. True and false left ventricular aneurysms. Propensity for the altter to rupture. *Circulation* 1975;**51**:567–572.
9. Ibanez B, James S, Agewall S, Antunes MJ, Bucciarelli-Ducci C, Bueno H et al. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). *Eur Heart J*;doi:10.1093/eurheartj/ehx393.