

## A rare complication of posterior myocardial infarction: Anterolateral papillary muscle rupture

✉ Ahmet Karaduman, ✉ İsmail Balaban, ✉ Berhan Keskin,  
✉ Çetin Geçmen, ✉ Gökhan Kahveci  
 Department of Cardiology, Kartal Koşuyolu Heart Training and  
 Research Hospital; Istanbul-Turkey

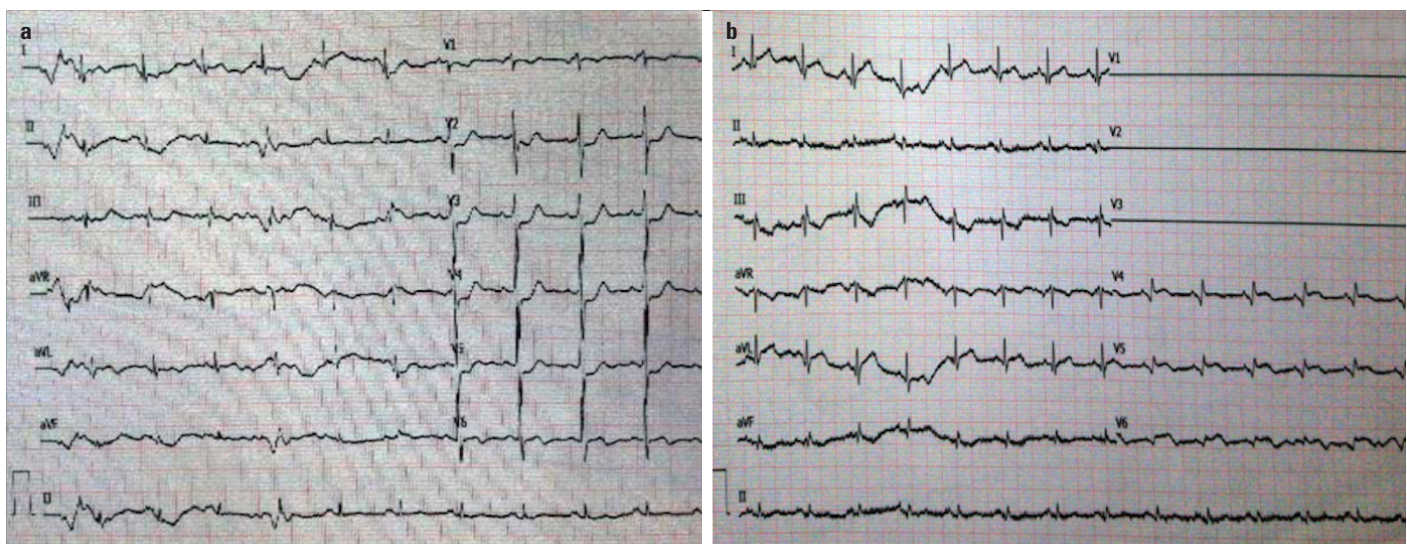
### Introduction

Papillary muscle rupture is one of the fatal complications of acute myocardial infarction. The incidence of anterolateral papillary muscle (APM) rupture is 6-12 times lower than that of

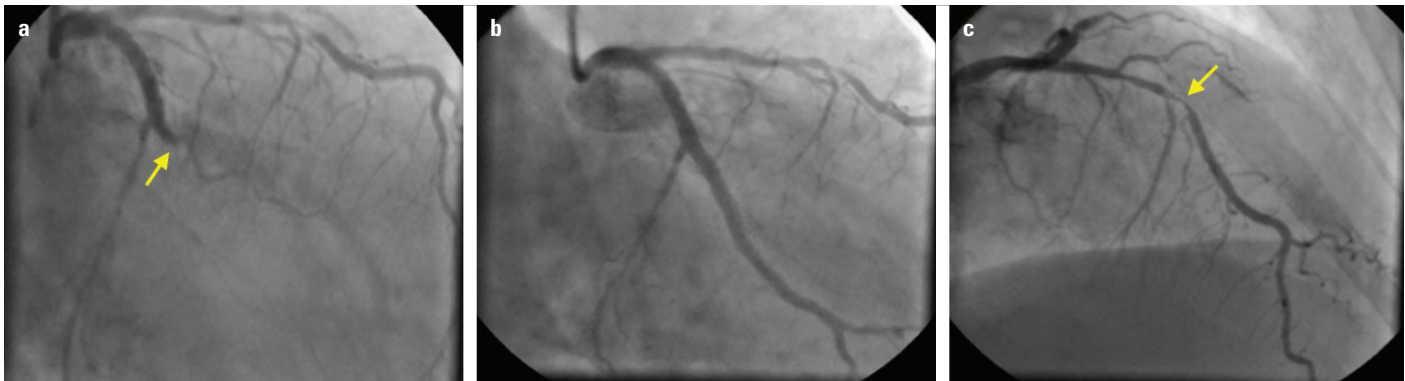
posteromedial papillary muscle (PPM) rupture. This is because APM has a dual blood supply from left anterior descending artery (LAD) and left circumflex artery (LCX), whereas the blood supply of PPM is maintained only by the posterior descending artery (1). In case of the presence of a lesion in both LCX and LAD, APM rupture can be seen. We present a case with an example of this pathophysiologic mechanism, which will provide insights into the features of patients with the Acute coronary syndrome (ACS) and APM rupture.

### Case Report

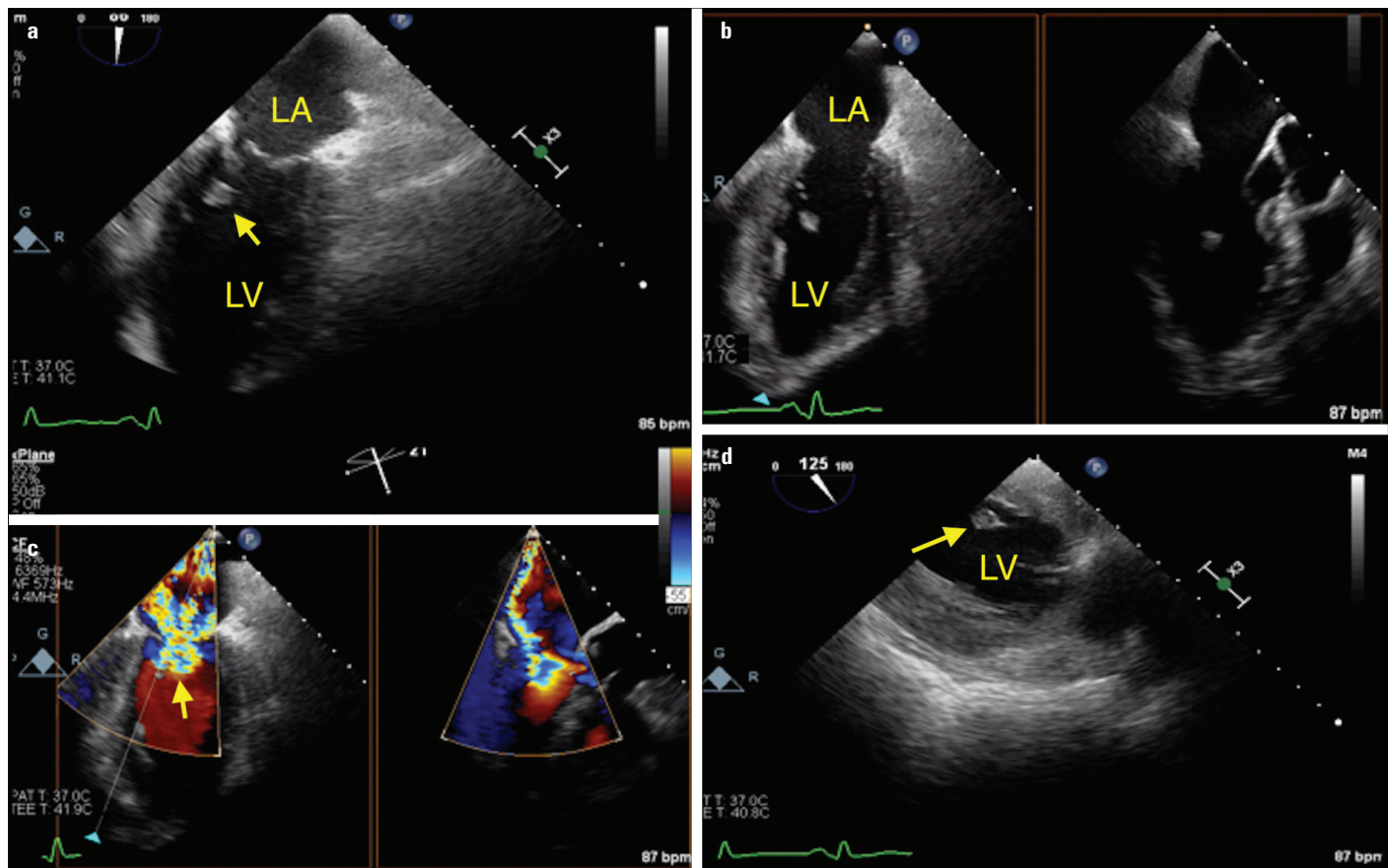
A 68-year-old male with no medical history of known coronary artery disease presented to the emergency department with acute chest pain. His blood pressure was 130/70 mm Hg and heart rate 92 bpm. Auscultation of the patient revealed loud S1 and S2, S4 gallop rhythm and no murmur. A 12-lead electrocardiogram showed ST depression on the anterior leads and ST elevation on the posterior leads (Fig. 1). The patient was admitted to the catheter laboratory with the diagnosis of posterior myocardial infarction (MI). Coronary angiogram showed a non-dominant LCX with first obtuse marginal branch (OM1) with complete occlusion of proximal end, a diffuse plaque in LCX after OM1, and LAD with 90% stenosis in the mid portion. Primary percutaneous coronary intervention (PCI) to OM1 and elective PCI to LAD was selected as the best treatment option (Fig. 2a-2c). The 3.0×15-mm drug-eluting stent was implanted into OM1 (Fig. 2d). The patient was admitted to the coronary intensive care unit and was hemodynamically stable. After 12 h, hypotension and tachycardia suddenly developed. Trans-thoracic echocardiogram (TTE) showed severe mitral regurgitation (MR). Furthermore, transesophageal echocardiogram (TEE) showed a normal thickness of the mitral valve and a flail



**Figure 1.** (a) 12-lead electrocardiogram shows ST-segment depression in anterior leads. (b) Posterior electrocardiogram shows ST-segment elevation in posterior leads



**Figure 2.** (a) Coronary angiography shows totally occluded obtus marginalis 1 branch of left circumflex artery (arrow). (b) Image after successful percutaneous coronary intervention to occluded obtus marginalis 1 artery. (c) Arrow shows lesion in the mid portion of left anterior descending artery



**Figure 3.** (a) Midesophageal bicommissural view shows flail anterior mitral leaflet. (b) Midesophageal bicommissural X-plane image shows ruptured anterolateral papillary muscle. (c) Color Doppler imaging with transesophageal echocardiography shows severe mitral regurgitation. (d) Transgastric 125 degrees view shows ruptured anterolateral papillary muscle

anterior leaflet not coapting with the posterior leaflet. (Fig. 3a-3c, Video 1-3). TEE showed an echodensity in the left ventricle, suggesting a partially ruptured APM (Fig. 3b-3d, Video 4, 5). TEE images were obtained using a Philips X7-2 ultrasound transducer probe (Philips Healthcare, Inc., Andover, MA, USA). Mitral valve replacement (MVR) with a St. Jude mechanical valve and concomitant coronary artery bypass grafting of LAD was performed (Fig. 4). The hemodynamic parameters of the patient improved postoperatively.

## Discussion

ACS may cause several serious complications, including papillary muscle rupture. Papillary muscle rupture is responsible for approximately 5% of death after MI (2). Papillary muscle rupture occurs most frequently within 2-7 days after MI (3). Interestingly, in our patient, this clinical scenario occurred within the first 24 h. Usually, while APM has a single head, PPM has two or more heads. APM rupture, which is usually a complete rupture, leads to



**Figure 4.** Surgical material shows excised mitral valve with ruptured anterolateral papillary muscle

more serious and fatal complications compared with PPM rupture (4). APM rupture is usually associated with anterolateral MI, rarely seen with posterior MI (5). The exact diagnosis of papillary muscle rupture may be difficult to establish using TTE because the ruptured head may not prolapse into the left atrium; TEE is a more sensitive and useful tool for the diagnosis (6). Without surgical repair, approximately 90% of patients with papillary muscle rupture die within 1 week (7). In some cases, reparation of the valve has been reported; however, weakness and friability of tissues makes repair difficult (8). Most cases are best served with MVR (9). In our patient, hemodynamic deterioration after ACS led to a suspicion of mechanical complications and successful use of imaging modalities led to an early diagnosis and treatment. It is important to increase awareness regarding clinical benefits of using imaging modalities in the management of such cases; our patient is a good example of a successful clinical approach for the management of papillary muscle rupture.

## Conclusion

ACS may cause several serious complications such as papillary muscle rupture; this may further lead to significant hemodynamic deterioration. PPM rupture is a common finding; however, APM rupture is rarely seen. With the development of primary PCI, these complications have significantly diminished. However, clinicians should exercise caution in the management of patients who are hemodynamically unstable after acute MI. Imaging is the main tool for detecting any mechanical complication after acute MI. We presented characteristic imaging findings with echocardiography to provide a good coverage of this rare complication (APM rupture) and reported the clinical benefits of the imaging modalities.

**Informed consent:** Written informed consent was obtained from the patient for publication of the case report and the accompanying videos and images.

**Video 1.** Midesophageal bicommissural view shows flail anterior mitral leaflet and ruptured anterolateral papillary muscle

**Video 2.** Color Doppler imaging shows posterior egsantric severe mitral regurgitation

**Video 3.** 3D imaging shows prolapsus of the anterior mitral leaflet and coaptation defect

**Video 4.** Midesophageal bicommissural X-plane image shows ruptured anterolateral papillary muscle

**Video 5.** Transgastric 125 degrees view shows ruptured anterolateral papillary muscle

## References

1. Voci P, Bilotta F, Caretta Q, Mercanti C, Marino B. Papillary muscle perfusion pattern. A hypothesis for ischemic papillary muscle dysfunction. *Circulation* 1995; 91: 1714-8.
2. Nishimura RA, Schaff HV, Shub C, Gersh BJ, Edwards WD, Tajik AJ. Papillary muscle rupture complicating acute myocardial infarction: analysis of 17 patients. *Am J Cardiol* 1983; 51: 373-7.
3. Lavie CJ, Gersh BJ. Mechanical and electrical complications of acute myocardial infarction. *Mayo Clin Proc* 1990; 65: 709-30.
4. Kishon Y, Oh JK, Schaff HV, Mullany CJ, Tajik AJ, Gersh BJ. Mitral valve operation in postinfarction rupture of a papillary muscle: immediate results and long-term follow-up of 22 patients. *Mayo Clin Proc* 1992; 67: 1023-30.
5. Tavakoli R, Weber A, Vogt P, Brunner HP, Pretre R, Turina M. Surgical management of acute mitral valve regurgitation due to post-infarction papillary muscle rupture. *J Heart Valve Dis* 2002; 11: 20-5.
6. Moursi MH, Bhatnagar SK, Vilacosta I, San Roman JA, Espinal MA, Nanda NC. Transesophageal echocardiographic assessment of papillary muscle rupture. *Circulation* 1996; 94: 1003-9.
7. Nishimura RA, Gersh BJ, Schaff HV. The case for an aggressive surgical approach to papillary muscle rupture following myocardial infarction: "From paradise lost to paradise regained". *Heart* 2000; 83: 611-3.
8. Bilge M, Alemdar R, Ali S, Saatçı Yaşar A. Percutaneous mitral valve repair with the MitraClip system in a patient with subacute severe mitral regurgitation caused by papillary muscle rupture. *Anadolu Kardiyol Derg* 2014; 14: 475-6.
9. Adicoff A, Alexander CS, Ferguson JN, Kelly WD. Surgical repair of ruptured papillary muscle complicating posterior myocardial infarction. *Am J Cardiol* 1963; 11: 246-52.

**Address for Correspondence:** Dr. Ahmet Karaduman, Kartal Koşuyolu Yüksek İhtisas Eğitim ve Araştırma Hastanesi, Kardiyoloji Kliniği, Denizer Cad.

Cevizli Kavşağı No: 2 Kartal, İstanbul-Türkiye

Phone: +90 216 500 15 00

E-mail: ahmetkaraduman91@gmail.com

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