CARDIOLOGIE TUNISIENNE

CASE REPORT

Non-ST Elevation Myocardial Infarction complicated by complete rupture of the posteromedial papillary muscle

Infarctus du myocarde sans sus-décalage du ST compliqué d'une rupture complète du muscle papillaire postéro-médian

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Résumé

Il s'agit de l'observation d'un homme âgé de 57 ans, fumeur avec des antécédents de coronaropathie familiale, présentant des douleurs angineuses évoluant vers une détresse respiratoire. Le diagnostic d'un infarctus du myocarde sans élévation du segment ST compliqué d'une régurgitation mitrale sévère due à une rupture du muscle papillaire postéro-médian, a été porté. Une chirurgie valvulaire urgente associée à un pontage aortocoronarien, a été faite avec succès, soulignant l'importance d'une reconnaissance et d'une intervention précoces dans les complications rares de l'infarctus du myocarde.

Keywords

infarctus du myocarde; régurgitation mitrale aiguë; rupture du muscle papillaire; complications mécaniques; échocardiographie.

Summary

This case study discusses a 57-year-old man, a smoker with a family history of coronary artery disease, presenting with angina symptoms escalating to respiratory distress. Delayed diagnosis revealed non-ST elevation myocardial infarction complicated by severe mitral regurgitation due to posteromedial papillary muscle rupture. Emergency surgical intervention and coronary artery bypass grafting were successful, emphasizing the significance of early recognition and intervention in rare myocardial infarction complications.

Mots-clés

myocardial infarction; acute mitral regurgitation; papillary muscle rupture; mechanical complications; echocardiography.

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HISTORY OF PRESENTATION

In September 2021, a 57-year-old man who smokes presented with acute chest pain typical of angina associated with orthopnea and hemoptysis. Further investigation revealed that angina had been present for two weeks, but was initially ignored.

Upon admission, the patient displayed clinical signs of congestive heart failure, including a tachycardia, respiratory distress with crackling sounds in the lungs and low oxygen saturation, without signs of shock. A systolic heart murmur was detected during cardiac auscultation at the mitral valve.

The electrocardiogram showed a ST segment depression in the inferior-lateral leads.

PAST MEDICAL HISTORY

The patient has no significant personal medical history but has a family history of coronary artery disease (CAD).

DIFFERENTIAL DIAGNOSIS

The main differential diagnosis discussed included non-ST elevation myocardial infarction (NSTEMI) complicated by severe left ventricular dysfunction associated with functional mitral regurgitation, or NSTEMI occurring in the setting of preexisting dilated cardiomyopathy with functional regurgitation.

INVESTIGATIONS

Chest X-ray showed signs of pulmonary oedema.

The patient's biology revealed an elevated troponin level and a biological inflammatory syndrome.

Transthoracic echocardiography (TTE) showed severe mitral regurgitation with a calculated effective regurgitant orifice area (EROA) of 120 mm2 and a vena contracta width of 7 mm (Figure 1). This was attributed to posterior mitral valve prolapse caused by a complete posteromedial papillary muscle rupture (PMR) (Figure 2). TTE also revealed moderate pulmonary hypertension, an elevation of the left ventricular filling pressure, hyperdynamic left ventricle with normal dimensions without any regional wall motion abnormalities, and a preserved left ventricular ejection fraction (LVEF).

Pulmonary echocardiography revealed lung comets.

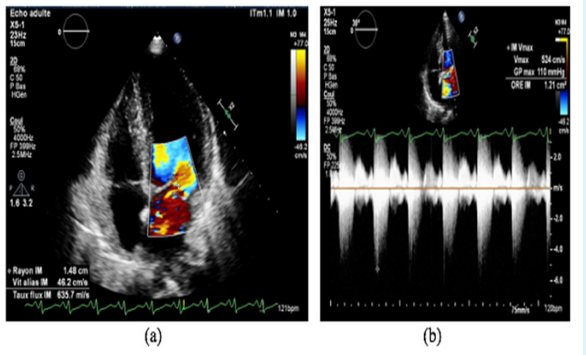

Figure 1. The apical four-chamber view with color flow Doppler (a) reveals a PISA radius of 1.4 cm, while the continuous wave Doppler recording (b) shows a velocity jet of 524 cm/s, concluding severe mitral regurgitation (regurgitant orifice area=1.21cm^2).

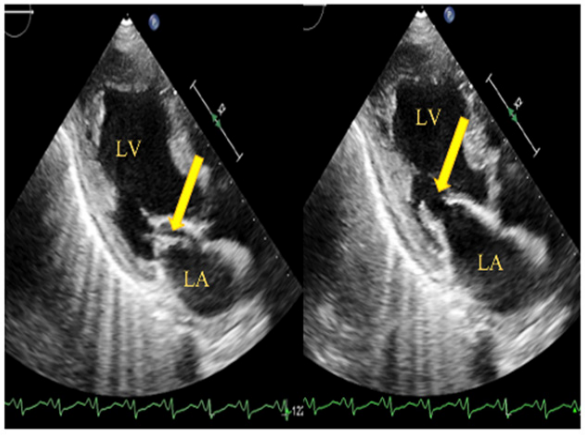

Figure 2. Apical three-chamber view demonstrating a complete rupture of the posterior-medial papillary muscle protruding into the left atrium during systole (yellow arrow).

MANAGEMENT

Based on the findings, the patient was diagnosed with NSTEMI complicated by mitral regurgitation due to complete rupture of the posteromedial papillary muscle.

Coronary angiography was performed and revealed a critical thrombotic stenosis in the third marginal branch artery, a tight stenoses in the first marginal branch and the second segment of the right coronary artery (Figure 3).

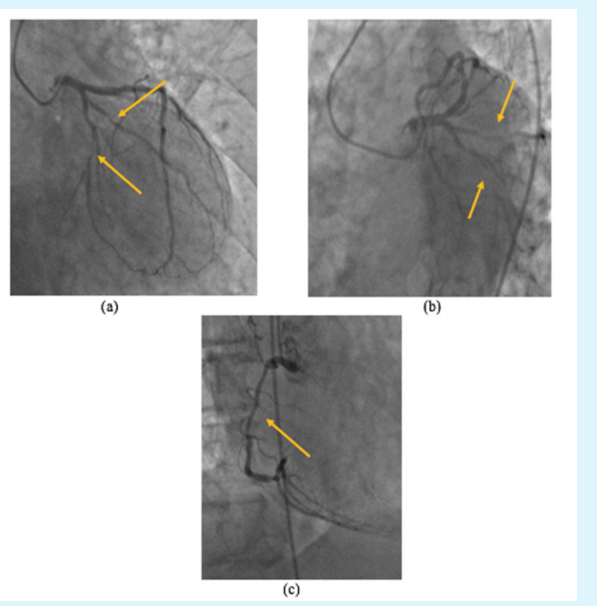

Figure 3. Coronarography showing a critical thrombotic stenosis of the third marginal branch artery, a tight stenosis of the first marginal branch ((a) and (b)) and of the second segment of the right coronary artery (c).

After receiving intravenous diuretics, anti-thrombotic and anti-ischemic therapy, the patient showed clinical improvement. A few days later, the patient underwent mitral valve replacement with a mechanical prosthesis and a three-vessel coronary artery bypass grafting (CABG) procedure.

DISCUSSION

PMR occurs more frequently in STEMI than in NSTEMI. It incidence is 0.05 % in STEMI and 0.01 % in NSTEMI (1). However, PMR is increasingly recognized in the setting of NSTEMI where a more indolent presentation delays diagnosis. Furthermore, patients who present with NSTEMI are typically of advanced age, have preexisting coronary artery disease, previous ischemic damage to the papillary muscles, preexisting mitral regurgitation and left atrial enlargement (2).

Classically, the posteromedial papillary muscle is most commonly injured due to a more vulnerable vascularization compared with the dual blood supply that delivers to the anterolateral papillary muscle. However, given the multiple sources of blood supply of the papillary muscles, PMR of ischemic origin is usually seen in multivessel coronary disease with poor collaterals.(3) Approximately 50% of reported PMR cases exhibit a small-sized infarction and preserved ejection fraction, resulting in heightened shearing stress at the rupture site. Rupture of the papillary muscle can be both partial and complete. Complete rupture usually leads to rapid clinical deterioration and eventually cardiac arrest. TTE is typically the initial diagnosis method used considering the hemodynamic instability. It may reveal a flail mitral valve leaflet with prolapse during systole into the atrium, visualization of a ruptured papillary muscle head with erratic movements in the ventricle, a mobile mass attached to the chordae tendineae, with a regurgitant jet across the valve and an hyperdynamic left ventricular function (4). Transesophageal echocardiography is reserved for those with equivocal TTE studies. The cornerstone of treatment for PMR includes emergency surgical treatment. Since the heart adapts poorly to the hemodynamic changes resulting from acute regurgitation, there is high mortality without surgical intervention. The poor results of such management make timely surgical intervention, though often challenging, mandatory (5). Concomitant CABG has been shown to improve outcomes (6). Temporary percutaneous circulatory assist devices may be needed for hemodynamic stabilization. In general, surgery consist in a mitral valve replacement, most likely by mechanical prothesis. Other techniques such as mitral valve repair or transcatheter edge to edge mitral valve repair have been described for selected patients (7,8).

FOLLOW UP

During the early postoperative period, the patient experienced tamponade, requiring surgical drainage. Six weeks later, the patient was readmitted due to dyspnea caused by thrombosis of the mitral prosthesis. The patient underwent a second mechanical valve replacement. Following the procedure, the patient was discharged in stable condition and transferred to cardiac rehabilitation.

In the patient's latest TTE, the prosthesis showed a favorable hemodynamic profile, a preserved LVEF with inferior and inferolateral akinesis.

CONCLUSION

In the modern era of coronary revascularization, PMR is more likely to occur in the context of NSTEMI. Clinical presentation can be protracted, delaying diagnosis. A high index of suspicion is warranted for early recognition of this serious condition. Mortality can be substantially reduced with rapid identification and referral for mitral valve surgery and revascularization.

LEARNING OBJECTIVES

This report contributes to the growing understanding of the clinical presentation, diagnosis, and management of PMR in the context of NSTEMI, emphasizing the need for vigilance and timely intervention in similar cases.

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