



Anterolateral Papillary Muscle Rupture in a Patient with Infectious Endocarditis and Rheumatic Mitral Disease: Case Report

Ruptura del Músculo Papilar Anterolateral en Paciente con Endocarditis Infecciosa y Enfermedad Valvular Mitral Reumática: Relato de Caso

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SUMMARY

Although its low frequency, the papillary muscle rupture is a condition associated with severe mitral regurgitation and cause of acute heart failure and need for urgent surgical intervention.

We present a case of severe mitral regurgitation due to the anterolateral papillary muscle rupture secondary to rheumatic mitral valve disease and infectious endocarditis.

Descriptors: Papillary Muscles / pathology, Rheumatic Fever, Mitral Valve Insufficiency; Endocarditis

RESUMEN

A pesar de poco frecuente, la ruptura de músculo papilar es una condición asociada a la regurgitación mitral importante, siendo causa grave de insuficiencia cardíaca aguda, necesitando de diagnóstico e intervención quirúrgica precoz.

En este relato, presentamos un caso de paciente portador de fiebre reumática asociado a endocarditis infecciosa, que evolucionó con insuficiencia mitral importante, secundaria a la ruptura del músculo papilar anterolateral.

Descriptor: Músculos Papilares/patología, Fiebre Reumática, Insuficiencia de la Válvula Mitral, Endocarditis

INTRODUCTION

Posteromedial or anterolateral papillary muscle rupture is mainly caused by ischemia related to coronary lesion corresponding to its irrigation. Its incidence varies between 10-50% in the literature, being more frequent in inferior infarction, as a consequence of irrigation of the posteromedial papillary muscle that takes place only by means of the posterior descending artery (branch of the right coronary artery). In contrast, the anterolateral papillary muscle is irrigated by the

anterior descending and circumflex arteries. The resulting mitral failure, in most cases, is of important degree, triggering an acute severe heart failure with sudden increase in pulmonary capillary pressure. The patient usually evolves rapidly to pulmonary congestion associated with mortality in almost all cases not surgically treated (emergency).

In the literature, we can observe other less frequent causes of papillary muscle rupture, such as endocarditis, rheumatic fever, trauma, myxomatous degeneration, tumors,

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collagenosis, Takotsubo syndrome, Ehlers-Danlos disease, myocarditis, steroidal therapy, and dobutamine stress echocardiography.

CASE REPORT

MSS, brown, woman, 23 years, student, diagnosed with rheumatic fever at 15 years old, under secondary prophylaxis since then, treated with Benzathine Penicillin. She had been admitted to another hospital three months ago, with a picture of infectious endocarditis in the mitral valve, being treated with antibiotics according to updated guidelines for infectious endocarditis. Since then, she presents with dyspnea on moderate stress, paroxysmal nocturnal dyspnea, and lower limbs edema; under regular use of furosemide, propranolol, spironolactone and digoxin.

At physical examination, she showed a systolic murmur in mitral focus (5+ / 6+), pulmonary auscultation presenting vesicular murmur, no adventitious noise. Heart rate of 87 bpm, blood pressure = 117 x 75 mmHg, without other worth noting changes. Electrocardiogram showed sinus rhythm with SÂQRS deviated to the left, without signs of left ventricular overload. Echocardiogram (09/05/2012): LA = 52 mm, Ao: 30 mm, LVDD = 69 mm, LVSD = 42 mm, EF = 68% (Teichholz).

The mitral valve presented with thickened leaflets and partial rupture of the anterolateral papillary muscle, leading to flail of anterior leaflet and coaptation failure. Doppler revealed mitral regurgitation of relevant degree.

DISCUSSION

The mitral valve failure can be classified as organic (primary) or functional (secondary). Organic mitral failure occurs due to intrinsic disease of the valve apparatus (leaflets, chordae), while functional failure is caused by regional or global remodeling of the left ventricle without structural abnormalities of the mitral valve. Primary causes include rheumatic disease, degenerative diseases and endocarditis, encompassing also papillary muscle rupture. Secondary causes include ischemic heart disease and cardiomyopathies.¹⁻¹²

The most common cause of papillary muscle rupture is the ischemic heart disease. By anatomical arrangement, we have as the most common presentation the posteromedial papillary muscle rupture, because it is irrigated only by the posterior descending artery (6-10 times more common than anterolateral papillary muscle rupture).

Several publications on papillary muscles rupture are found in the literature, emphasizing the importance of the

echocardiogram as fast, secure, and essential test for diagnosis, exact location of the rupture, and subsequent hemodynamic commitment, facilitating early surgical approach.¹³⁻¹⁵ Rarely, we are able to find rupture of both papillary muscles, being severe cases of restricted prognosis and usually evolve with multivessel coronary disease. Because of its high mortality, the diagnosis is often made *postmortem*.¹⁶

The mitral valve involvement in rheumatic disease is characterized by thickening of leaflets, especially their free edges. Chordae fibrosis is quite frequently, especially those inserted in the posterior leaflet, then justifying its stiffness and reduced mobility in diastole. It is also observed a dome-like opening of the anterior leaflet, thickening, and commissural fusion. Papillary muscle rupture in rheumatic valve disease is rare and usually associated with infectious endocarditis.³⁻⁵

In valve diseases caused by endocarditis, the lesion usually consists of ulceration, mitral abscesses, perforation, and rupture of the chordae tendineae. This rupture often is multiple, involving both leaflets.^{11,13} Mohammad et al.¹² described a case of septic emboli causing occlusion of the circumflex coronary artery, originated from the aortic valve, with consequent rupture of the anterolateral papillary muscle.¹² The most common mechanism of mitral regurgitation is the failure of coaptation of the leaflets, the images being better visualized by transesophageal echocardiography.^{6,7}

Among the rare causes of papillary muscle rupture, we can mention the use of corticosteroids for prolonged periods, having already been linked to spontaneous rupture of the left ventricle and now also to the papillary muscle rupture¹⁰. Another report in the literature is the partial rupture of the posteromedial papillary muscle during dobutamine echocardiography, evolving with cardiogenic shock and need for surgery for mitral valve replacement.¹¹

Myocarditis is another entity causing papillary muscle rupture less commonly, but there are few case reports with histopathological evidence being catastrophic if not treated urgently.⁹

CONCLUSION

We present a case of anterolateral papillary muscle rupture in a patient with history of rheumatic valve disease and endocarditis treated 3 months before. Although rare, papillary muscle rupture is a complication that can occur in rheumatic patients, particularly associated with infectious endocarditis -¹⁶

Due to severity and restricted prognosis, the echocardiography is an important diagnostic tool in the identification and definition of the hemodynamic impacts resulting from mitral regurgitation of relevant degree.

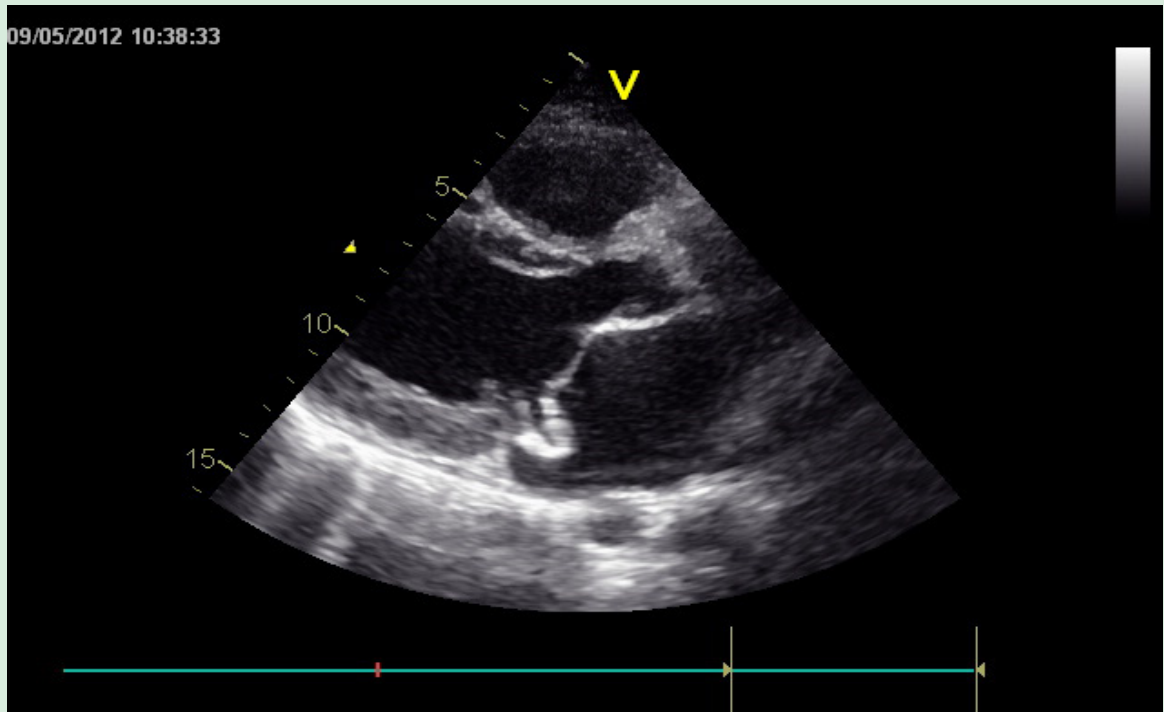


Figure 1: Paraesternal longitudinal view revealing echogenic image inside the left atrium, which is compatible with partial rupture of the anterolateral papillary muscle and flail of anterior leaflet.

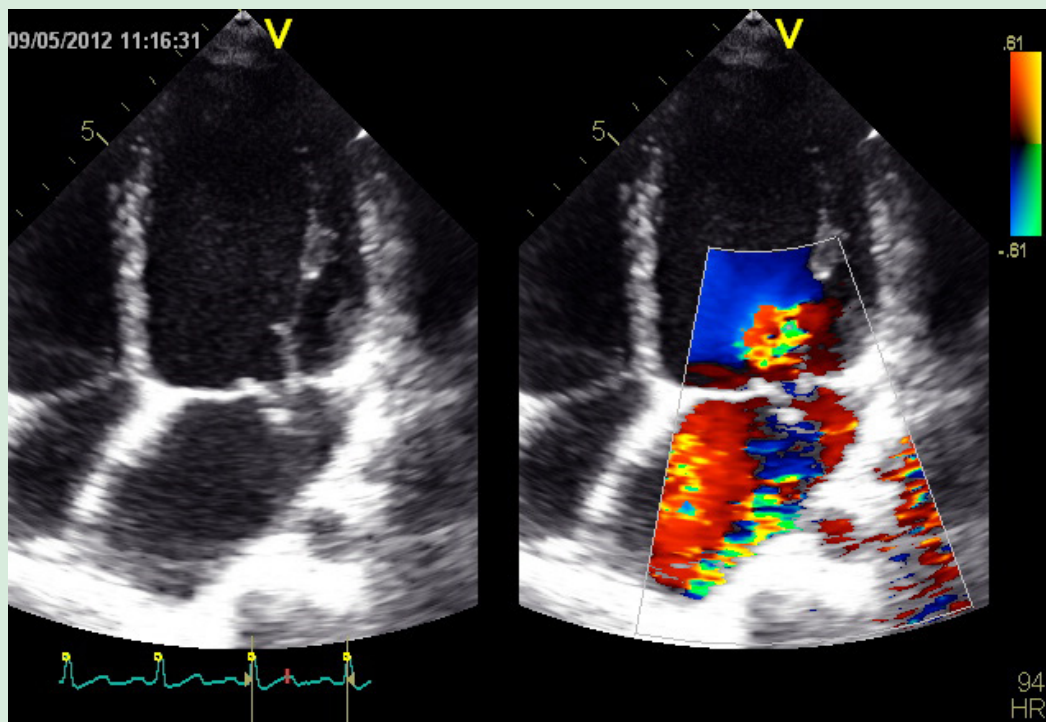


Figure 2: Apical four-chamber view with color flow mapping, revealing significant mitral regurgitation secondary to partial rupture of the anterolateral papillary muscle and flail of anterior leaflet.

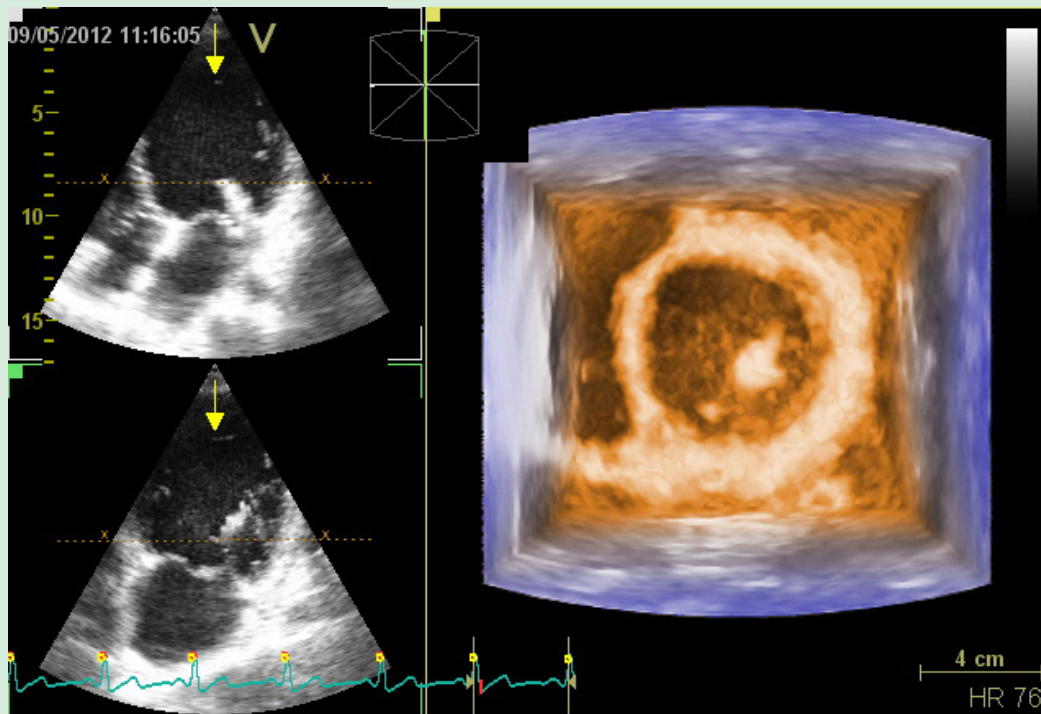


Figure 3: Three-dimensional transthoracic echocardiography - View from the left ventricle to left atrium demonstrating echogenic image compatible with fragment of anterolateral papillary muscle ruptured and still.

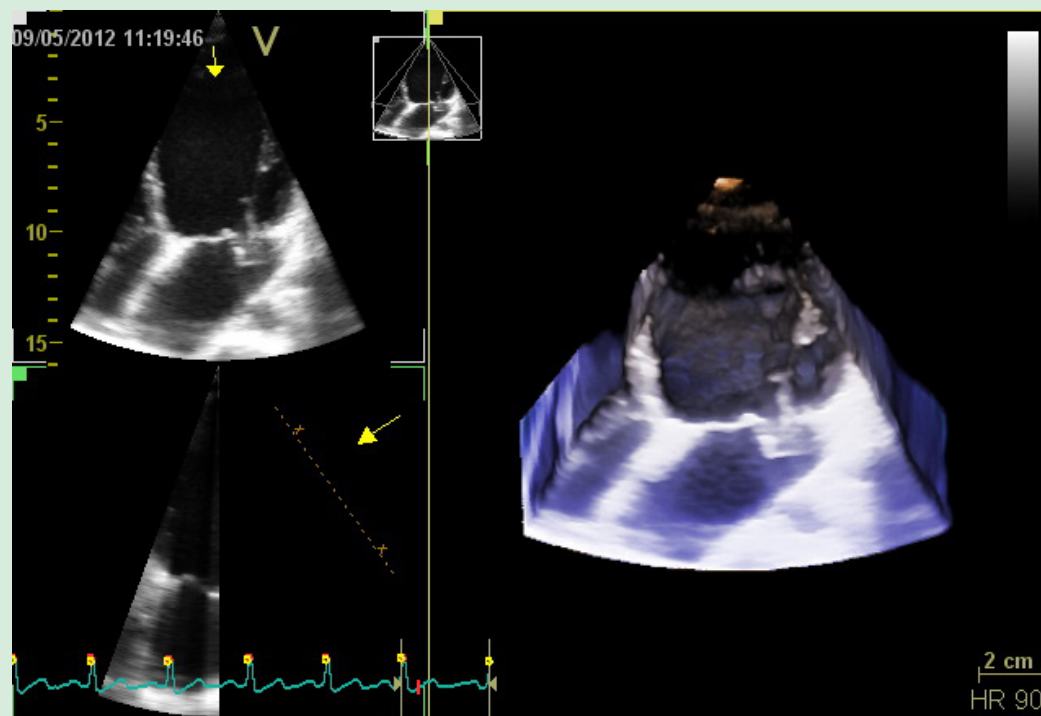


Figure 4: Three-dimensional transthoracic echocardiography. Echogenic image inside the left atrium, which is compatible with flail of anterior leaflet, arising from partial rupture of the anterolateral papillary muscle.

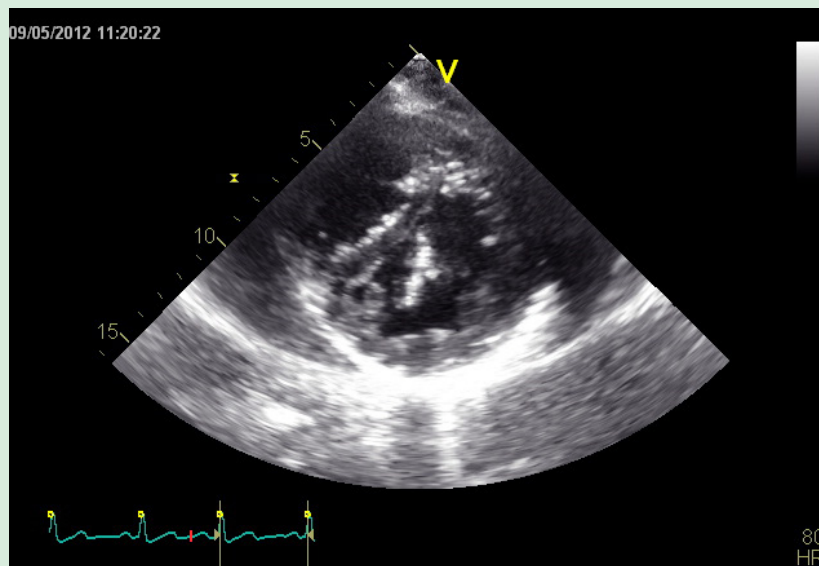


Figure 5: Paraesternal view of the left ventricular in transverse axis, revealing a partial rupture of the anterolateral papillary muscle and interventricular septum deviation to the left arising from pulmonary hypertension.

Referências

1. Luxereau P, Dorent R, De Gevigney E, Bruneval P, Chomette G, Delahaye C.. A etiology of surgical treated mitral regurgitation. *Eur Heart J*. 1991; 12(Suppl B):2-4.
2. Olson L, Subramanian R, Ackerman D, Orszulak TA, Edwards WD.. Surgical pathology of the mitral valve: a study of 712 cases spanning 21 years. *Mayo Clinic Proc*. 1987; 62(1): 22-34.
3. Connolly H, Cray J, MacGoon M, Hensrud DD, Edwards BS, Edwards WD, et al. Valvular heart disease associated with fenfluramine-phentermine. *N Eng J Med*. 1997; 337(9): 581 -8.
4. Redfield M, Nicholson W, Edwards W, Tajik AJ. Valve disease associated with ergot alkaloid use: echocardiography and pathology correlations. *Ann Intern Med*. 1992;117(1): 50-2.
5. Metz D, Jolly D, Graciet-Richard, Nazeyrollas P, Chabert JP, Mailler B, et al.. Prevalence of valvular involvement in systemic lupus erythematosus and association with antiphospholipid syndrome: a match echocardiography study. *Cardiology*. 1994; 85(2): 129 -36.
6. Terai H, Okada Y, Hamaya H, Sugiki K, Ohran T.: Successful surgical treatment in a case of complete rupture of the posterior papillary muscle of the mitral valve caused by infective endocarditis. *Nippon Kyobu Geka Gakkai Zasshi* 1994;42(7):1101-4.
7. Sugimoto T, Shimanuki T, Minowa T, Minowa T, Uchino H.: Nakamura C. A case report of infective endocarditis with total rupture of the posterior papillary muscle after aortic valve replacement. *Kyobu Geka* . 1998;51(13):1120-2.
8. Nurkalem, Z, Gorgulu S, Orhan AL, Demirci DE, Sargin M Papillary muscle rupture secondary to infective endocarditis. *Echocardiography*.2008;25(8):901-3.
9. Voros G.; Ishad M, Dens J. Spontaneous rupture of papillary muscle in acute myocarditis. *Acta Cardiol*. 2011;66(3): 405-6.
10. Schiano P, Revel F, Bergez C, Hemery Y, Barbou F, Broustet J. e A myocardial infarction complicated with mitral anterior papillary muscle rupture during long-term corticotherapy. *Ann Cardiol Angéi*.2009; 58(4)244-7.
11. Kemdem A, Briki R, Lemaitre F, Jahjah L., Guimfacq V, Sakabenis D, et al. Rupture of papillary muscle during dobutamine stress echocardiography. *Ann Cardiol Angéi*.2010; 59(2):100-2.
12. Q. Najib MQ, Lee HR, DeValeria PA, Vinales KL., Surapaneni P, Chalik HP. Anterolateral papillary muscle rupture: an unusual complication of septic coronary embolism. *Eur J Echocardiography*.2011;12(2):E10
13. Lungheci S, D'Asaro MG, Guerrieri, G Zacà V, Carrera A, Fusi S, et al. Massive mitral regurgitation secondary to acute ischemic papillary muscle rupture: the role of echocardiography. *Cardiol J*.2010;17(4):397-400.
14. McQuillan BM, Weyman AE. Severe mitral regurgitation secondary to partial papillary muscle rupture following myocardial infarction. *Rev. Cardiovasc Med*. 2000;1(1): 57-60.
15. Chen Q, Darlymple-Hay MJ, Alexiou C, Ohri SK, Haw MP, Livesey SA, et al.. Mitral valve surgery for acute papillary muscle rupture following myocardial infarction. *J Heart Valve Dis*. 2002;11(1):27-31.
16. Patel AD, Abo-Auda W, Chowdhury, N, Lan Z, Kanti R, McGriffin D, et al. Rupture of both papillary muscles after acute myocardial infarction: a case report. *Heart* 2002;4(5):285-7.