ISSN: 2640-9615

Journal of Clinical and Medical Images

Case Report

The Role of Echocardiography in the Diagnosis and Management of Prosthetic Mitral Valve Endocarditis in Myocardial Infarction with Secondary Mitral Regurgitation: A Case Report

Rodrigo Escalante-Armenta[1,2], Eulo Lupi-Herrera[3], Miguel Tapia-Sansores[1,2], Joaquin Berarducci[2], Carlo Angello Sanchez-Montaño[1], Eduardo Chuquiure-Valenzuela[4] and Nilda Espinola-Zavaleta[1,5*]

[1]Department of Nuclear Cardiology, National Institute of Cardiology Ignacio Chavez, Mexico City, Mexico

[2]Mexican Faculty of Medicine, La Salle University, Mexico City, Mexico

[3]Department of Clinical Cardiology, ABC Medical Center, Mexico City, Mexico

[4]Department of Clinical Cardiology, National Institute of Cardiology Ignacio Chavez, Mexico City, Mexico

[5]Department of Echocardiography, ABC Medical Center, Mexico City, Mexico

Volume 4 Issue 1- 2020

Received Date: 02 Apr 2020

Accepted Date: 18 Apr 2020

Published Date: 24 Apr 2020

2. Key words

Infective endocarditis; Echocardiography; Mitral regurgitation; Myocardial infarction

1. Abstract

1.1. Background: Mitral regurgitation is a frequent complication of ischemic heart disease. In the literature, there are only 4 cases of late prosthetic endocarditis in patients with mitral regurgitation due to myocardial infarction.

We present a case of 68-year-old male with myocardial infarction that evolved with mitral regurgitation and underwent valvular mechanical prosthesis developing mitral valve endocarditis.

This is a case of late prosthetic mitral valve endocarditis, that was successfully diagnosed by transthoracic (TTE) and corroborated by transesophageal echocardiography (TEE). The patient underwent surgical replacement of mitral prosthetic valve due to severe mitral regurgitation after myocardial infarction, with good results and in seven -years follow-up he is in NYHA functional class I.

3. Learning Points

- Infective endocarditis is an uncommon complication of myocardial infarction with secondary mitral regurgitation.
- Echocardiography, especially transesophageal is the technique of choice in the diagnosis of prosthetic valveendocarditis.

4. Introduction

In the literature there are only 4 cases of late mitral prosthetic valve endocarditis after myocardial infarction. The diagnosis of infective endocarditis depends on a combination of clinical factors, laboratory, and imaging studies, described in the modified Duke criteria, including the use of echocardiography[1].

Ischemic mitral regurgitation is a subtype of secondary mitral regurgitation and it is a frequent complication of structural and functional changes, global or regional remodelling of the left ventricle due to chronic coronary artery disease. Seventeen to 40% of patients who suffer an acute myocardial infarction present mitral regurgitation. It is more frequent after an inferior (38%) than an anterior myocardial infarction (10%) [2].

The prognosis varies according to the degree of mitral regurgitation, presenting a relative risk between 1.48-7.5, with a first-year mortality of 22% in patients with grade 1-2 and 52% in patients with grades 3-4. [3,4].

Medical treatment is based on the reduction of afterload, using nitrates, sodium nitroprusside, diuretics and intra-aortic balloon counterpulsation. The surgical procedure of choice is coronaryartery bypass grafting, with or without repair of the mitral valve. A study conducted by Michler et al, reported that there is no significant difference between performing or not mitral valve repair in these patients [5]. In the case of complete rupture of the papillary muscles, immediate surgical management is necessary, with valve repair or replacement, depending on the extent of the injury and the experience of the surgeon, since the survival in these patients with medical management is very low. Before a partial rupture of the papillary muscles, it's possible to stabilize with medical treat-

***Corresponding Author (s):** Nilda Espinola-Zavaleta, National Institute of Cardiology Ignacio Chavez, Juan Badiano Nº 1, Colonia Sección XVI, Tlalpan, P.C 14800, Mexico City, Mexico, E-mail: niesza2001@hotmail.com*

Citation: Escalante-Armenta R, et al., The Role of Echocardiography in the Diagnosis and Management of Prosthetic Mitral Valve Endocarditis in Myocardial Infarction with Secondary Mitral Regurgitation: A Case Report. J Clin Med Images. 2020; V4(1): 1-5.

ment and postpone surgery 6-8 weeks, in order to avoid operating on necrotic tissue [6].

The use of transesophageal echocardiography (TEE) is the method of choose in the suspicion of prosthetic valve dysfunction. TEE has several advantages over transthoracic echocardiography (TTE), offering a better image quality and greater sensitivity to find vegetations and perivalvular conditions [6-8]. The overall sensitivity of each technique for the diagnosis of endocarditis is slightly variable, however a sensitivity of approximately 40-63% for TTE and 90-100% for TEE is reported[4].

The main aim of this study is to present a case with prosthetic mitral valve endocarditis in 68-year-old patient, who developed myocardial infarction complicated with severe mitral regurgitation.

5. Patient Information

Male-68-year-old with history of dyslipidemia, systemic hypertension, sedentarism and acute myocardial infarction (Inferior and lateral) 24 years ago, treated by percutaneous transluminal coronary intervention with 3 stents. After myocardial infarction the patient developed severe mitral regurgitation that required mechanical prosthetic valve St Jude # 29 implantation in December 2010. The cardiac catheterization demonstrated an independent origin of left anterior descending artery (LAD) and circumflex artery (Cx), ectasia of LAD and Cx with aneurysmal dilatation in its proximal and middle segments; ectasia of the right coronary artery and slow flow throughout the coronary territory. He was hospitalized with symptoms of pneumonia and discharged in good condition receiving treatment with moxifloxacin 400 mg/24 hours x 5 days. Seven days after discharge he came again to the emergency department with progressive dyspnea of sudden onset, orthopnea and paroxysmal nocturnal dyspnea, accompanied by hemoptysis and palpitations, without chest pain. He received treatment with diuretic with relative clinical improvement.

On examination, heart rate of 95 bpm, blood pressure of 110/60 mmHg, temperature of 96.8°F, respiratory rate of 14 rpm and oxygen saturation of 94% on room air. On precordial auscultation, a holosystolic murmur was heard in the mitral area 4/6 without radiation, S3, S4 nor pericardial rub was detected. Pulmonary bilateral hypoventilation, without rattles or wheezing, no pleuropulmonary syndrome. No jugular venous distention or peripheral edema.

The laboratory showed leukocytosis with left deviation (white cell counts of 17.3 x 10 6/L, segmented 83%), hemoglobin of 15.4 g/dl, platelets 228 x 10 3/uL, TP 31.6 and INR 2.8. The blood culture was positive for Staphylococcus epidermidis. ECG showed sinus rhythm with Q waves in leads DII, DIII, AVF, V4-V6, incomplete right bundle branch block and left atrial dilation. Chest X-ray demonstrated cardiomegaly grade III and venocapillary pulmonary hypertension, (Figure 1). The TTE showed mitral prosthetic valve stenosis with valvular area of 0.75 cm2 and mean diastolic gradient of 15 mmHg, aortic sclerosis with mild aortic regurgitation and mild to moderate tricuspid regurgitation, pulmonary hypertension with systolic pulmonary artery pressure of 60 mmHg and left ventricular ejection fraction of 38%. The 2D-transesophageal echocardiogram reported partial obstruction of the prosthetic mitral valve due to intraprosthetic vegetations and on the atrial side and in the 3D echo, dehiscence of the mitral annulus of approximately 50% and severe paravalvular leakage with color flow were observed.

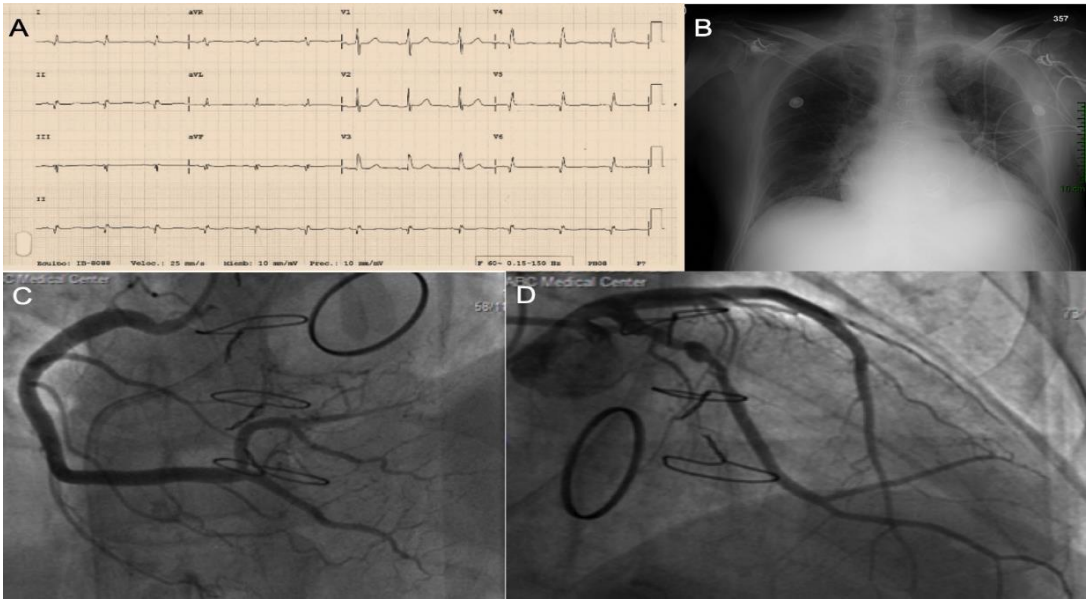

Figure 1: A-ECG in sinus rhythm, Q waves in leads DII, DIII, AVF, V4-V6, incomplete right bundle branch block and left atrial dilation. B- Chest x-ray with cardiomegaly grade III and venocapillary pulmonary hypertension. Coronary angiography with an independent origin of left anterior descending artery (LAD) and circumflex artery (Cx). C- ectasia of LAD and Cx with aneurysm dilation in its proximal and middle segments. D- ectasia of right coronary artery.

The patient underwent for a second mitral valve replacement (St. Jude #22 bivalve mechanical prosthesis), with good evolution, (Figure 2) and antibiotics (Vancomycin andGentamicin).

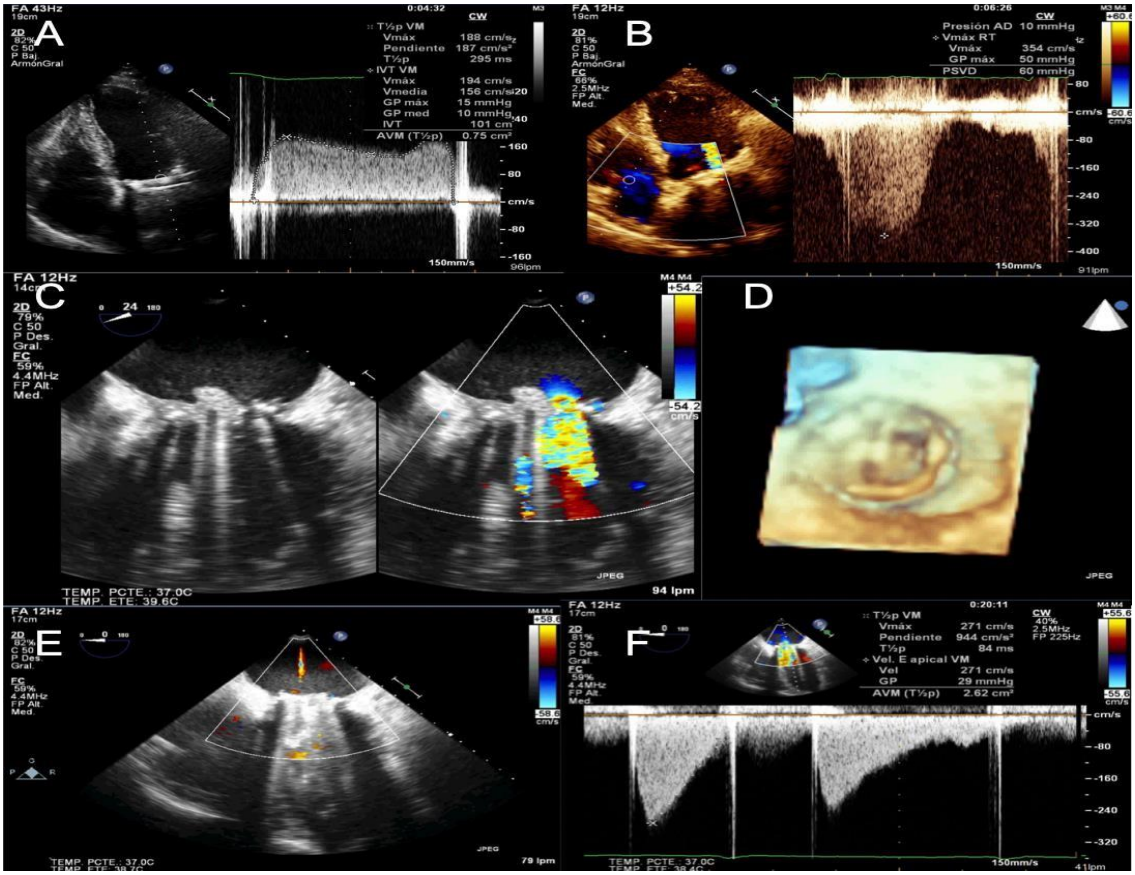

Figure 2: Bidimensional, color and continuous Doppler. A-Apical four chamber view showing prosthetic mitral stenosis with valvular area of 0.75 cm^2 and mean diastolic gradient of 15 mmHg. B- Moderate pulmonary hypertension with systolic pulmonary artery pressure of 60 mmHg.
Bidimensional with color flow and three-dimensional transesophageal echocardiography showing: C- intraprosthetic vegetations and on the auricular side of the mitral prosthesis with dehiscence of mitral annulus of approximately 50%(D).
E- Four chamber view bidimensional and color flow without evidence of mitral prosthetic valve vegetations. F- with continuous Doppler the mitral prosthetic valvular area was of 2.62 cm^2

The histopathological report of the mitral prosthetic valve showed a partially encapsulated fibrin accumulation with ancient hemorrhage and inflammatory cells.

6. Follow-up and Outcomes

The patient was discharged home because he had a good response to treatment, and in his 7-year follow-up he continues in NYHA functional class I.

7. Discussion

Our patient had an inferior and lateral myocardial infarction 24 years ago, which was resolved by percutaneous transluminal coronary angioplasty with placement of 3 stents. In the follow-up he developed severe mitral regurgitation and a mechanical prosthesis was placed in mitral valve position in 2010 and two years later he presented with prosthetic mitral valve endocarditis. The blood culture was positive to Staphylococcus epidermidis, so the patient underwent to a second mitral valve replacement and antibiotic therapy according to the recommendations of the European Society of Cardiology.

The incidence of infective endocarditis (IE) after surgical valve replacement occurs in 1-6% of patients and it increases the morbidity and mortality. The risk is considered higher during the first three months after surgery, after six months it begins to gradually decrease with an annual rate of almost 0.4% from 12 months onwards. The proportion of patients developing prosthetic valve endocarditis during the first year after replacement goes from 1-3% and then by five years the cumulative percentage goes from 3-6% [2].

The number of patients requiring prophylaxis for IE according to the 2007 guidelines has been greatly reduced. There are only 4 groups now recognized that require prophylaxis: a) patients with prosthetic valves, b) patients with prior IE, c) cardiac transplant patients with valve disease, and d) patients with certain congenital heart disease [9].

Regarding detections of vegetations in prosthetic valves or pacemakers, Lyons and Biswas and Yassin demonstrated greater sensitivity using TEE (93.3% sensitivity), compared to the resultsobtained by TTE (65.7% sensitivity) as it was described in (Table 1) [5,6].

Timeline

1986	Acute myocardial infarction (inferior and lateral).
1986	Percutaneous transluminal coronary intervention with implantation of 3 stents.
Dec/2010	Severe mitral regurgitation that required mechanical prosthetic valve St Jude #29 replacement.
Dec/2010	Cardiac catheterization: Left anterior descending-Circumflex artery independent origin, ectasia of the LAD and Cx with aneurysmal dilatation; ectasia of the right coronary artery and slow flow in the coronary tree.
Dec/2010	Discharge home.
2011	Cardiac arrest and cardiopulmonary resuscitation.
June/2012	Hospitalization due to pneumonia.
July/2012	Progressive dyspnea of sudden onset, orthopnea and paroxysmal nocturnal dyspnea, accompanied by hemoptysis and palpitations, without chest pain.
05/07/12	Laboratory data: Leukocytosis with left deviation.
05/07/12	Chest X-ray: Cardiomegaly grade III. ECG: Sinus rhythm with Q waves in leads DII, DII, aVF, V4-V6, incomplete right bundle branch block and left atrial dilation.
05/07/12	Transthoracic echocardiography: Ischemic heart disease, postero-inferior and lateral LV akinesia, mechanical prosthesis in mitral position with partial obstruction due to thrombosis, aortic sclerosis with mild aortic regurgitation and mild to moderate tricuspid regurgitation, moderate pulmonary hypertension with pulmonary arterial systolic pressure of 60 mmHg and left ventricular ejection fraction of 38%. TEE: Prosthetic mitral thrombosis with significant paravalvular prosthetic leak.
08/07/12	Cardiac catheterization: Aneurysmal dilation of the middle third of the coronary tree.
09/07/12	Blood cultures: *Staphylococcus epidermidis.*
	Mitral valve replacement with a St. Jude #22 bivalve mechanical prosthesis.
23/07/12	Discharge home.
Dec/2019	Normal prosthetic mitral valve. Stable at NYHA functional class I.

Table 1: Sensitivity and specificity of TEE and TTE in patients with infective endocarditis

Findings	TTE (Sensitivity)	TEE (Specificity)
Infective endocarditis	69.40%	94.70%
Prosthetic valve or pacemaker	56.50%	90%
Aortic root abscesses	33%	90%
Global sensitivity	65.70%	93.30%

Source: Lyons K, Bhamidipati K. Comparison of transthoracic and transoesophageal echocardiography in the diagnosis of infective endocarditis – a tertiary centre experience. Heart. 2018.

Empirical treatment is the first step in the management of IE. In this patient, with a prosthetic valve implanted more than 12 months, the proposed treatment by the European Society of Cardiology (ESC), consists on Ampicillin, with Cloxacillin or Oxacillin and Gentamicin. A blood culture is considered negative if nothing growths during the first 5 days of incubation and should be

treated using Vancomycin and Ceftriaxone or Ampicillin. When on day 16th the blood culture was reported positive for Staphylococcus epidermidis, a coagulase- negative staphylococci, methicillin- resistant, the ESC guidelines suggest giving Vancomycin with Rifampin and Gentamicin, but if it is resistant to Gentamicin, it is recommended to change it for an alternative aminoglycoside or fluoroquinolone that shows susceptibility, such as levofloxacin or moxifloxacin [2].

In the literature, there are only four reported cases with MI and late onset prosthetic valve infective endocarditis. Calero-Nuñez S, et al published a 3-cases series where the first patient presented a non-ST-elevation with infero-posterior and lateral hypokinesia and severe mitral regurgitation due to a large mitral valve vegetation that was treated with a stent replacement. The second patient had an infero-lateral ST-elevation and severe mitral regurgitation due to small mitral valve vegetation and periaortic abscess, who was managed with a conventional balloon angioplasty and successful double replacement and the third patient with ST segment elevation in leads II, III, aVF, and V5 and vegetation on the auricular side of the anterior mitral leaflet and on the ventricular side of the aortic right coronary cusp causing severe aortic regurgitation and moderate mitral regurgitation. This patient received antibiotic therapy and mitral and aortic mechanical prostheses. These patients had a follow-up for six months and were stable with NYHA functional class I-II and LVEF from 30% to 55%. In 1996, Takimoto E, et al reported a 65-years old man diagnosed with infective endocarditis with blood cultures that demonstrated beta streptococcus. On the 20th day of hospitalization he developed chest pain consistent with acute extensive anterior myocardial infarction. This patient underwent to a successful percutaneous transluminal coronary angioplasty [10, 11].

Fortunately, our patient had an accurate diagnosis, which allowed timely management. Currently, he is in NYHA functional class I and the 2019 control echocardiogram showed no prosthetic mitral valve dysfunction.

8. Conclusion

In the literature there are few cases of myocardial infarction with secondary mitral regurgitation treated with prostheses that developed delayed onset prosthetic endocarditis, this is the reason we decided to present this case where the timely diagnosis had a great impact on its treatment and survival.

The echocardiogram, especially the transesophageal technique is of great value in the diagnosis of prosthetic valvular endocarditis.

References

1. Schiller N, Ristow B, Ren X. UpToDate [Internet]. Uptodate.com. 2019. Available from: https://www.uptodate.com/contents/role-of-echocardiography-in-infective-endocarditis
2. Habib G, Badano L, Tribouilloy C, Vilacosta I, Zamorano J, Galderisi M et al. Recommendations for the practice of echocardiography in infective endocarditis. Eur J Echocardiogr. 2010; 11(2): 202-219.
3. Baumgartner H, Falk V, Bax J, De Bonis M, Hamm C, Holm P et al. 2017 ESC/EACTS Guidelines for themanagement of valvular heart disease. Eur Heart J. 2017; 38(36):2739-2791.
4. Evangelista A. Echocardiography in infective endocarditis. Heart. 2004; 90(6): 614-617.
5. Lyons K, Bhamidipati K. 4 Comparison of transthoracic and transoesophageal echocardiography in the diagnosis of infective endocarditis – a tertiary centre experience. Oral abstract presentations 1. 2017.
6. Biswas A, Yassin M. Comparison between transthoracic and transesophageal echocardiogram in the diagnosis of endocarditis: Aretrospective analysis. Int J Crit Illn Inj Sci. 2015; 5(2): 130.
7. López-Pardo F, González-Calle A, López-Haldón J, Acos- ta-Martínez J, Rangel-Sousa D, Rodríguez-Puras M. Ecocardiografía transesofágica tridimensional en tiempo real en la valoración anatómica de la regurgitación mitral compleja secundaria a endocarditis. Rev Esp Cardiol. 2012; 65(2): 188-190.
8. García-Fernández M, Cortés M, García-Robles J, Gomez de Diego J, Perez-David E, García E. Utility of Real-Time Three-Dimensional Transesophageal Echocardiography in Evaluating the Success of Percutaneous Transcatheter Closure of Mitral Paravalvular Leaks. J Am Soc Echocardiogr. 2010; 23(1): 26-32.
9. Thanavaro K L, Nixon JV. Endocarditis 2014: An update. Heart & Lung. 2014; 43(4): 334-337. doi:10.1016/j.hrtlng.2014.03.009
10. Calero-Núñez S, Ferrer Bleda V, Corbí-Pascual M, Córdoba-Soriano J, Fuentes-Manso R, Tercero-Martínez A et al. Myocardial infarction associated with infective endocarditis: a case series. Eur Heart J - Case Reports. 2018; 2(1). doi: 10.1093/ehjcr/yty032
11. Takimoto E1, Iwase T, Yanagishita Y, Nishiyama S, Nakanishi S, Seki A. Successful coronary angioplasty in a patient with acute myocardial infarction caused by prosthetic valve endocarditis. J Cardiol. 1996; 27 Suppl 2: 103-8; discussion 109-10.