CASE PRESENTATION

Löeffler endocarditis due to idiopathic hypereosinophilic syndrome
Laura Benchea¹,², Alexandra Clement¹,², Alina-Elena Nedelcu¹,², Cristian Statescu¹,²

Abstract: Hypereosinophilic syndrome encompasses a heterogenous group of non-hematologic and hematologic disorders defined as peripheral blood eosinophilia >1500/mm³ persisting more than 6 months and eosinophilic end organ complications¹ ². Löeffler endocarditis (LE) is the most common cardiac manifestation of the hypereosinophilic syndrome (HES) and represents an acute form of primary restrictive cardiomyopathy³. We report the case of a 74 years-old woman with symptoms related to congestive heart failure and weight loss. At admission the patient had tachycardia and a grade (HES) and represents an acute form of primary restrictive cardiomyopathy³. We report the case of a 74 years-old woman with symptoms related to congestive heart failure and weight loss. At admission the patient had tachycardia and a grade 2/6 systolic mitral murmur. Laboratory findings revealed eosinophilia, hepatocytolysis syndrome and dyslipidemia. The electrocardiogram (ECG) showed non-specific ST-segment and T wave abnormalities. The echocardiography revealed left ventricular apical thrombus and entrapment of chordae tendineae with restricted motion of mitral leaflets leading to mitral regurgitation. The diagnosis of myocarditis was confirmed by the cardiac magnetic resonance imaging which showed the presence of a left ventricular mass with low signal on steady-state free precession imaging and diffuse circumferential sub-endocardial late gadolinium enhancement (LGE). When discussing the etiology of the HES the following were taken into consideration: hematologic, reactive or secondary disorders. This case is distinguished by diagnosis in an elderly woman and good response to corticosteroid therapy.

Keywords: Löeffler endocarditis, hypereosinophilic syndrome, cardiac involvement, multimodality imaging.

INTRODUCTION
Löeffler endocarditis is a restrictive cardiomyopathy caused by eosinophilic infiltration of the heart. It represents the cardiac manifestation of HES and is associated with high mortality and morbidity rates⁴. LE progresses through three stages: acute necrotic stage, thrombotic stage, and fibrotic stage. It is still unclear which is the best imaging method, but both non-invasive and invasive imaging modalities may be useful⁵.

CASE REPORT
We report the case of a 74-year-old patient, without family medical history, who addressed to emergency care unit for resting dyspnea, orthopnea, paroxysmal nocturnal dyspnea, atypical chest pain, weight loss, and skin lesion, since two weeks. Her past medical history was remarkable for autoimmune thyroiditis and dyslipidemia. Home medication included Levothyroxine 25 mcg per day.

Contact address:
Cristian Statescu, MD, PhD, „Prof. George I.M. Georgescu” Institute of Cardiovascular Diseases, „Grigore T. Popa” University of Medicine and Pharmacy, Iasi, Romania. 
E-mail: cstatescu@gmail.com

¹ „Prof. George I.M. GEORGESCU” Institute of Cardiovascular Diseases, Iasi, Romania
² „Grigore T. Popa” University of Medicine and Pharmacy, Iasi, Romania
On presentation, the patient was afebrile, with a blood pressure of 170/100 mmHg, pulse rate of 100 beats/min, with a grade 2/6 systolic mitral murmur, absent breath sounds on right hemithorax, and peripheral oxygen saturation of 97%. Her physical examination was also notable for palmar and plantar rash (Figure 1 A, B) and lower lip and right lateral tongue ulcerations (Figure 1 C, D).

The biological work up revealed leukocytosis (WBC=18140/mm³), an eosinophil (Eo) count of 2080/mm³, representing 11.5% (normal range, 0%-4%), hepatocytolysis syndrome (ALT=45 U/L, AST=86 U/L), electrolyte imbalance (Na=129 mmol/L, Cl=97 mmol/L), and dyslipidemia (Total Cholesterol=226 mg/dL; HDL-Col=34 mg/dL, LDL-Col=166 mg/dL, TGL=181 mg/dL). Her serum NT-pro BNP level was 4070 pg/mL.

The ECG showed sinus rhythm, ST-segment depression in leads V4-V6 and T-wave inversion in inferior leads (Figure 2). She was admitted to the department of cardiology for further evaluation.

Transthoracic echocardiography revealed non-dilated cardiac chambers, good left and right ventricular global systolic function (TAPSE=18 mm and...
Löeffler endocarditis due to idiopathic hypereosinophilic syndrome

Figure 3. Transthoracic Echocardiography: A. Apical four-chamber view - Left ventricular apical obliteration with mural thrombus. B, C. Apical four chamber and two chamber view - mitral regurgitation. D. Apical four-chamber view - tricuspid valve regurgitation. E. Restrictive flow pattern across mitral valve. F. Left ventricular endomyocardial systolic dysfunction.

LVEF=53%). Apical four-chamber view showed a large echo density fixed to the left apex (32/31 mm) (Figure 3A) with restriction of the mitral apparatus and moderate-severe mitral regurgitation (Figure 3B,C), and small ventricular cavity due to mural thrombus.

Moderate tricuspid valve regurgitation and moderate pulmonary hypertension was also observed (Figure 3 D). Diastolic function was evaluated using a multiparametric approach including: mitral inflow E/A wave (>2.5), E wave deceleration time (<150 msec), incre-
ased left atrial volume index (43 ml/m²) (Figure 3-E). Overall left ventricular (LV) global longitudinal strain (GLS) was reduced to -10.4% indicating LV endocardial systolic dysfunction (Figure 3 F).

**Clinical impression and differential diagnosis**

Given the patient’s presentation and prior investigations, the few top diagnoses included apical thrombus, apical hypertrophic cardiomyopathy, left ventricular non-compaction cardiomyopathy, or Löeffler endocarditis.

Cardiac magnetic resonance (CMR) demonstrated left ventricular apical obliteration with mural thrombus with a low signal on steady-state free precession imaging, first-pass perfusion and postcontrast late enhancement images (Figure 4-A, B, D), moderate mitral regurgitation (Figure 4-C), and diffuse circumferential subendocardial late gadolinium enhancement (LGE) (Figure 4-D). However, since subendocardial LGE is a hallmark of ischemic heart disease, coronary heart disease was excluded using computed tomography angiography.

In addition, her hyper eosinophilia and skin rash prompted evaluation for others etiologies. Hematology was consulted and BCR-ABL (for chronic myeloid leukemia), CALR (for myeloproliferative neoplasms), and JAK-2 (for essential thrombocythemia, polycythemia vera, or myelofibrosis) mutation were all negative. Test results for parasitic infection were also negative. The patient’s immunoglobulin E level was normal (40.5 UI/mL, the upper normal limit is 100.0 UI/mL). The work up for cytoplasmic antineutrophil cytoplasmic antibody and perinuclear antineutrophil cytoplasmic antibody was negative. A complete computed tomography scan including thorax, abdomen and pelvis was performed in order to exclude the presence of a malignant mass. Right pleural effusion was observed (Figure 4 E) and laboratory analyses after transthoracic puncture revealed transudate. Thyroid function was in normal range. There were not enough criteria for Churg-Strauss syndrome.

Therefore, the final diagnosis was Idiopathic Hypereosinophilic syndrome with Löeffler endocarditis. Management of this patient included gradual tapering of methylprednisolone guided by echocardiogram and biological work up, acenocumarol and heart failure treatment according to current guidelines with Furosemide 40 mg od, Spironolactone 25 mg od, Candesartan 16 mg od, and Bisoprolol 2.5 mg od.

At seven-months follow-up, she was asymptomatic with no skin lesions, normal hemogram (Eo=360/mm³) and resolution of left ventricular thrombus, but persisting mitral valve regurgitation and restrictive pattern diastolic dysfunction (Figure 5).

**DISCUSSION**

HES is a disorder characterized by persistent eosinophilia with damage to the multiple organs. After activation, eosinophils express several proteins including eosinophil major basic proteins (MBP1 and MBP2), eosinophil peroxidase (EPO) and eosinophil-derived neurotoxin (EDN) with numerous biological properties including direct cell toxicity. Dermatologic involvement followed by pulmonary, gastrointestinal, and cardiac manifestations are the most common clinical implications reported. Cardiac involvement usually follows 3 stages: the first stage, frequently asymptomatic, with acute necrosis, the second stage characterized by mural thrombi formation, and third stage with fibrosis and restrictive cardiomyopathy ensues.
CONCLUSIONS

The presented case highlights a Löeffler endocarditis which was diagnosed in an elderly patient in the thrombo-fibrotic stage with restrictive cardiomyopathy and it is distinguished by no specific cause for HES and good response to corticosteroid therapy. Every imaging tool has advantages and limitations. A multimodality imaging stepwise approach is the most rational way for precise characterization of LE.

Conflict of interest: none declared.

References:
1. Klon A. Hypereosinophilic syndrome: approach to treatment in the era of precision medicine. Hematology American Society of Hematology Education Program. 2018;2018(1):326-31.
2. Gotlib J. World Health Organization-defined eosinophilic disorders: 2017 update on diagnosis, risk stratification, and management. Am J Hematol. 2017;92(11):1243-59.
3. Ribeiro S, Gaspar A, Assuncao A, Torres JP, Azevedo P, Basto L, et al. [Fungal endocarditis with central and peripheral embolization: case report. Rev Port Cardiol. 2012;31(6):449-53.
4. Gao M, Zhang W, Zhao W, Qin L, Pei F, Zheng Y. Löeffler endocarditis as a rare cause of heart failure with preserved ejection fraction: A case report and review of literature. Medicine (Baltimore). 2018;97(11):e0079.
5. Piotr Ponikowski* AAV, Stefan D., Anker. Ghidul ESC de diagnostic si tratament al insuficientei cardiace acute si cronice 2016. Romanian Journal of Cardiology. 2017;Vol. 27, No. 4.
6. Piotr Ponikowski AAV, Stefan D., Anker. Ghidul ESC de diagnostic si tratament al insuficientei cardiace acute si cronice 2016. Romanian Journal of Cardiology. 2017;Vol. 27, No. 4.
7. Valent P, Gleich GJ, Reiter A, Roufosse F, Weller PF, Hellmann A, et al. Pathogenesis and classification of eosinophilic disorders: a review of recent developments in the field. Expert review of hematology. 2012;5(2):157-76.
8. Ginghina C. Mic tratat de Cardiologie. 2nd ed. Editura Academiei Române, 2017.