Mesothelial/monocytic incidental cardiac excrescence (MICE) is a rare benign lesion composed of a mixture of histiocytes, mesothelial cells, fibrin, adipocytes and scattered inflammatory cells without a vascular network or supporting stroma. Its pathogenesis is controversial with some authors favoring an artifactual theory while others consider a reactive phenomenon. To date, only 41 cases of MICE have been reported in the literature. We describe an additional case of MICE in a 24-year-old female with antiphospholipid syndrome. A mobile hyperechogenic mass attached to the left ventricular surface of the aortic valve was documented by transthoracic echocardiography (TTE). The patient did have cardiac catheterization one month before the cardiac surgery. Histopathologic and immunohistochemical examination showed a lesion composed of histiocytes and mesothelial cells together with fibrin and scattered inflammatory cells. To our knowledge, this is the first case of MICE detected in a patient with antiphospholipid syndrome.

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Keywords: Heart; Mesothelial/monocytic incidental cardiac excrescence; Antiphospholipid syndrome

1. Introduction

Mesothelial/monocytic incidental cardiac excrescence (MICE) is a rare benign cardiovascular lesion composed of a mixture of histiocytes, mesothelial cells, fibrin, adipocytes and scattered inflammatory cells without a vascular network or supporting stroma. They have been described in cardiac chambers, on cardiac valves or freely floating in the pericardial sac. Most lesions have measured <1 cm in greatest dimension, although some have reached up to 3 cm [1]. To date, only 41 cases of MICE have been reported in the literature and its etiology remains controversial [2, 3]. Two hypotheses (reactive or artifactual) have been proposed to explain these lesions. The reactive theory invokes mechanical irritation, inflammation or neoplasm as possible triggers for the formation of the lesion. One such mechanical irritation is the speculation that a needle tract created during cardiac catheterization enables the mesothelial cells to transmigrate into vascular space [1]. The artifactual theory supports an iatrogenic clustering of formerly free floating cells that enter the heart due to a cardiac surgery [4].

The importance of this lesion lies in the potential for confusion with a primary or metastatic malignancy [5]. Alternatively, antiphospholipid syndrome is related to thrombotic conditions and the finding of a cardiac mass would be expected to be a thrombus. An extensive search of literature did not yield any report of cardiac MICE occurring in association with antiphospholipid syndrome. To our knowledge, this is the first case of MICE detected in a patient with antiphospholipid syndrome.

2. Case report

A 24-year-old female with severe chest pain was hospitalized for acute myocardial infarction. Coronary angiography revealed total occlusion of her left coronary artery, which was recanalized by percutaneous transluminal coronary angioplasty and stenting. A transthoracic echocardiography (TTE) was performed on the second day of postinfarct survival. Mild anteroseptal hypokinesia was detected without any detectable mass or vegetation in the cardiac chambers.

Laboratory analysis revealed positive antinuclear antibody (ANA), negative anti ds DNA, positive lupus anticoagulant, positive IgG and IgM anticardiolipin antibodies (101 GPL and 118 MPL) and positive IgG and IgM β2-glycoprotein-I (100 U/ml). Cranial magnetic resonance imaging (MRI) showed lacunar infarct in the left caudate nucleus. She had a past history of two spontaneous abortions. In the light of these findings the diagnosis of antiphospholipid syndrome was suggested.

One month later she was admitted to the hospital with the complaint of tachycardia. TTE showed a mobile hyperechogenic mass attached to left ventricular surface of the aortic...
valve and mild anteroseptal hypokinesia (Fig. 1a). Surgery was performed and a large, fragile, spongious, bright red colored mass was extracted from ventricular surfaces of left coronary and right coronary cusps of the aortic valve (Fig. 1b). The mass was under the left coronary and right coronary cusps of the aortic valve and partially attached to the muscular septum and ventricular surfaces of the left coronary cusp. It was removed without the need of replacing the valve. In terms of antiphospholipid syndrome, intravenous heparin was started immediately before the operation and continued for three days. Postoperative mobilization was performed as fast as possible. She had good postoperative course and was discharged with warfarin and acetylsalicylic acid. Follow-up echocardiographic examinations (three, six and 12 months) showed no evidence of recurrence, and repeated blood tests after 12 weeks confirmed the diagnosis of antiphospholipid syndrome.

Tissue received for pathologic examination was fixed in 10% buffered formalin solution, routinely processed, and embedded in paraffin. Paraffin sections were used for hematoxylin-eosin and immunohistochemical studies. Macroscopically the lesion consisted of fragmented hemorrhagic tissues, the largest one measuring 1.2 cm. Microscopic examination revealed a lesion composed of solid cell clusters within a network of fibrin. Most of these cells were medium-sized, round or polygonal in shape and had a round to oval nuclei with clear to eosinophilic cytoplasm (Fig. 2a). Nucleoli and mitotic figures were not evident. Focally, small cuboidal epithelial-type cells with small dark nuclei and a moderate amount of cytoplasm were present (Fig. 2b). No vascular stroma was noted among the cells. Occasional adipocyte-like empty vacuoles were interspersed. Scattered inflammatory cells were present. Immunohistochemically, the polygonal cells were positive for CD68 (Fig. 2c). Cytokeratin AE1/AE3 and calretinin positive cells were dispersed (Fig. 2d). CD34, S100 protein, synaptophysine, chromogranin were negative. Accordingly, the lesion was diagnosed as MICE.

3. Discussion

MICE was initially considered to be a type of histiocytoid hemangioma of the heart [6] and then Luthringer et al. showed mesothelial origin by immunohistochemical studies and suggested that these lesions might represent a form of mesothelial hyperplasia [1]. Veinot et al. suggested that the lesion is probably a reactive lesion related to previous cardiac catheterization and proposed the term ‘mesothelial/mesenchymal incidental cardiac excrescences’ in 1994 [7].

However, Courtice et al. examined the contents of extracorporeal bypass pump filters and mediastinal drains, demonstrated that material recovered from 82% of the pump filters and 13% of the drains had histologic features similar to MICE. Therefore, the authors suggest that these lesions are artifactual and are produced during cardiac surgery by cardiotomy suction, with compaction and aggregation of friable mesothelial strips, other tissue debris and fibrin into tumor-like fragments that may be transported around the operative site [4].

Another theory was suggested by Argani et al. for their patient where adenocarcinoma cells were seen embedded within MICE in the pericardial sac [8]. In the absence of prior catheterization the authors postulated that the carcinoma cells may have induced the formation of MICE after invasion of the pericardial sac. They considered that MICE could be induced by the procoagulant activity of invasive adenocarcinoma. Furthermore, the case report demonstrated that not all cardiac lesions with the characteristic architecture and cell composition of MICE can be dismissed as being benign [8].

In this case, the patient did have cardiac catheterization one month before the cardiac surgery. Additionally, the patient had antiphospholipid syndrome. Antiphospholipid syndrome (APS) is characterized by the presence of circulating antiphospholipid antibodies (most commonly detected by a lupus anticoagulant test, anticardiolipin antibody and anti-β2-glycoprotein-I antibody), vascular thrombosis, and/or pregnancy loss. Cardiac manifestations of the APS range from asymptomatic valve lesions to life threatening myocardial infarction. The diagnostic criteria depend on clinical and laboratory data. The clinical criteria are: (1) one or more confirmed vascular thrombotic episode; and (2) pregnancy morbidity. The laboratory criteria are:

![Image](https://example.com/image1.png)

**Fig. 1.** (a) Transthoracic echocardiography showed a mobile hyperechogenic mass attached to left ventricular surface of the aortic valve. (b) Gross appearance of the mass. The lesion was bright red colored and measured 1.2 cm in the greatest diameter. AV, aortic valve; LA, left atrium; LV, left ventricle.
References


The role of mechanical irritation, inflammation, or neoplasm as possible triggers for a reactive process, or a form of mesothelial hyperplasia, has been emphasized in the reactive theory. Specifically, the atrial wall is focally very thin and could easily be perforated during cardiac catheterization, leading to the displacement of mesothelial cells into a cardiac chamber. Once exposed to the bloodstream, the mesothelial cells could aggregate with histiocytes and fibrin through an unknown mechanism, forming a loose tissue mass [4]. Nodular histiocytic/mesothelial hyperplasia (NHMH), a similar entity to MICE, is also predominantly composed of histiocytes with scattered mesothelial cells that can occur in the pericardium, pleura, peritoneum, and pelvis [3]. NHMH may also be a reactive lesion which could result from inflammation, mechanical irritation, or tumor. Based on their similar morphologic features and the fact that the term MICE does not exactly reflect the essence of this entity, Hu et al. propose to unify MICE and NHMH and suggest that NHMH might be a better choice [3]. Interestingly, the hypothesis that active cell-to-cell interaction may be involved in the formation of NHMH, due to expression of CD34 strongly positive mesothelial cells, has been reported, a factor that might also be considered for MICE [5].

References


EComment: Cardiac mesothelial/monocytic incidental excrescence and antiphospholipid syndrome

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We read with great interest the article on mesothelial/monocytic incidental cardiac excrescence (MICE) [1] in a young female with antiphospholipid syndrome (APLS). Patients with APLS present a significant involvement of the cardiovascular system, as coronary artery disease and valvular abnormalities constitute the most frequent manifestations, representing more than two-thirds of cases [2]. Notably, hypercoagulability in APLS patients predisposes to high rates of thromboembolic events as well as a high rate of restenosis after percutaneous interventions (PCI) or CABG respectively, causing significant morbidity and mortality [2]. In particular, angioplasty-induced arterial injury leads to platelet aggregation, adhesion, and thrombosis. Several factors involved in the thrombogenesis influence the restenosis rate after PCI, as thrombosis is one of the possible mechanisms of restenosis [2]. Moreover, restenosis may occur more frequently in anticoagulopin-positive patients, as in the case described in this article [1].

MICE is a rare intracardiac lesion, whose importance stems from the symptoms it may cause and the errors in diagnosis it can lead to, either in clinical and image assessment or during surgery. MICE appears to be equally distributed between males and females in the age range 5–80 years [3], with most of the cases involving individuals above 60 years, and lesion size ranging from microscopic to 3.5 cm [3]. Lesions have been found more frequently in the left cardiac chambers and on valve surfaces, especially during aortic and mitral valve surgery, or in endomyocardial biopsy specimens. The only importance commonly attributed to this lesion is that it may potentially be mistaken for a primary or metastatic malignancy. Differential diagnosis is necessary with metastatic adenocarcinoma, particularly in clear cell tumors or a mesothelial tumor, because both lesions are frequently strongly positive for cytokeratine AE1/AE3, as in MICE disease [4].

The role of mechanical irritation, inflammation, or neoplasm as possible triggers for a reactive process, or a form of mesothelial hyperplasia, has been emphasized in the reactive theory. Specifically, the atrial wall is focally very thin and could easily be perforated during cardiac catheterization, leading to the displacement of mesothelial cells into a cardiac chamber. Once exposed to the bloodstream, the mesothelial cells could aggregate with histiocytes and fibrin through an unknown mechanism, forming a loose tissue mass [4]. Nodular histiocytic/mesothelial hyperplasia (NHMH), a similar entity to MICE, is also predominantly composed of histiocytes with scattered mesothelial cells that can occur in the pericardium, pleura, peritoneum, and pelvis [3]. NHMH may also be a reactive lesion which could result from inflammation, mechanical irritation, or tumor. Based on their similar morphologic features and the fact that the term MICE does not exactly reflect the essence of this entity, Hu et al. propose to unify MICE and NHMH and suggest that NHMH might be a better choice [3]. Interestingly, the hypothesis that active cell-to-cell interaction may be involved in the formation of NHMH, due to expression of CD34 strongly positive mesothelial cells, has been reported, a factor that might also be considered for MICE [5].

References