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CASE REPORT

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So-called mesothelial/monocytic incidental cardiac excrescences obtained during valve replacement surgery: report of three cases and literature review

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Abstract We present three cases of so-called mesothelial/monocytic incidental cardiac excrescences (MICE) of the heart and a brief review of related literature. Case 1 was a 51-year-old woman who underwent mitral- and aortic-valve replacement. A tissue sample was submitted as a thrombus attached to the left atrial endocardium. Case 2 was a 69-year-old woman who underwent mitral-valve replacement. The sample was incidentally obtained as whitish clot-like fragments, but its exact origin was not known. Case 3 was a 68-year-old woman who underwent mitral-valve replacement for suspected infective endocarditis. The sample adherent to the pericardium was removed after valvular surgery. Histologically, these lesions were composed of a mixture of plump histiocytoid cells, a papillary arrangement of cuboidal cells, various sized vacuoles, and fibrin. The nests of cuboidal cells resembled cancer cells but showed features of mesothelial cells and no proliferative activity, immunohistochemically or ultrastructurally. In all cases, a suction tube placed in the left atrium was occasionally used to remove overflowing intrapericardial fluid during the surgery. The tip of the suction tube was covered with spiral wire, which is likely to transfer the stripped pericardial mesothelial cells to the left atrium. The significance of MICE is their possibility of being misdiagnosed as metastatic carcinoma by pathologists and a risk of arterial embolization by mesothelial debris clinically.

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Introduction

So-called mesothelial/monocytic incidental cardiac excrescences (MICE) are small non-neoplastic clot-like lesions composed of stripped mesothelial cells, clusters of histiocytes, and fibrin. This lesion was initially considered to be a type of histiocytoid hemangioma of the heart [8] and then as a "distinctive cardiovascular lesion" resembling a histiocytoid hemangioma by Luthringer et al. [7]. The latter authors considered the lesion to be mesothelial hyperplasia. Veinot et al. [9] postulated that the lesion is probably a reactive lesion related to previous cardiac catheterization and proposed the term "mesothelial/monocytic incidental cardiac excrescences" in 1994. However, Courtice et al. [3] reported that the lesion is an iatrogenic artifact and is a common lesion produced through the suctioning of atrial blood and the pericardial cavity during cardiac surgery. A recent report by Walley et al. [10] showed that MICE are fragments of mesothelial cells and blood elements produced iatrogenically when any body cavity is opened or physically disturbed. This paper describes the immunohistochemical and ultrastructural findings on MICE in three cases obtained at cardiac surgery. Related literature is also briefly reviewed.

Clinical history

Case 1

A 51-year-old Japanese woman with orthopnea first visited the University Hospital of Tokushima in May 1990. Echocardiography showed stenosis and incompetence of the mitral and aortic valves and thrombus of the left atrium. At the end of August, she underwent mitral and aortic valve replacement and suture closure of an orifice of the left atrial appendage. A thrombus (35×25 mm) attached to the left atrial endocardium was also removed and submitted for histological examination.

Case 2

A 69-year-old Japanese woman with a 15-year history of general fatigue first visited the University Hospital in November 1998. She was diagnosed with mitral stenosis and incompetence with a giant left atrium. The patient underwent mitral valve replacement, a plication of the left atrium, and tricuspid annuloplasty. Several whitish clot-like fragments (20–25 mm) were incidentally obtained during the surgery, but the exact origin of the sample was not known.

Case 3

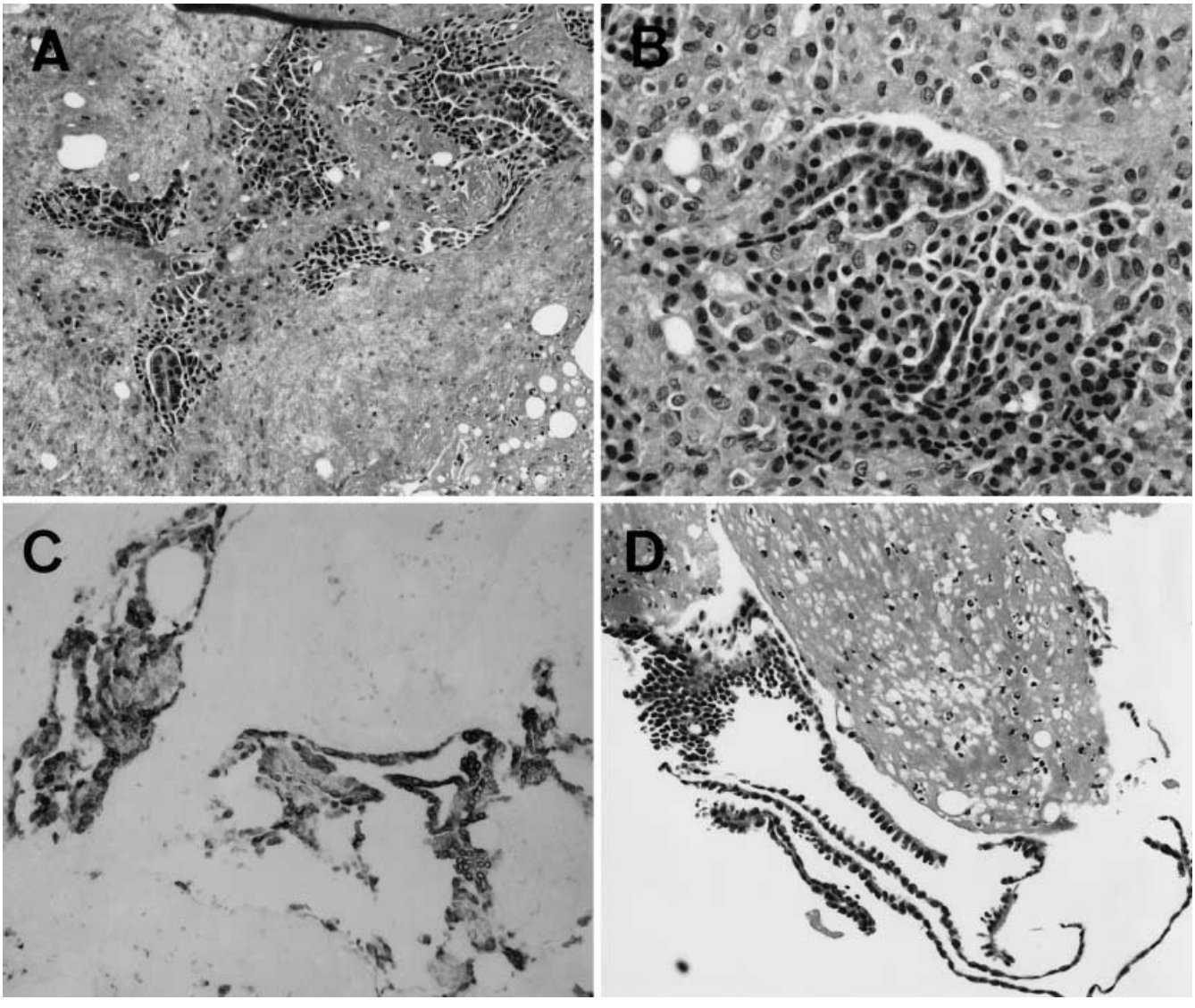
A 68-year-old Japanese woman with a remittent fever visited the University Hospital in May 1999. Echocardiography showed mitral stenosis and incompetence with large vegetations and protruded lesion around the left atrioventricular groove. She was diagnosed as a case of active infective endocarditis and mitral-valve replacement was performed. A whitish soft mass (10 mm) adherent to the left atrioventricular groove of the pericardium was removed after surgical closure of the left atrial fenestration.

Materials and methods

Specimens were fixed in 10% phosphate-buffered formalin, and paraffin-embedded sections were stained with hematoxylin and eosin (H&E). Sections were also examined immunohistochemically using a Dako lsab kit, peroxidase (Dako Co., Carpinteria, Calif.). Low-molecular-weight cytokeratin (Cam 5.2, Becton Dickinson Immunocytometry Systems, Mountain View, Calif.), high molecular-weight cytokeratin (34βE12, Dako Co.), human epithelial antigen (Ber-EP4, Dako Co.), epithelial membrane antigen (EMA, Dako Co.), carcinoembryonic antigen (CEA, Dako Co.), vimentin (Dako Co.), KP-1 (Dako Co.), leukocyte common antigen (Dako Co.), S-100 protein (Dako Co.), and proliferating cell nuclear antigen (PCNA, Dako Co.) antibodies were used.

For electron microscopic studies, paraffin-embedded materials were immersed in paraffin at 60°C, dewaxed in xylene, hydrated

Fig. 1 Histological and immunohistochemical appearances of mesothelial/monocytic incidental cardiac excrescences in case one. **A** Papillary formation of cuboidal (putative mesothelial) cells within a fibrin network (×150). **B** Putative mesothelial cells with dark nuclei and sheets of histiocytoid cells (×300). **C** Mesothelial cell nests positive for 34βE12 (×150). **D** Strips of viable mesothelial cells and fibrin in case three (×150)



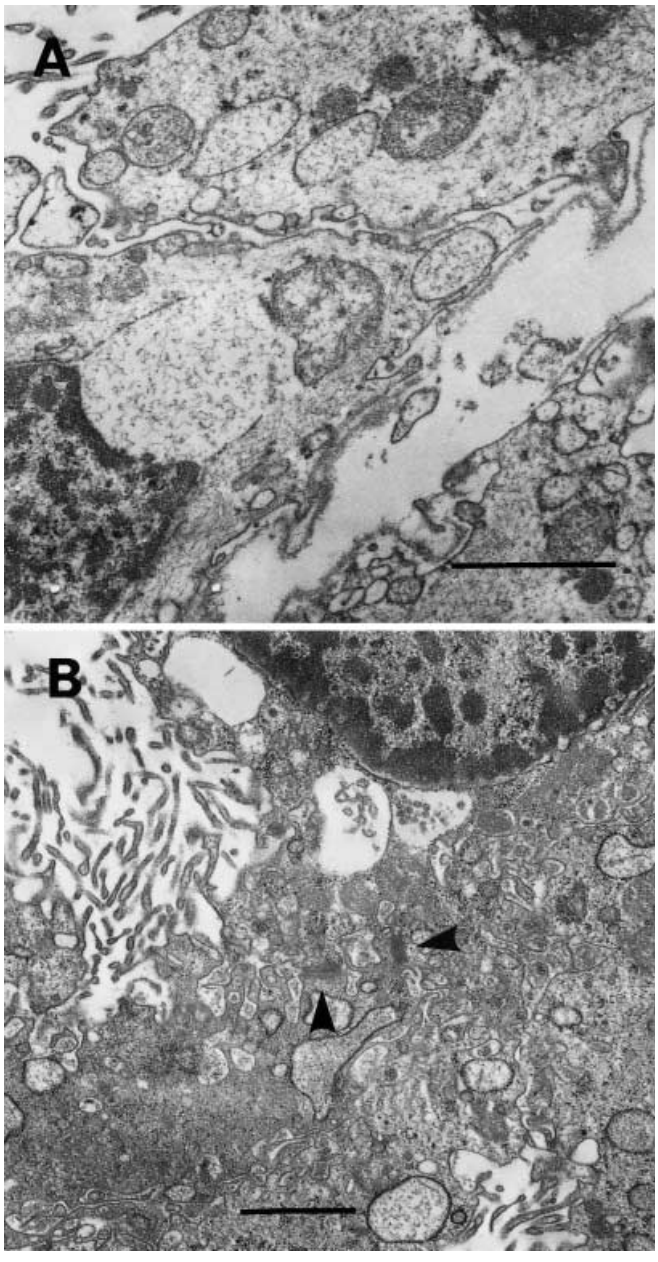


Fig. 2 Electron micrograph of mesothelial/monocytic incidental cardiac excrescences in case one. **A** Basal lamina of putative mesothelial cells. **B** Numerous microvilli and desmosome-like structure of mesothelial cells (*arrow head*). *Bar* 1 μm

in a graded ethanol series, and stained with 1% osmium tetroxide in 0.1 M phosphate buffer. Epon-embedded ultrathin sections were stained with uranyl acetate and lead citrate and examined under a Hitachi H-300 electron microscope.

Results

Histological findings

In case 1, the specimen showed papillary formation of epithelial-like cells, clusters of numerous histiocytoid cells, other blood cells, and various-sized fat vacuoles in a network of fibrin (Fig. 1A, B). The lesion contained no blood vessels or fibroblasts and did not adhere to the atrial scar tissue. In September 1990, we initially diagnosed this lesion as "suggestive of papillary adenocarcinoma in the thrombus, possibly of lung or thyroid gland origin" but corrected the diagnosis to "histiocytoid hemangioma of the endocardium" 1 week later. The cytoplasm of epithelial-like cells was acidophilic, and the nuclei were round and dark. Mitotic figures were absent. Histiocytoid cells had abundant cytoplasm and oval shaped nuclei with occasional cleaves. The histological appearance of specimens in case 2 was similar to that in case 1, but no scar tissue was observed. Epithelial-like cells were scant in H&E sections. In case 3, the specimen removed from the pericardial sac showed strips of viable mesothelial cells, clusters of a few histiocytoid cells, and fibrin (Fig. 1D).

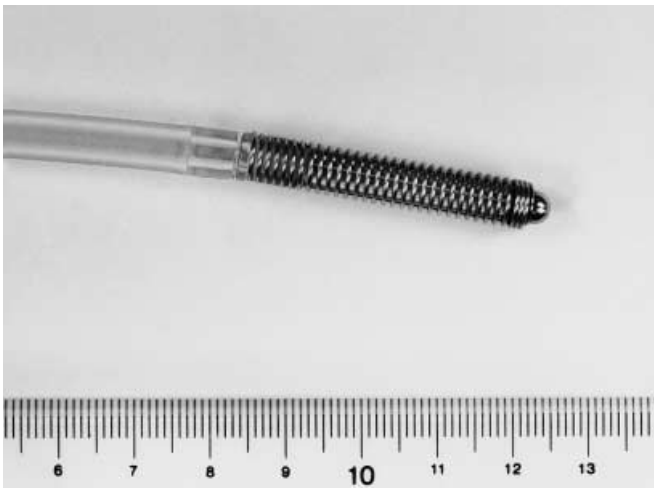


Fig. 3 Suction tube for removal of venous return

Immunohistochemical findings

In all cases, epithelial-like cells were positive for 34βE12, Cam 5.2, and Ber-EP4. In contrast, histiocytoid cells were positive for KP-1, vimentin, leukocyte common antigen (LCA), and S-100. Both types of cells were negative for EMA and CEA. Immunostaining of 34βE12 clearly demonstrated many more epithelial-like cells than H&E staining (Fig. 1C). PCNA was positive in a few histiocytoid cells but not in epithelial-like cells.

Ultrastructural findings

Epithelial-like cells had a continuous basal lamina, degenerative nuclei, numerous microvilli, a filament-rich cytoplasm, and desmosome-like structures (Case 1, Fig. 2A, B). Histiocytoid cells had oval nuclei and a few cytoplasmic filaments.

Table 1 Prior procedures for so-called mesothelial/monocytic incidental cardiac excrescences in reported cases

Author	Year	Open cardiac surgery/biopsy[a]	Exploratory laparotomy	Endomyocardial biopsy	Transbronchial lung biopsy
Luthringer et al. [7]	1990	13 (1)[b]		1	
Veinot et al. [9]	1994	2		2	
Courtice et al. [3]	1994	2			
Argani et al. [1]	1997	1 (1)[b]			
Walley et al. [10]	1997	4 (2)[c]	1		
Chan et al. [2]	1997				2
Ikeda et al. [5]	1998	2 (2)[b]			
Ferguson and Reid [4]	1999	1			
Bando et al.	Present study	3 (1)[b]			

[a] Valve replacement, valvuloplasty, coronary artery bypass, repair of anomalies, and open pleural biopsy
[b] Figures in parentheses are lesions found in pericardial sac
[c] One is a lesion found in pericardial sac and the other is a lesion found in celiac artery as thrombus at autopsy

Discussion

Courtice et al. [3] identified tissue fragments indistinguishable from MICE in the contents of bypass pump filters in cardiac surgery cases and materials adherent to pericardial drains in post-cardiac surgery cases. Therefore, these authors postulated that operative debris might be transferred around the operative site. The specimens from the present two cases were obtained during valve replacement surgery as a thrombus grossly, but not histologically, attached to the left atrium (case 1) and clot-like fragments found incidentally (case 2). The sample of case 3 obtained from the pericardial sac showed similar histological appearance, but mesothelial cells were viable. PCNA positivity was demonstrated in a few histiocytoid cells but not in mesothelial cells. These findings were consistent with those of Ikeda et al. [5]. Mesothelial cells in case 1 and case 2 had degenerative nuclei, as shown histologically and ultrastructurally. Thus, we considered that the lesions in these three cases were non-neoplastic, non-proliferative, and artifactual.

In all cases, surgeons used a disposable suction tube placed in the left atrium for removal of both blood returning to the heart through pulmonary veins and overflowing intrapericardial fluid for topical cooling during the surgery. The tip of this suction tube (Fig. 3) was covered with spiral wire, which is favorable for catching and compacting the operative debris, including mesothelial fragments, and transferring it to the left atrium incidentally and iatrogenically.

Recently, Walley et al. [10] showed that MICE could be produced in any body cavity by compaction of stripped mesothelial cells, blood elements, and other debris iatrogenically. Argani et al. [1] reported a case of an intrapericardial floating lesion that probably developed in response to pericardial invasion of a lung adenocarcinoma. Until recently, 34 cases of MICE, including the present three cases, have been recorded [1, 2, 3, 4, 5, 7, 9, 10] (Table 1). Of these, 28 cases (82%) were lesions in cases of open cardiac surgery/biopsy, and six cases, including our case 3, were lesions obtained from the pericardial sac. In three endomyocardial biopsy cases [7, 9] and two transbronchial biopsy cases [2], no open surgery was performed before diagnosis. In endomyocardial biopsy cases, it is postulated that displacement of pericardial mesothelial cells might occur through cardiac perforation due to biopsy or catheterization [9]. However, the pathogenesis of the lesions in these cases and those of transbronchial biopsy has remained uncertain.

Histological and immunohistochemical findings in the present cases were similar to those in previous reports. Histological diagnosis of MICE is easy if the pathologist is aware of the existence of such lesions. An autopsy case in which celiac arterial emboli containing mesothelial debris developed after elective open mitral valvuloplasty is included in the cases of Walley et al. [10]. Therefore, MICE may be important clinically and for their potential confusion with metastatic adenocarcinoma pathologically.

The term "mesothelial/monocytic incidental cardiac excrescences" is inappropriate as Walley et al. [11] pointed out. Although the names "histiocytoid hemangioma-like lesions" [3] and "lesions of aggregated monocytes and mesothelium" [6] have been proposed, a more comprehensive name may be necessary for these lesions.

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