Double Right Atrial Blood Cysts

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Blood cysts are exceedingly rare benign cardiac tumors, generally involving the cardiac valves. They are found mainly in the first month of life and in children and are very uncommon in adults. We present a rare case of double right atrium blood cysts, incidentally detected by transthoracic echocardiography in an 85-year old patient. (Ann Thorac Surg 2016;101:e147–9) © 2016 by The Society of Thoracic Surgeons

Blood cysts of the heart are benign cardiovascular tumors and are extremely rare in adults. Almost all reported cases of adult cardiac blood cyst in the literature were solitary and generally involved the valvular apparatus or mitral valves. Reported complications of blood cyst are left ventricular outflow tract obstruction, valve dysfunction, ventricular dysfunction, embolic stroke, pulmonary embolism, and occlusion of a coronary artery. Our case is the first report of double cardiac blood cysts. We present a case of double cardiac blood cysts in an adult.

An 85-year-old woman received a diagnosis of sick sinus syndrome at another hospital, and the decision was made to implant a permanent pacemaker immediately. The patient underwent routine investigations before implantation of the device, and a right atrium mass was suspected on echocardiography. The surgeons experienced difficulty implanting the pacemaker, and during the procedure the patient’s blood pressure dropped suddenly. On transthoracic echocardiography, a pericardial effusion was detected. She was transferred to our hospital for treatment of suspected heart perforation induced by pacemaker implantation, and a right atrium mass. Physical examination on admission revealed no abnormal heart sounds, respiratory sounds, or neurologic findings except hypotension (98/60 mm Hg) under dopamine infusion at a rate of 6 μg/kg/min. The results of general hematologic and biochemical tests were within normal limits except for mild anemia (hemoglobin 10.7 g/dL, hematocrit 28%). Electrocardiography showed pacemaker rhythm (80 beats per minute). Chest roentgenology showed cardiomegaly and bilateral pleural effusion. Echocardiography showed moderate pericardial effusion. There were two thin-walled cystic masses (3.0 cm × 3.0 cm, 2.5 × 2.5 cm) in the right atrium (Fig 1A). The cysts were not mobile and occupied almost two thirds of the right atrium, but inflow to the tricuspid valve was not obstructed. Preoperative computed tomography revealed two circular filling defects in the right atrium, evidence of right ventricle perforation by the pacemaker lead (Fig 1B). A diagnosis of cardiac tamponade induced by right ventricular perforation and right atrial tumor was made, and the patient was taken to the operating room.

The patient underwent a median sternotomy for resection of the atrial mass and repair of the right ventricular wall. When the pericardium was opened, 250 mL of pericardial blood effusion and a blood clot were found in the pericardial sac. Cannulation was performed through the aorta, superior vena cava, and inferior vena cava. Cardiopulmonary bypass was started, with mild hypothermia to 32°C. The aorta was cross-clamped, and myocardial protection was achieved with intermittent antegrade cold cardioplegia through the aortic root. The right atrium was then opened and inspected. Two tumors were observed, about 3 cm and 2.5 cm in diameter, having a cystic appearance with short stalks individually on the atrial septum between the fossa ovalis and the tricuspid valve (Fig 2A). The mass was removed completely, including the stalk with the superficial layer of atrial septal wall. The small tumor burst during removal. The small defect of atrial septal wall where the stalks were attached was repaired primarily with a Z suture of 4-0 Prolene. The perforated lead was pulled out of the right ventricular wall (Fig 2B), and the perforation was repaired with 3-0 Prolene. An epicardial sense-pace lead was stitched to the free right ventricular wall. Histologic examination confirmed a blood cyst containing bloody fluid but no malignant

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Fig 1. (A) Echocardiographic findings. Double cystic lesions (arrow) are present in the right atrium. There is an area of increased echogenicity inside the cysts. (B) Computed tomographic view showing double nonenhanced masses (arrow) in the right atrium and the pacing lead perforation of the right ventricular wall (arrow).
cells, with walls consisting of thin-layered fibrous tissue (Figs 3A, 3B). The patient recovered uneventfully and was discharged on postoperative day 16.

Comment
Cardiac blood cyst is a rare finding and was first reported by Elasser in 1844 [1]. Blood cysts are believed to be benign, are not uncommon findings in infants, and typically regress by 6 months of age. Such cysts usually measure less than 1 mm and often involve the cardiac valves [2]. However, an adult cardiac blood cyst is exceedingly rare. Our review of the recent literature (1952 to 2014) found 55 cases of cardiac blood cysts. They were distributed in the mitral valve, tricuspid valve, pulmonary valve, right atrium, right ventricle, left ventricle, and aortic valve. Almost all reported adult cardiac blood cysts in the literature were solitary, were approximately 3 cm in size, and generally involved the valvular apparatus or mitral valves [3, 4]. Our case is unique because it is the first case ever reported of double cardiac blood cysts. Reported complications of blood cyst are left ventricular outflow tract obstruction, valve dysfunction, ventricular dysfunction, embolic stroke, pulmonary embolism, and occlusion of a coronary artery [1, 5–7].

Several hypotheses of the origin of cardiac blood cysts have been proposed. A first theory suggested that cysts are formed during valve development by blood being pressed and trapped in crevices that are later sealed off. A second theory suggested that blood cysts arise from heteroplastic changes in tissues originating from the primary pericardial mesothelium, which participates in
the formation of the fibrous skeleton of the heart. Sakakibara and colleagues [8] proposed that blood cysts result from a sudden occlusion of circulation in either the atrium or the ventricle. They suggested that hypoxia, inflammation, and bleeding tendencies are possible mechanisms for producing an endocardial hematoma that progresses to a blood cyst.

Echocardiography is useful in detecting and examining intracardiac tumors, because a thin-walled cystic mass with an echo-free space within the lumen can be distinguished from a solid tumor. However, it is often difficult to discriminate a cystic mass from a solid tumor, particularly myxoma. Therefore, magnetic resonance imaging is the most effective tool for the differential diagnosis of solid tumors. A blood cyst may be suspected when a round homogeneous image is observed with signs of bleeding (isointense or hyperintense in T1 and isointense or hypointense in T2) with no uptake of intravenous contrast medium, which indicates a hematic and cystic nature. There is not yet a consensus regarding the optimal management of a cardiac blood cyst. In patients without symptoms, regular follow-up by echocardiography after diagnosis has been proposed because of the benign nature of the tumor.

In summary, we report an extremely rare case of double right atrial blood cysts. To our knowledge, this is the first case ever reported of double adult cardiac blood cyst.

References