Type B Right Ventricular Thrombus With Postmortem Computed Tomography and Postmortem Examination Correlation

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CASE REPORT

The deceased was a woman in her early 50s who was found dead unexpectedly at home during a welfare check. According to her family, she had a long history of opioid dependence, mental health issues, and had been having "fluid buildup in her heart and legs.". Of note, there was no previous history of or investigation for pulmonary thromboembolism. She complained of shortness of breath in the days leading up to her death and was subsequently found dead on her chair. There was no indication of a death from trauma or violence. The death was referred for coronial investigation, and a postmortem examination was authorized.

Postmortem examination was undertaken 2 days after the death. A noncontrast postmortem computed tomography (PMCT) scan was performed before postmortem examination. PMCT of the heart showed distended right atrium and ventricle, and the right ventricular wall was hyperdense with whisps of hypodense strands (Fig. 1). The lungs showed a left-sided pleural effusion. The abdominal cavity and the head and neck region did not show any other significant pathology. External examination of the deceased showed a body mass index of 20.4 kg/m^2 (height: 170 cm, weight: 59 kg) with bilateral pitting ankle edema up to the mid shin. The most striking finding on internal examination was in the chest cavity. There was 50 mL of pericardial effusion, and the heart was enlarged and hypertrophied at 480 g with right ventricular trabecular hypertrophy. Within the trabeculae of the right ventricle were marked adherent type B thrombus (Fig. 2). In the left pleural cavity, there were multifocal adhesions and 1 L of serous effusion with no histologic evidence of inflammation of the pleura. The left lung was collapsed with areas (10 mm in maximum dimensions) of healing infarct. The right lung was grossly edematous and congested, but with no recognizable pulmonary embolism or previous infarct. The lung field did not show any evidence of foreign bodies from intravenous drug use or vascular pathology. There were no histologic features of systemic inflammation involving blood vessels or tissues, and the remaining visceral organs showed no other significant pathology that would have accounted for the death. Toxicological analysis showed the presence of prescribed psychiatric medications (nontoxic levels) and was negative for opioids and other illicit drugs/medications.

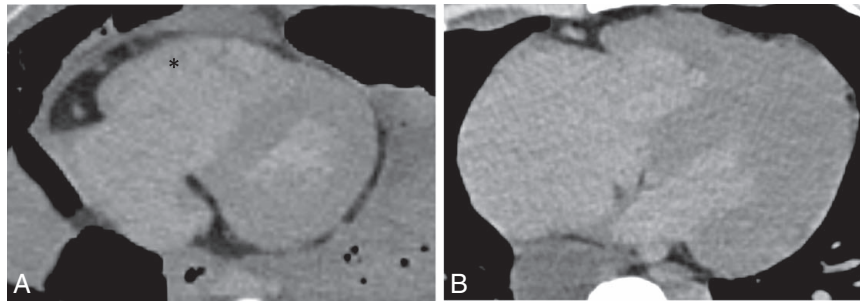

FIGURE 1. A transverse section of the thoracic cavity on postmortem computed tomography scan showing a distended right atrium and ventricle. The uniform right ventricular wall is hyperdense with whisp of hypodense strands (*, A), compared with normal (B).

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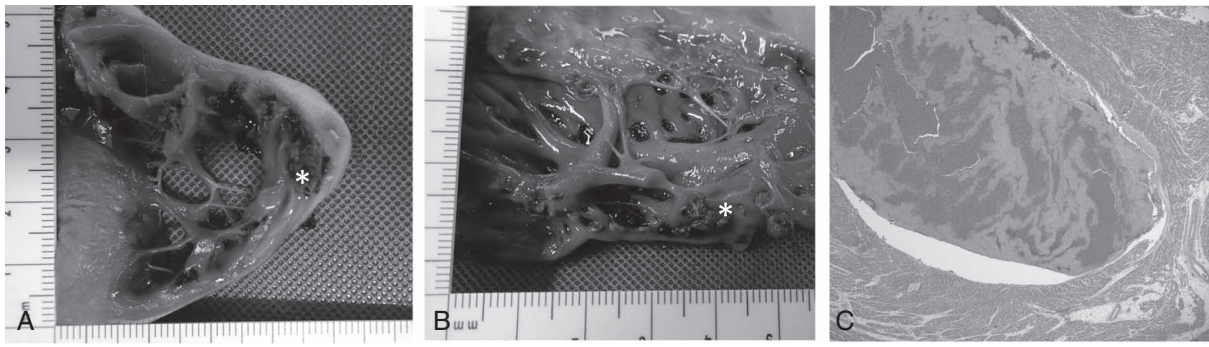

FIGURE 2. Type B right ventricular thrombus adherent to the hypertrophied trabecular muscles recognized macroscopically (*, A and B) and confirmed microscopically with florid lines of Zahn (C, hematoxylin and eosin, high power).

The cause of death was due to heart failure. The cause of the heart failure was probably secondary to long-term opioid dependence with cyclic use and withdrawal resulting in cardiomyopathy.[1] The type B right ventricular thrombus was an incidental finding secondary to cardiomyopathy.

DISCUSSION

We report a death from heart failure in which there was an incidental type B mural thrombus formation in the right ventricle, with PMCT and postmortem examination correlation.

Isolated thrombus in the right ventricle is rare with small number of case series and reports documented in the clinical and forensic pathology literature.[2–15] Right ventricle thrombus is often difficult to distinguish from intraventricular vegetations or tumor masses.[4] Approximately 98% cases of right ventricle thrombi are present in patients with concurrent pulmonary emboli, with mortality rates of almost 100% if left untreated.[16] Associated risk factors include younger age, previous bleeding events and congestive heart failure. Clinically, transthoracic echocardiogram, computed tomography, and contrast-enhanced magnetic resonance imaging are common modalities of choice used for diagnosis of right ventricle thrombosis.[12] It can be treated through anticoagulation, thrombolysis, and surgical thrombectomy.[12,16]

Right ventricular thrombus are categorized into types A, B, and C.[17] Type A thrombi are thin, mobile, and often related to pulmonary embolism. Type B thrombi are immobile, forming in situ due to underlying cardiac abnormalities and/or cardiomyopathies. Type C thrombi, though rare, exhibit mobility and share characteristics of both type A and B. Although being a clear indication of potential fatal underlying cardiovascular pathology and reported to have up to 100% mortality if left untreated,[18–20] there is limited forensic literature on right ventricle thrombus and no documentation of its appearance on PMCT. The limited documentation may be accredited to their overall rarity and subsequent underappreciation of these thrombi, the migration of thrombi into pulmonary arteries leading to death (particularly in types A and C), and their potential removal as artifacts during postmortem cardiac examination. Documentation of their appearance on PMCT may assist in the postmortem identification of underlying cardiovascular pathologies, including thromboembolism and cardiac abnormalities or cardiomyopathies.

On PMCT, in our experience, the ventricular walls are homogenous and slightly hypodense compared with the cavity blood. The cavity blood is also homogenous (or has a "fluid level") and relatively hyperdense. In the presented case, the right ventricular wall was hypodense (comparable to the cavity blood) with whisp of hyperdense strand. This was in keeping with the florid type B thrombus adherent to the trabecular muscles, which was confirmed on postmortem examination. For type A and C thrombus, we hypothesize that the right ventricle cavity will appear heterogeneous (mixed density). From the findings in this case, hyperdense and heterogenous right ventricular wall should raise suspicions of type B right ventricular thrombus, an indicator for cardiac abnormalities/cardiomyopathies.

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