A Rare Case of Dense Spontaneous Echo Contrast within Inferior Vena Cava

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Abstract
A 33-year-old gentleman was examined because of fatigue and progressive right heart failure. A striking finding in his echocardiogram was intense and slow-moving dense echo contrast in the inferior vena cava (IVC). Cardiac catheterization revealed constrictive pericarditis, and pericardiectomy was performed. Postoperatively spontaneous echo contrast in IVC have resolved. This case helps explain the origin of spontaneous IVC contrast.

Keywords: Echo contrast, inferior vena cava, spontaneous

Introduction
Spontaneous echocardiographic contrast (SEC) occurs because of increased ultrasonic density in the cardiac chambers or great vessels, or both, with the characteristic flow pattern of blood, but in the absence of any intravascular injections. The occurrence of SEC is rare. Our patient of constrictive pericarditis showed extensive SEC in the inferior vena cava (IVC) which is very unusual and infrequently reported in literature.

Case Report
A 33-year-old gentleman presented with progressive shortness of breath for the last 30 days. On examination, there is bipedal edema, hepatomegaly, and elevated jugular venous pressure with prominent “Y” descent. A pericardial knock was audible on auscultation. The patient was in regular rhythm. The patient gave a history of taking antitubercular drug for the last 4 months for tuberculous pericardial effusion. Electrocardiography showed nonspecific ST-T changes. X-ray chest posterioranterior view showed mild cardiomegaly.

The level of Factor V Leiden and anticardiolipin antibodies was negative. Serum homocysteine was normal.

Echocardiography showed enlarged both atria and thickened pericardium with mild mitral and tricuspid regurgitation. There was a significant respiratory variation of mitral inflow pattern. IVC was dilated (24 mm) and very dense and slow-moving SEC was found in IVC. Biventricular systolic function was normal [Figures 1-4]. Computed tomography thorax showed thickening of the pericardium. Cardiac catheterization showed that there is equalization of diastolic pressures in all four chambers. The right ventricular (RV) and left ventricular waveforms exhibit a “square root” sign, consistent with constrictive pericarditis. E/e1 in lateral mitral annulus was 16. The patient was put on furosemide and spironolactone with partial improvement of breathlessness and pedal edema noted. The patient was advised for pericardiectomy. Operative findings were consistent with chronic constrictive pericarditis. The postoperative course was uneventful, and the patient is currently doing well. A repeat echocardiogram was performed 1 week after surgery and showed spontaneous echo contrast.

Discussion
SEC on the left atrium in echocardiography is frequently found in patients with atrial fibrillation, mitral stenosis, or history of thromboembolism, occurring in 30%–60% of such patients.[1]

Although less common, right atrial SEC has been documented

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in patients with a dilated right atrium associated with atrial arrhythmias or RV systolic dysfunction.\textsuperscript{[2]} The pathogenesis of SEC is not clearly established. In addition to atrial fibrillation and structural cardiovascular abnormalities, other entities have been implicated, including aging, low blood flow velocities, low shear rates, high erythrocyte sedimentation rate, increased serum fibrinogen levels, and elevated hematocrit levels.\textsuperscript{[3]}

In vitro studies demonstrated that SEC reflects an interaction between RBC and plasma proteins, particularly fibrinogen, but does not require platelets.\textsuperscript{[4]} The spontaneous contrast in this patient was similar to that observed experimentally when blood undergoes stasis or when the flow is reduced. There is a tendency for the echoes to be more intense at the lateral borders of the blood vessel. This may be due to the presence of slower flow at the borders if one assumes a parabolic velocity profile across the blood vessel. There is a role of chronic hepatic congestion with blood stasis as a main predisposing factor leading to red blood cell aggregation. Our patient did not have hepatic insufficiency. SEC density is determined by flow rate and the relative concentrations of RBC and fibrinogen. Alternately, SEC can be produced from microcavitations, or microbubbles, almost exclusively associated with mechanical valves. SEC occurs because of low blood flow velocity and predisposes to clot formation and thromboembolism. SEC in IVC is extremely rare. Hjemdahl-Monsen\textit{ et al.}\textsuperscript{[5]} reported the case of a patient with constrictive pericarditis with significant SEC in the IVC and right-sided cardiac chambers that resolved following pericardiectomy. In our case, SEC was very dense and it probably reflects the severe degree of stasis of blood in IVC.

SEC occurs because of abnormal blood flow velocity and predisposes to thromboembolism. This patient of constrictive pericarditis showed extensive echo contrast in IVC which is very unusual and infrequently reported in literature.

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\textbf{Declaration of patient consent}

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/ their consent for his/her/their images and other clinical information.
to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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