Effect of Intensive Diuretic Treatment over Right Ventricular Behaviour: Evidence Provided from Colour and Pulsed-wave Doppler Echocardiography

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Case History

Doppler acceleration at the left ventricular outflow tract or within the left ventricular cavity is frequent, especially in patients with left ventricular hypertrophy\cite{1}. Acceleration within the right ventricle is less common, but it has been observed in patients with hypertrophic cardiomyopathy and right ventricle involvement, as well as in some congenital cardiac abnormalities\cite{2–5}.

Some mechanical adjustments in right ventricle, such as an increased ejection fraction, may compensate the reduction in venous return\cite{6}. We present a representative case of a patient with severe left ventricular dysfunction who received an intensive treatment with diuretics, and in whom the echocardiographic study showed the features of right ventricular compensatory behaviour in response to a reduced pre-load.

A 72-year-old female patient who had suffered an anteroseptal myocardial infarction 4 years before admission was hospitalized due to decompensated heart failure and acute pulmonary oedema. The patient was treated with vasodilator agents and high doses of diuretics.

An echocardiographic study was performed 4 days after admission, when the patient was asymptomatic and without rales and other signs of cardiac failure. At the time of the echocardiographic study, blood pressure was 125/80 mmHg, heart rate 88 beats per minute, and temperature 36°C. Creatinine (0.9 mg/dl) and haemoglobin (14.8 g/dl) plasmatic values were normal; at that time, the patient was not receiving inotropic agents. Echocardiography showed a severely depressed left ventricular ejection fraction (0.19 by modified Sympsom’s rule). Two-dimensional echocardiography showed a hypercontractile right ventricle, with a collapse of right ventricular cavity in systole (Fig. 1). There was no evidence of right ventricular hypertrophy by electrocardiogram or echocardiography. Four-chamber apical view showed a regional acceleration of colour Doppler flow within the right ventricular cavity; the turbulence was easily viewed in the four-chamber apical view and subcostal view (Figs. 2 and 3). A late Doppler systolic signal in the right ventricle was obtained by the pulsed-wave Doppler (Fig. 4). There was no evidence of left ventricular volume depletion, such as respiratory variation of mitral or right ventricular inflow during diastole.

Doppler acceleration in right ventricle has been observed in patients with hypertrophic cardiomyopathy and right ventricle involvement, as well as in some congenital cardiac abnormalities\cite{2–5}. In our patient, a reflex response of right ventricular contractility to a vigorous reduction of pre-load probably played a key role. Other potential mechanisms, such as right ventricular hypertrophy, interventricular septum paradox movement, and inotropic treatment, could not be found.

References


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Figure 1. Subcostal view. The image shows the collapse of right ventricular cavity in systole.

Figure 2. Four-chamber apical view. Colour Doppler shows a regional acceleration of flow within the right ventricular cavity.

Figure 3. Colour Doppler at subcostal view, demonstrating the turbulence within the right ventricular cavity.
Figure 4. Pulsed-wave Doppler, displaying a late systolic signal in the right ventricle whose velocity was 1.8 m/s.

