

Contrast Echocardiography and Clinical Safety

Dear Editor:

The use of contrast media provides a greater diagnostic yield for echocardiographic techniques.¹ In combination with the possibility of performing myocardial perfusion studies, its use can be generalized in stress echocardiography. It therefore leads us to question the safety they afford concerning adverse reactions, an issue that has recently led to the temporary withdrawal from the market of one of these products used in echocardiography.

We present the case of a 42 year old man with a history of an acute anterior myocardial infarction 4 months previously, and single vessel coronary disease (100% middle anterior descending), with a normal ejection fraction and apical akinesia. He was referred to the echocardiograph laboratory for measurement of apical myocardial viability by means of stress echocardiography with dobutamine, prior to attempting revascularization. When the patient was clinically and hemodynamically stable, the study was started according to the usual protocol; contrast material was not considered necessary at this point. On reaching a dobutamine infusion dose of 10 g/kg/min, a heart rate of 105 bpm, and a blood pressure of 140/70 mm Hg, a bolus dose of 1.5 mL of Sonovue[®] was given, maintaining a mechanical index of 0.3. The patient immediately developed sudden sweating, rubefaction and bradycardia, followed by severe hypotension and cardiorespiratory arrest. Advanced cardiopulmonary

resuscitation was initiated and four minutes later the patient recovered a stable hemodynamic situation. No evidence was seen of angina, or conduction, enzymatic or echocardiographic changes. The course of the patient was satisfactory.

The pathophysiology of damage due to microbubbles of sulphur hexafluoride (Sonovue®) was initially associated with physical phenomena of cavitation.² The impact of ultrasound waves, with high mechanical indices, can lead to intravascular rupture, a phenomenon that can produce a capillary lesion in the myocardium. Effects seen in animals involve transitory ventricular dysfunction, a temporary increase in coronary perfusion pressure and a rise in the myocardial production of lactates.² In a recent study, however, Cosyns et al noted the absence of myocardial damage by Sonovue® in humans, as evaluated by tissue Doppler in 28 studies.³ Later, anaphylaxis, as the result of hypersensitivity to polyethylenglicol (a constituent of the membranes in the bubbles of sulphur hexafluoride) was presented as a mechanism of systemic adverse reactions.⁴ As a result of all these observations, the question of direct and/or anaphylactic cardiac toxicity is currently the subject of debate.

Studies of contrast enhanced stress echocardiography in humans have demonstrated the safety of the technique. Recently, Tsutsui et al⁵ analyzed a large series of 1486 stress echocardiography studies performed with a low mechanical index and Optison® or Definity® contrast material. The incidence of adverse events was no different from that of a control group composed of 1012 stress studies with no contrast agents. No cases of anaphylaxis were reported. Nevertheless, other authors, such as de Groot et al, have reported 3 cases of anaphylactic reactions in their experience using Sonovue®.⁶ Hypersensitivity to polyethylenglycol, not present in Optison® or Definity®, could account for these observations. Dijkmans et al analyzed and compared the accumulated experience with several different radiological contrast agents and the echograph contrast agents Sonovue® and Optison®. They found a worse safety profile for Sonovue®, which the authors associated with a greater incidence of adverse allergic reactions.⁷

This is the only case of a severe adverse reaction in our experience, which covers 175 studies. In the absence of disorders of conduction and contractility, our case appears to represent another anaphylactic reaction to Sonovue®. Furthermore, no myocardial damage was shown and a phenomenon of extreme peripheral vasodilatation was the apparent cause of the symptoms.

As has been reported in other series,⁶ we believe that anaphylaxis with no direct myocardial damage may be a mechanism of the adverse reaction by Sonovue®. The ultimate decision about the use of these substances corresponds to the relevant health authorities, but, as a result of these observations, we believe that echocardiography laboratories should be adequately prepared, as a prophylactic measure, to face possible anaphylactic reactions that, logically, will be worse in patients with heart disease.

David Calvo, Jesús M. de la Hera,
and Dae-Hyun Lee

Área del Corazón, Hospital Universitario Central
de Asturias, Oviedo, Spain.

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