Bubbles in the Heart

To the Editor:

The image by Catapano et al1 gives misleading information concerning bubbles in the heart in patients with prosthetic valves. They speculated that “bright particles” seen in the left ventricular cavity are consistent with gas bubbles that occur in scuba divers after hypobaric decompression. We disagree with this speculation, because this phenomenon is well documented in patients with prosthetic valves. In their large series, Gencbay et al2 found a strong correlation between serum lactic dehydrogenase levels and quantity of bubbles. They suggested hemolysis as a cause of bubble formation. Moreover, Kaymaz et al3 determined the prevalence of bubble formation in 279 patients with valve replacement and found that none of the patients with bioprosthetic valves demonstrated bubble formation. Bubbles were present, however, in 128 of 227 (56.4%) prosthetic mitral valves (P<0.0001). Bubbles were documented in 75.4% of the normal mechanical prosthetic mitral valve.

Surprisingly, the idea that cavitation is the mechanism triggering bubble formation is even supported by one of the authors to which Davutoglu et al refer. More specifically, Kaymaz et al2 state “The microbubbles occur at the inflow zone of the valve when flow velocity and pressure drop suddenly at the time of valve closing. The cavitation potential was correlated…” Furthermore, if hemolysis were an invariable effect of cavitation, the prevalence of hemolytic anemia in patients with prosthetic valves would be expected to be much higher than currently reported. To our knowledge, the highest prevalence documented is 30% in patients with double mechanical prostheses.3 In the case of our patient, then, hemoglobin was 14.7 g/dL, and LDH and bilirubin serum concentrations were within the normal range.

Second, Davutoglu et al point out that specific types of valve prosthesis vary substantially in their likelihood of being associated with bubbles in ventricular cavities. We were unable to discuss this issue in detail in our article, but our patient had a Caromedics (No. 26) prosthesis.

Finally, in contrast to the assertion by Davutoglu et al, there have been several reports documenting the concomitant presence of cerebral gaseous emboli and bubbles in the left ventricle of patients with mechanical heart valves.4 Indeed, the elegant work by Lin et al5 documents that intracavitary bubbles can be sufficiently stable to reach the aortic root.

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Response

Davutoglu et al argue that in our case bubbles may reflect hemolysis rather than a cavitation process. Indeed, hemolysis has been shown to be an effect rather than the cause of bubble formation.1 Surprisingly, the idea that cavitation is the mechanism triggering bubble formation is even supported by one of the authors to which Davutoglu et al refer. More specifically, Kaymaz et al2 state “The microbubbles occur at the inflow zone of the valve when flow velocity and pressure drop suddenly at the time of valve closing. The cavitation potential was correlated…” Furthermore, if hemolysis were an invariable effect of cavitation, the prevalence of hemolytic anemia in patients with prosthetic valves would be expected to be much higher than currently reported. To our knowledge, the highest prevalence documented is 30% in patients with double mechanical prostheses.3 In the case of our patient, then, hemoglobin was 14.7 g/dL, and LDH and bilirubin serum concentrations were within the normal range.

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