To the Editor.—We read with interest the case report and the study of Sanchez-Guijo et al., which describes the failure of patient-controlled analgesia pumps in a hyperbaric environment. We have experience with this problem. Electronic infusion pumps function in a fashion similar to a patient-controlled analgesia pump. We have observed unexplained low blood pressure in some patients treated by hyperbaric oxygen therapy at 2.5 absolute atmospheres (ATA). These patients were receiving inotropic drugs (epinephrine or norepinephrine), either for therapy of septic shock or for air embolism after cardiac surgery. Alterations in pump (DPS Becton-Dickinson & Company, Franklin Lakes, NJ) performance were suspected. We conducted a series of pressurizations with two pump models: the DPS Becton-Dickinson (the most recent model) and the P 300 (Ivac Medical Systems, Basingstoke, UK). To minimize the risk of explosion, the pumps ran on a battery with less than 50 V, as recommended in French legislation.

As in the case report, the DPS pump stopped between 2 and 2.1 ATA. With the P 300 pump, we compared the functioning in a normobaric and a hyperbaric environment at different flows and pressures. In these conditions, the P 300 pump was reliable; the three liquid crystal display screens did not blink, the alarm did not ring, the pump did not stop, and the released flows were equal at each pressure. This difference in reliability could be related to the airtightness of the DPS pump.

We believe that pumps could be used after being tested in hyperbaric chambers. There is a real need to establish international norms.

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In Reply:—The need to adjust different devices, such as electric syringes, blood pressure sensors, and respirators, during the compression and decompression stages of treatment with hyperbaric oxygen is known. However, rather than being a problem of program readjustment, our case concerned the cessation of function of the epidural patient-controlled analgesia pump at a pressure of 2 absolute atmospheres (ATA), as occurred in one of the cases mentioned in the letter by Levecque et al.

Because the treatment schedule with hyperbaric oxygen in anaerobic infections involves 90-min sessions as 3 ATA, we think it is wiser not to use the more sophisticated and expensive electronic pumps for patient-controlled analgesia, bearing in mind that rescue analgesia can be used for short periods to maintain good pain control, if necessary. We are studying the behavior of these systems, and we welcome further correspondence that might help to resolve the problem.

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References