The Reliability of the 25-gauge Needle for Arterial Blood Sampling

To the Editor.—The sampling by needle puncture of arterial blood for determination of pH, $P_{CO_2}$, and $P_O_2$ is now widely used. Sampling with 23–26-gauge needles has been reported to be simple, safe, and relatively painless.1–3 We have been using 25-gauge needles for this purpose for some time. It has come to our attention, however, that some confusion relating to this subject exists in the minds of many house officers, attending physicians, and laboratory technicians. We constantly encounter individuals who believe that large-bore needles (18–20 gauge), through which blood can flow freely and rapidly, are necessary for providing samples for accurate blood-gas analysis. A review of the literature disclosed no information about the relative accuracy of 25-gauge needles compared with larger-bore needles when used for this purpose, so we decided to determine this ourselves.

Using 25-gauge ½-inch disposable needles, arterial blood samples were obtained from 30 selected patients in the Special Care Unit and Recovery Room of our institution. Samples were simultaneously taken from the same patients using either 20-gauge ¾-inch disposable needles or indwelling 16-gauge teflon arterial catheters. The latter samples represented our control group. Disposable heparinized plastic syringes (5 ml) with Luer-lok tips were used for collection of the blood. The Astrup technique was used to determine pH and $P_{CO_2}$. $P_O_2$ was measured by a $P_O_2$ electrode, type E 5044, and thermostatic cell, type D 615, attached to the radiometer.

The results showed mean control pH’s and those obtained using a 25-gauge needle to be 7.415 ± 0.078 and 7.414 ± 0.076, respectively. Corresponding figures were 38.44 ± 8.25 and 38.94 ± 8.22 mm Hg for mean $P_{CO_2}$’s and 96.2 ± 51.2 and 95.9 ± 50.35 mm Hg for mean $P_O_2$’s. None of the differences was significant.

There are several advantages to using a fine-bore needle for arterial blood sampling. 1) When subjected to this procedure with a 25-gauge needle, patients frequently, although not invariably, experience no pain or only minimal pain (no local anesthesia is infiltrated beforehand). 2) Although serious complications resulting from single arterial punctures are rarely reported, this procedure is not completely benign. A fine-bore needle will not traumatize an artery as much as a large-bore needle. 3) In our experience, although puncture of the radial artery is an individual skill which requires some practice, it is technically easy with a 25-gauge needle. It has been reported that the radial artery is safer than the femoral or brachial artery as a site for entry.4 In addition to safety, radial-artery blood sampling is also desirable because inadvertent aspiration of venous blood from this site is unlikely.

A word of caution should be kept in mind when using a fine-bore needle. Adams et al. have reported that if excessive force is applied to the plunger of a syringe during aspiration of blood from an artery, gas bubbles may be pulled out of solution, lowering $P_O_2$ by as much as 12 mm Hg.5 We aspirate our samples slowly, with minimal traction, and have not found this to be a problem.

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