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## A Possible Cause of Temperature Probe Failure

*To the Editor:*—Chapman and Moravec[1] expressed a real concern for the operating room staff when they cautioned against immediate treatment to remedy an increase in patient temperature as recorded by a temperature probe. One can readily understand how, if false readings are obtained when measuring patient temperature directly, this could lead to therapeutic steps by a physician. This could very well result in emergency measures or the curtailment of a surgical procedure, or even the cancellation of scheduled surgical procedures. The situation could be equally disastrous if the probe is being used as the sensing component of a controller to regulate patient temperature during hyperthermia or hypothermia. Unnecessary corrective steps may be taken with the thermia unit, which could prove injurious to the patient.

At the Downstate Medical Center, during one period, we noticed several instances where a patient's temperature is indicated by a physiologic temperature monitor did not correlate with the patient's physical condition. The suspect thermistor probes were removed to our clinical engineering department and tested on a Yellow Springs Instrument (YSI) temperature bridge. In all cases the readings obtained were in accordance with the temperature of the bath in which the probes were immersed. However, when they were tested on the physiologic temperature monitoring system that is normally used in our operating rooms, the readings were 2 to 4 degrees higher.

The difference between the YSI temperature monitor and our operating room system is that the YSI is a DC-excited bridge while that used in our operating rooms is an AC-excited bridge. We took several new probes, which read correctly on both systems, and shunted them with sufficient capacitance to make them respond incorrectly on the AC bridge only. The problem seemed to be one of high capacitance.

We investigated the cleaning method used by our nursing staff and found that they were soaking the probes in Cidex® for cleaning and sterilization. The Cidex apparently penetrated the plastic sheathing of the probe and caused sufficient capacitance to build up to cause incorrect temperature readings. After the probes were washed thoroughly in water and then allowed to dry for 24 hours at room temperature, they responded accurately and provided correct temperature readings.

At present, in lieu of Cidex, our nursing staff washes thermistor probes in water and a germicidal solution of Vesphene®, before sending them for gas sterilization.

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## Intrathecal Opiates, a Potent Tool to be Used with Caution

*To the Editor:*—The letter of Davies, Tolhurst-Cleaver and James[1] reports respiratory arrest ten hours after intrathecal administration of morphine (1 mg). Others have also reported this complication.[2,3] That respiratory arrest can occur when morphine and perhaps other narcotics are introduced in the subarachnoid space, at least in the dosage now being utilized, should come as no surprise to those familiar with the pharmacokinetics of narcotic compounds. Only a small fraction (0.1 per cent) of an intravenously administered dose of morphine is able to penetrate into the entire CNS.[4,5] The same is true with meperidine[6,7] and probably many other narcotic compounds as well. If only 0.1 per cent of an intravenous dose of morphine of 100 mg (a dose that produces respiratory arrest in all nonaddicted patients and general anesthesia in most[8]) enters the central nervous system, less than 0.1 mg will appear in the entire brain.

One milligram of morphine injected intrathecally is more than ten times the amount of morphine found in the entire brain, and probably at least 100 times that found in the region of medullary respiratory centers following a 100-mg intravenous dose of the drug. Considering the potency of morphine after it is in the central nervous system, the free communication of cerebrospinal fluid (CSF) between the brain and

spinal cord, and the dosage of morphine currently being used intrathecally, it will be surprising to me if respiratory depression and or arrest is not a common complication of this technique.

The incidence of respiratory arrest after intrathecal administration of morphine is unknown at present. Likewise, the dynamics of CSF flow and the pharmacokinetics of morphine following intrathecal administration are unknown. While the advantages of intrathecal morphine (opiate) administration in anesthesia seem significant and the possible applications of the technique great, the potential risks, at least at present, may be equally high. Because of this, intrathecal opiate analgesia should be reserved for institutions where close, continual surveillance of patients is possible, at least until more is known about the pharmacokinetics of narcotics injected into the subarachnoid space.

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# Problems with Dupaco Ventilator Valve Assembly

*To the Editor:*—In our hospital, we are using several Dupaco Palomar anesthetic gas machines,* model 78800, equipped with the Dupaco assembly valve (#17865, Dupaco Schematic), which proved to be hazardous.

After approximately two months of use, during a surgical procedure requiring mechanical ventilation, the valve failed to function properly. After switching from automatic (fig. 1*A*) to manual ventilation (fig. 1*B*), it was impossible to ventilate the patient. Upon inspection, it was found that the valve handle was in an extremely high position. In such a position the valve allowed gas to flow into the ventilator when the bag was squeezed, in effect creating a huge leak in the breathing system (fig. 1*C*). The situation was corrected by pushing the shaft downward until the position was approximately that shown in fig. 1*B*. This allowed manual ventilation by sealing off the leak to the ventilator.

Examination of the valve revealed that the shaft has three identical retainer rings (fig. 2). Two of the rings secure the rubber seal on the shaft. The third ring should serve to stop the rubber seal in the position to close off the ventilator or bag inlet during ventilation (fig. 1*B*). Our problem was caused by the missing top retainer ring. However, we found the bottom retainer ring on the rubber seal missing also. Rust on the rubber seal where the ring should have been suggested that the ring had become corroded and broken off during use. When we checked the other Dupaco machine, rust was present on all three retainer rings.

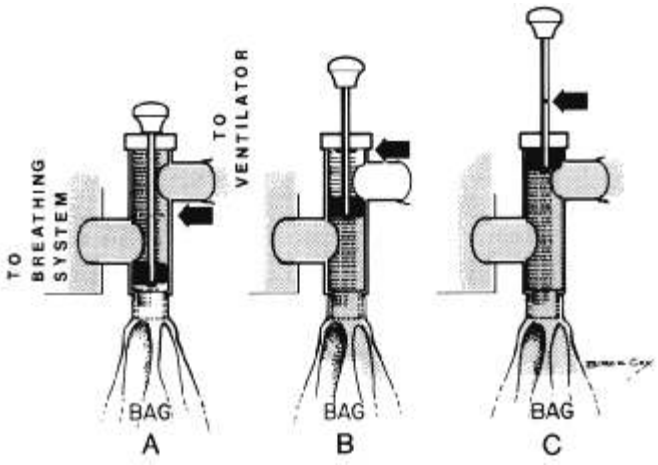


FIG. 1. Various positions of the valve assembly. Arrows show locations of the retainer ring.

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