

CORRESPONDENCE

Anesthesiology
72:208, 1990

An Unusual Cause of Misleading Temperature Readings

To the Editor:—We wish to report that small amounts of oral secretions in the connection between the esophageal temperature probe and the cable leading to the temperature module can lead to incorrectly elevated temperature readings.

This was brought to our attention recently during a neurosurgical procedure. After the patient was turned to the prone position, the temperature obtained with the esophageal temperature probe (Hi-Lo Temp[®], Mallinckrodt Critical Care) increased from 36° to 40° C over 10 min. Replacing the probe and the temperature module itself (Hewlett-Packard 78214-C) had no effect. Eventually a drop of saliva was noted to be bridging the contacts on the patient end of the cable that connected the probe to the module. When this was cleaned and dried the temperature reading returned to near 36° C. The connectors used in this temperature monitoring system are shown in figure 1.

We then sought to confirm that an electrically conducting solution bridging the contacts of the esophageal temperature probe could result in a spurious yet realistically increased temperature reading. This effect would be due to formation of a second path for current within the temperature probe circuit, lowering the overall resistance. Using a clean probe and module we observed the readings for a temperature bath maintained at 37° C. Application of deionized water shifted the temperature reading to 37.8° C. Saline in the connector increased the reading to 41.2° C. The results with oral secretions varied from 39.4° to 40.4° C, depending upon the mucous content.

Most temperature sensors in the operating room are based on the use of thermistors that conform to the same industry standard (YSI 400 Series). Our experience with one particular brand is probably applicable to others. Since the case reported here, we have noticed that when patients are in a prone or sitting position, oral secretions frequently track down the wire from the esophageal temperature probe to the connector on the extension cable. In two instances, anesthesiologists unaware of this as a cause of elevated temperature readings were unable to determine the source of the problem. Thus, spurious intraoperative temperature readings may be occurring with some frequency.

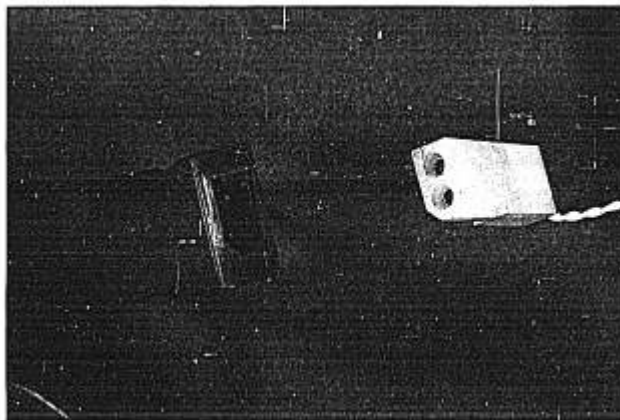


FIG. 1. Connectors used by the Mallinckrodt Hi-Lo Temp[®] esophageal temperature probe. The male connector from the temperature probe is on the right, the female connector from the cable leading to the temperature monitor is on the left.

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In Reply:—Thermistors are composed of materials whose electrical resistance varies with temperature. It is this property that makes it possible to measure temperatures with thermistors, and it therefore follows that any situation which would alter the electrical resistance, such as the creation of a saliva induced shunt, would result in a spurious reading. The present report from Berman is the first one we have seen on this subject and we can only add that electrical connections must always be kept dry.

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Opioid Premedicants Are Not Candy, Lollipops, or Funny Stickers

To the Editor:—As a pediatric anesthesiologist, I read with interest the article by Nelson *et al.* on oral transmucosal fentanyl citrate (OTFC) premedication in children.¹ OTFC appears to offer a safe and humane

approach to preoperative sedation with only minor side effects in children.^{1,2}

Most advocates of OTFC now refer to the preparation as a candy

or lollipop, when, in fact, OTFC is fentanyl base molded in a candy-flavored vehicle that looks more like a lozenge or suppository-on-a-stick than a traditional sucker or lollipop.^{1,3} The reasons for the flavored vehicle and the stick are clear—to provide a pleasant taste for patients and a safety handle for patients and attendants. The reasons for the repeated use of the terms “candy” and “lollipop” to describe OTFC are not as clear and have sent confusing signals to both the news media and the health consuming public about narcotics in candy form. Even the running title of the Nelson *et al.* article in ANESTHESIOLOGY is “Fentanyl Lollipop Premedication in Children.”¹

OTFC may prove to be a very useful premedicant in children, and its continued development will provide more understanding of transmucosal drug delivery. In addition to OTFC, a number of other new methods for opioid premedication including intranasal sufentanil⁴ and transdermal fentanyl⁵ are now being developed for potential use in children. With so many new preparations of potent opioids now being designed for painless delivery by transmucosal and transcutaneous routes, anesthesiologists should avoid coining misnomers that may give children and their parents mixed messages about preoperative anxiety.

OTFC and transdermal fentanyl are not candy, lollipops, or funny stickers; they are preparations of an ultra-potent opioid designed for pain-free administration to children facing surgery. More appropriate lay terms for OTFC and nasal sufentanil might be “lozenge” and “drops,” terms long-applied to drugs (cough drops, nose drops), including topical anesthetics (throat lozenges) and even volatile anesthetics (ether drops). A more appropriate lay term for the fentanyl sticker may be drug patch, now associated with many commonly prescribed transcutaneous drugs including nitroglycerin, clonidine, and scopolamine.

In any event, anesthesiologists should avoid falling into the same semantic trap radiologists did by initially promoting magnetic resonance imaging (MRI) as nuclear magnetic resonance imaging (NMR).⁶ Both NMR and MRI are accurate, descriptive terms with the former being more needlessly alarming than the latter due to its nuclear preface.⁶ It took years to re-educate the lay public about the safety and effectiveness of NMR, now MRI. Similarly, more carefully chosen lay descriptions for OTFC, intranasal sufentanil, and transdermal fentanyl during early clinical trials will prevent later public confusion and un-

necessary alarm over drugs as premedicants and not as candy, lollipops, suckers, or happy-face stickers.

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In Reply:—We applaud Dr. Diaz's letter and believe his comments and suggestions are right on target. The initial idea that fentanyl might be absorbed in sufficient quantities and with sufficient speed to produce a useful clinical effect when applied to buccal mucosal surfaces developed after many experiments using a variety of extremely potent opioids in a number of animal models over many years.^{1,2,*} When early experiments with fentanyl crystals in a sweetened base showed that fentanyl plasma concentrations sufficient to provide “anesthesia” were possible if enough of the opioid was incorporated in the OTFC unit, it became popular to call the studies “the lollipop studies.”³ Out of this came the term “the fentanyl lollipop.”

Our interest in this new way of noninvasively administering a potent opioid and our desire to provide an appropriate and simple image of what the unit looked like led us to use the “L” word even after oral transmucosal fentanyl citrate and OTFC were coined. In retrospect,

* Port J, Stanley TH, Steffey EM: Narcotic inhalation anesthesia (abstract). ANESTHESIOLOGY 57:A344, 1982.

this was unwise for it sent the wrong signal to some news media people and one health consumer group. Fortunately, we believe most anesthesiologists, surgeons, nursing personnel, patients, and patients' families did not get the wrong signal.

Nonetheless, the fact that even a few individuals might believe that OTFC is a lollipop or candy rather than a potent opioid intended for patients under the care of anesthesiologists is a serious issue. I am also concerned that carefully thought-out clinical research studies at medical institutions throughout the United States designed to document the safety and efficacy of OTFC for patients prior to surgery may be erroneously characterized as casual or cute rather than as serious research.

Clearly, we must avoid falling into the same semantic traps our colleagues have in the past with useful devices such as MRI. Now is the time to correct our mistakes before additional studies of OTFC are completed and the inappropriate terminology becomes established. In this regard we have made a conscious decision to use the terms “OTFC” or “OTFC units,” where previously the word “lollipop” was used. Also, the terms “sweetened base” or “sweetened matrix” for “candy” is more appropriate terminology.