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What are the Real Factors Associated with Postoperative Sore Throat?

To the Editor:—I read with interest the recent article by Loeser *et al.*[1] concerning the incidence of postoperative sore throat in association with the use of endotracheal tubes with various cuff designs. This seemed like a straightforward, concise study until I read a companion study done by Loeser *et al.*[2] which appeared in the *Canadian Anesthetist's Society Journal* the same month. The second study dealt with lubricants and the incidence of postoperative sore throat. In comparing these two studies, the issue became clouded. In the study in ANESTHESIOLOGY, the authors used 5 per cent lidocaine ointment to lubricate all endotracheal tubes (this ointment contains polyethylene and propylene glycols), and reported incidences of sore throat with currently employed endotracheal tubes to be 24–58 per cent, depending on cuff design. The National Catheter® narrow cuff tube was reported by the authors to be experimental and was not included in this range. Based on these results, the authors conclude that the new National Catheter narrow cuff tube or the Portex® Taper cuff tube may be preferable. However, in the companion article in the Canadian journal, the authors conclude from their study that polyethylene and propylene glycols are irritating to tracheal mucosa and may be responsible for a high incidence of postoperative sore throats. If this were true, were the sore throats in the study in ANESTHESIOLOGY due to cuff design or these glycols? Second, 4 per cent lidocaine jelly was the lubricant employed in the report in the Canadian journal, and its chemical composition differs markedly from that of lidocaine ointment. I am not familiar with a 4 per cent lidocaine jelly that contains polyethylene or propylene glycols. Last, if cuff design is a major factor in postoperative sore throats, is there a statistically significant difference between a 47 per cent incidence with National Catheter medium cuffs and a 40 per cent incidence with uncuffed tubes?[2] I feel the question of absolute factors involved in the incidence of postoperative sore throat still needs study and clarification before we discard our existing endotracheal tubes and lubricants.

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In reply:—As mentioned in the discussion, our findings from our several studies do suggest that lidocaine lubricants with preservatives such as polyethylene glycol and propylene glycol are irritating or damaging to the mucosa of the trachea or upper airway. The preservatives in the jelly seem to give a similar result.

The lidocaine jelly contains methyl and propyl parabens as preservatives, and the 4 per cent solution contains methyl paraben. Why the marked difference between the solution and the jelly despite some similarities in the preservatives? The amounts of the two substances remaining on the tube are certainly different. Also, the solution is the only preparation whose *p*H is adjusted to 7.0. The lubricant preparations are acidic, whereas normal tracheal secretions are slightly alkaline.

We were not able to determine the *uncuffed* endotracheal tube–mucosal interface, but were curious to see what the patient response would be. However, current studies do indicate (Loeser, unpublished data)

that cuff design and lubricants both have effects on the production of sore throat. It is hoped that the relative contributions of individual factors will be further elucidated by studies now under way. In addition, cuff-wall thickness has an effect in larger cuffs that is probably related to the degree and size of wrinkles on the cuff surface, with thinner cuffs giving better results (Bernhard W: Personal communication).

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Inadvertent Intravascular Injections during Lumbar Epidural Anesthesia

To the Editor:—In his letter regarding inadvertent intravascular placement of caudal epidural blocks, Schweitzer[1] suggests use of a wick (after injecting 2 ml of local anesthetic solution) for detecting blood in the hub of the needle when it cannot be aspirated. Blood staining of the wick indicates an intravascular position. Since one cannot differentiate between venous blood in the hub and traumatic blood staining of a properly placed solution, this test may cause a repetition of the block in some patients while not guaranteeing absence of an intravascular position in the remainder. Additionally, Schweitzer states that the 2-ml dose of local anesthetic is sufficient to produce symptoms of mild systemic toxicity and is a further test of position. In an audit of 4,003 instances of obstetric epidural anesthesia at the Hospital of the University of Pennsylvania from January 1978 to December 1979, 194 patients were found to have had inadvertent intravascular placement, and 13 had had the problem recur with a second placement of the catheter. The intravascular position was recognized by aspiration of blood initially in 130 cases. Apparent intravascular migration of the epidural catheter occurred in 12 other patients when blood was aspirated prior to reinjection of anesthetic during a functioning block. In the 65 remaining cases (including those of ten further patients with intravascular migrations of the catheter) the patients received 2 ml of local anesthetic without epinephrine to test for an inadvertent subarachnoid position. Symptoms of mild toxicity occurred in three patients, two of whom had recurrent symptoms and blood return in the catheter when further volumes of 3 and 5 ml were administered. In the third patient, the catheter was placed in another interspace with recurrence of the symptoms on each injection despite an excellent block. In 11 patients, blood was aspirated either immediately after the test dose or prior to further drug administration. Thirty-nine of 51 patients who received additional local anesthetic intravenously had symptoms of systemic toxicity (five had tremor or seizure). The remaining 12 had no symptoms in spite of aspiration of blood immediately after injection. Representative doses were 8–10 ml of .25–.75 per cent bupivacaine (nine patients) and 4–20 ml of 2–3 per cent 2-chloroprocaine (three patients). These findings illustrate that 2 ml of local anesthetic solution without epinephrine do not produce symptoms in most patients, and that rather large quantities apparently administered intravenously are well tolerated in 23 per cent of patients. In our experience, when the test solution contains epinephrine, 1:200,000, 2 ml will increase the heart rate when given intravenously. Unfortunately, Schweitzer does not specify whether or not epinephrine was used in the local anesthetic solution. If indeed epinephrine was used by Schweitzer, this might well explain why a 2-ml test dose produced symptoms in his patients but not in ours. Elimination of epinephrine from obstetric anesthetic practice has made detection of intravascular catheters more difficult. Prevention of inadvertent intravascular injection of lumbar epidural catheters continues to be a problem, particularly in pregnant patients, where epidural veins are markedly dilated and easily entered.[2] Careful aspiration prior to and after every drug administration, employment of test doses prior to each supplemental injection, and use of small, closely spaced incremental doses rather than large bolus administration of local anesthetics may avoid serious toxic symptoms from intravascular injection, as well as inadvertent spinal blockade.