Aspiration of Meconium from the Trachea of Neonates

To the Editor—In a recent letter describing “disappearing” endotracheal tubes (ETT) during attempted suctioning of meconium from the tracheobronchial tree through ETT from which the 15-mm adapter had been removed, Finucane and Shanley mention a recently designed hollow suctioning tube. A response to this letter cautioned against this approach and against attempts to pass a catheter through an ETT to suction the meconium. As the designer of the NeoVac®, the device referred to by Finucane and Shanley, I would like to describe the technical design considerations that make this device useful for meconium resuscitation of the neonate.

1. As Finucane and Shanley have indicate in their letter, the NeoVac® is a hollow tube that fits into an ETT and permits aspiration of meconium without the need to remove the 15-mm adaptor. Seguin and Clafin warn against passing a suction catheter through an ETT because this may prevent use of a catheter large enough to adequately suction the meconium.

2. Suctioning through an ETT with a standard flexible suction catheter requires that the suction catheter be considerably smaller than the ETT in order to pass the catheter through with ease. The majority of the vacuum applied is lost in a leak between the suction catheter and the ETT, and the catheter usually is too small to adequately suction thick material. The NeoVac® has a rigid suctioning stylet that is the maximum diameter that can fit through the ETT. The internal diameter of a Portex 3.0 ETT is 3.0 mm; the outside diameter of the suction stylet is 2.84 mm; and the internal diameter of the stylet is 2.24 mm. There is no leak between the suctioning stylet and the ETT. With this system, the full vacuum applied to the stylet is transmitted to the trachea.

3. The NeoVac® was tested for its ability to suction thick, viscous, and particulate matter. In vitro tests were performed with various amounts of suction applied to several materials of different consistency, including undiluted meconium. The NeoVac® was never obstructed by any of the test materials.

4. When suction is applied directly to the ETT, the wall of the hollow tube is contaminated by the material suctioned with the NeoVac®. After suctioning is complete, the contaminated stylet is removed, and the clean ETT may remain in place for positive pressure ventilation, as is sometimes required in cases of severe meconium aspiration associated with intrapartum asphyxia.

5. Immediately after delivery, the newborn is usually placed in a bassinet under warming lights, where the tracheal suctioning and resuscitation of the newborn is then carried out. Standard synthetic endotracheal tubes become soft if used in such an environment. The suction stylet of the NeoVac® is made of a heat-resistant material and is molded in the standard Magill curve. Therefore, when intubating the trachea of an infant in a heated environment, the heat-resistant stylet helps the ETT maintain its shape, and intubation is facilitated.

6. The suctioning stylet allows the resuscitating individual to regulate suction through the ETT with one hand while performing the laryngoscopy with the other. This permits the NeoVac® to be used as an oropharyngeal suction device to clear secretions from the oral airway and to aid in visualization of the trachea.

As Director of Obstetric Anesthesia at the Beth Israel Hospital, at which 6,000 babies are delivered annually, I have been using prototypes and various models of this device since it was first designed in 1984. When properly manufactured, this system has never failed to deliver adequate suction and has never become clogged with meconium. (One of the earlier manufacturing techniques caused occlusion of the suction stylet, but this problem has since been solved). In accordance with standard practice, excessive suction (>100 cmH2O) or prolonged suctioning through an ETT that fits too snugly in the trachea should be avoided.

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REFERENCES
(Accepted for publication September 21, 1990.)

Mechanism of Ulnar Nerve Injury

To the Editor—Kroll et al. point out that the mechanism of nerve injury was least often apparent with ulnar nerve injuries. They conclude that “the lack of identifiable mechanism suggests either methodologic shortcoming in the medicolegal investigative process or the existence of other mechanisms of nerve injury, especially of the ulnar nerve, which are not yet understood.”

I would like to suggest another possible mechanism reported by Sy nearly 10 yr ago. With the almost universal use of automatically cycled blood pressure cuffs, it is possible that prolonged use of frequent cycles could cause long periods of ischemia or compression of the ulnar nerve. This is especially true if the cuff is applied over the elbow rather than as far proximal on the arm as possible.
It would be interesting to know how many of the unexplained cases of ulnar nerve injury occurred on the side of the blood pressure cuff. However, since most of us do not follow Sy's advice to record which arm the blood pressure cuff is on, it is probably impossible to retrieve this information.

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Anesthesiology
73:1295, 1990

In Reply—Dr. Alexander makes a good point in his letter. In a closed-claims review the only etiologic factors that can be considered are those focused on by the physician expert witnesses. Therefore, if a factor such as the site of an automatically cycling blood pressure cuff was not elicited during the medicolegal process, then the information was not available in the file. Usually in a case of ulnar nerve injury, the plaintiff's expert opined that the arm must have been malpositioned because there was an injury. The defense experts usually opined that ulnar nerve injury can occur without apparent causation. Dr. Alexander's letter emphasizes what we say in our paper—that the causes of perioperative ulnar nerve injury are unknown and that large scale prospective studies are needed.

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Anesthesiology
73:1295, 1990

To the Editor—In this age of increased awareness of infection and increased concern about cross contamination between physician and patient, it never ceases to amaze us to watch our anesthesia personnel carefully putting on their gloves before induction only to place the dirty laryngoscope on the clean surface that is used for all the syringes, tubes, airways, and other equipment to be used for both the current and subsequent cases. Furthermore, they use the same pair of gloves, which may have been in the patient's mouth, for continuing the case, which may include the insertion of a second intravenous catheter.

To avoid such practices, we have devised a "clean" way of performing an induction, which we encourage our residents to follow.
1. First, the anesthesiologist puts on two pairs of gloves.
2. Induction is carried out in the normal manner.
3. As soon as the endotracheal tube is in place, the blade of the laryngoscope is held in the gloved hand, and one outer glove is peeled off the hand and inverted over the dirty laryngoscope blade. The other outer glove is also removed. The anesthesiologist now has on a clean pair of gloves to pursue other tasks during the case.

This technique ensures that the used laryngoscope blade never comes in contact with other equipment, and that the gloves that were used for induction and intubation do not touch the chart, the needles, syringes, and other clean equipment.

This may sound a little far-fetched, but it is a positive step on the way to improving infection control procedures in our operating rooms.

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(Accepted for publication October 2, 1990.)