

Letters to the Editor

Influence of Anthropometric Variables on the Spread of Epidural Anesthesia

To the Editor:

Previous studies performed during general surgery or cesarean section reported (1,2) or refuted (3,4) the influence of anthropometric variables such as height, weight, and age on the spread of epidurally administered anesthetics. In term pregnant patients, a reduction of volume injected is usually recommended (1), and considerable volume ranges have been reported to block a fixed dermatomal level. To improve the safety of epidural anesthesia used for cesarean section, we investigated the influence of other anthropometric variables on the spread of epidural anesthesia. Footprints have been used by paleontologists for retrospective anthropometric analysis of the human skeleton (5), and skeletal measurement has been used by De Nguyen et al. (6) to determine ideal body weight.

Sixty ASA grade I consenting near-term pregnant patients, after approval from the hospital ethical committee, were included in this study. Height, weight before pregnancy, weight before anesthesia, the length of the foot from the tip of the first toe to the back of the heel, and wrist perimeter were recorded. Body mass index (BMI) was calculated ($BMI = \text{weight in kg}/\text{height in m}^2$).

Epidural puncture was performed with the patient in the sitting position via the midline approach at the L2-3 interspace. After negative aspiration and negative results from a 3-mL test dose (2% lidocaine with epinephrine 1/80,000), 15 mL of lidocaine 1.6%, with epinephrine 1/200,000, and fentanyl 100 μg were injected through a catheter inserted 3 cm into the epidural space. The upper level of anesthesia was determined by absence of pain in response to pinprick and was correlated to anthropometric variables using a Spearman test.

Twenty percent of patients were obese according to BMI (>30 using the weight at term). Despite the same volume injected, the upper level of anesthesia ranged from T10 to T1 (Figure 1). The mean number of blocked spinal segments at maximum extent of anesthesia was 17 ± 1.6 SD. The only anthropometric measurement to correlate with the level of block was age ($r = 0.39$; $P < 0.003$). The block was adequate for cesarean section in 58 of 60 patients.

In conclusion, only age was found to correlate with the spread of anesthesia, but its coefficient of determination, $r^2 = 0.16$, indicates that this variable is not more useful than those previously published. In this group, we failed to demonstrate any benefit of using

new variables such as wrist perimeter or foot length on the spread of epidural anesthesia. Despite the use of a standardized technique, there was a large variation in the spread of anesthesia, and several uncontrollable factors affect the spread of local anesthetic within the epidural space.

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Fragmentation of Tube Exchanger

To the Editor:

We report a device failure resulting in the deposition of a foreign body in a patient's tracheobronchial tree.

A 38-yr-old man suffered a deceleration injury, sustaining an angiographically documented aortic disruption. The patient underwent emergency thoracotomy for aortic repair. As part of the anesthetic care, a 39-Fr left-sided double-lumen endobronchial tube (Mallinckrodt Medical, Inc., St. Louis, MO) was placed to permit single-lung ventilation. The tube's correct position was verified by fiberoptic bronchoscopy (1). At the conclusion of surgery it was decided to replace the endobronchial tube with a single-lumen endotracheal tube for postoperative ventilation. A 19-Fr tube exchanger (Cook, Inc., Bloomington, IN) was inserted into the bronchial lumen of the double-lumen tube. However, upon direct laryngoscopy it was found that the patient's hypopharynx was so edematous as to make tube exchange an excessively risky procedure, and it was abandoned. The tube exchanger was removed. Before transfer of the patient to the intensive care unit, the endobronchial tube was pulled back into the trachea under guidance of the fiberoptic bronchoscope inserted, in turn, into both lumina. Positioning of the tube was straightforward; however, of great interest was the incidental finding of a foreign body in the patient's left mainstem bronchus. This foreign body was retrieved using urologic forceps. It was a 3 \times 10-mm oval composed of a thin, pale yellow, opaque synthetic material, and was curved and wrinkled (Figure 1).

The identity of the foreign body was a mystery. The possibility was entertained that the patient had aspirated it at the scene of the accident. The initial intubation with the double-lumen tube had been unremarkable; no defects in function or appearance of the tube or stylet had been noted. At no time during surgery was the tracheobronchial tree believed to have been entered by the surgeons. The object was examined by a pathologist, who was equally at a loss to identify it.

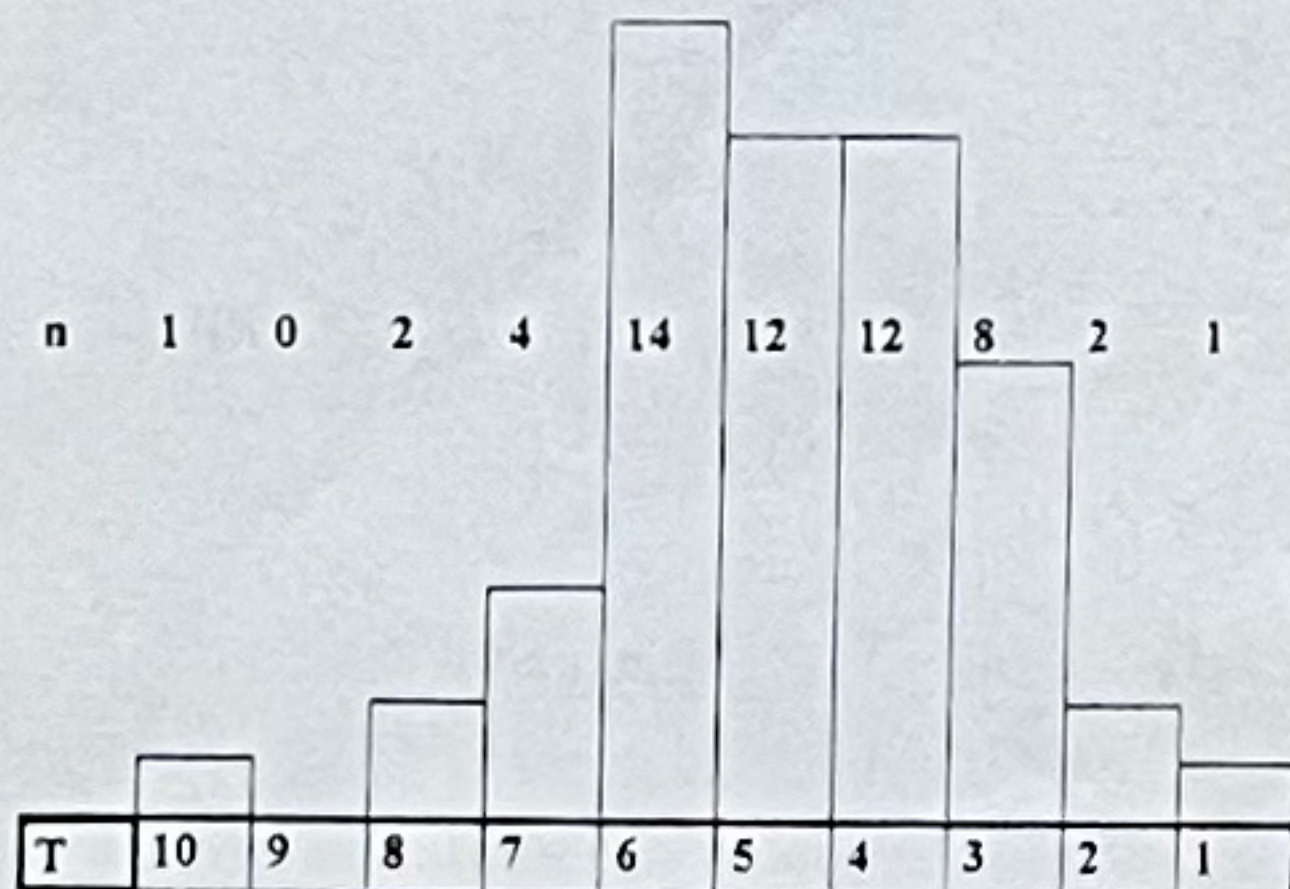


Figure 1. Number of parturients (n) for each upper level of anesthesia (T = thoracic) obtained after injection of 15 mL lidocaine 1.6% in the epidural space.

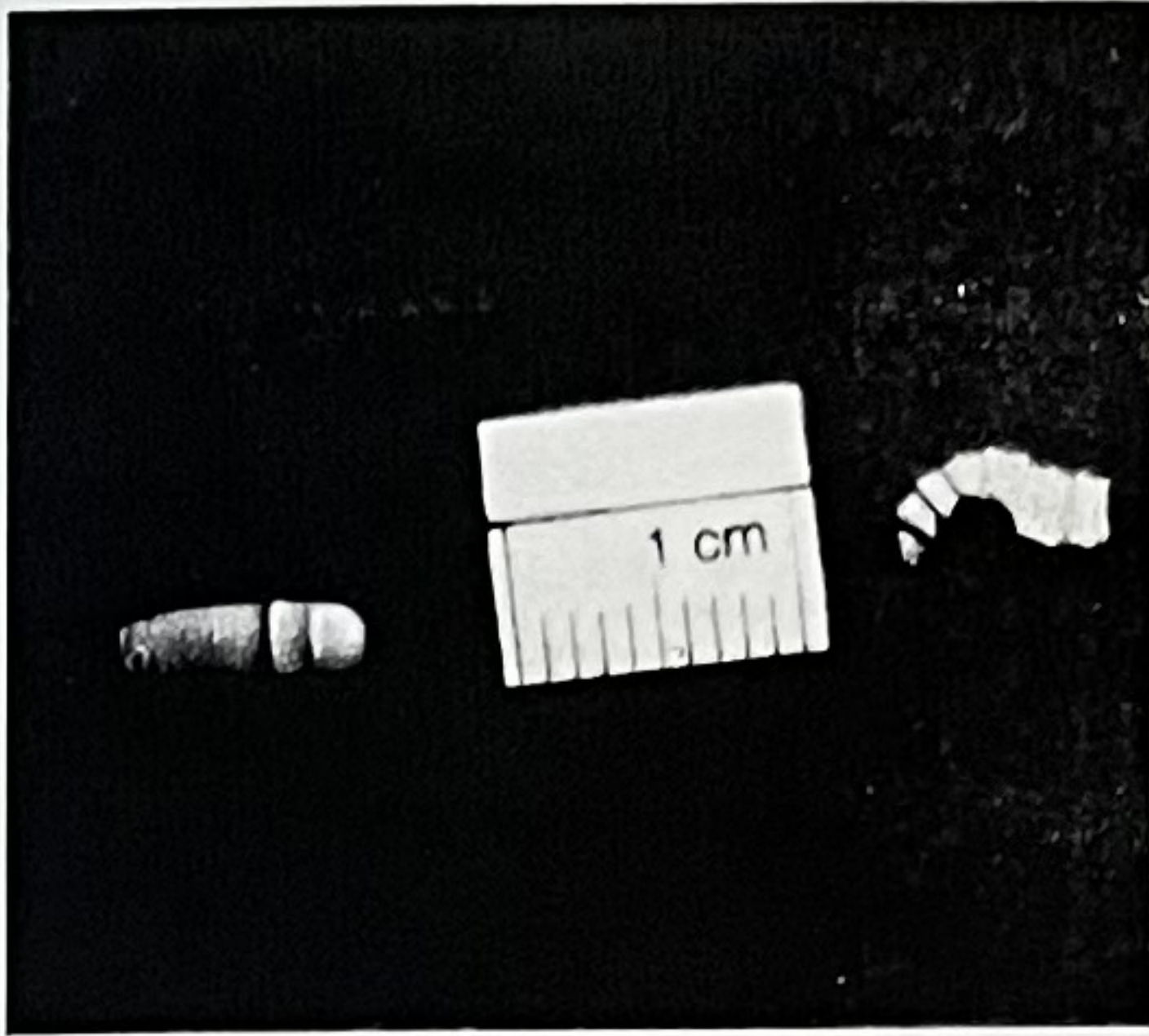


Figure 1. At left is the foreign body recovered from the patient's bronchus. At right is the wafer of plastic recovered from within a double-lumen tube during manipulation of a tube exchanger.

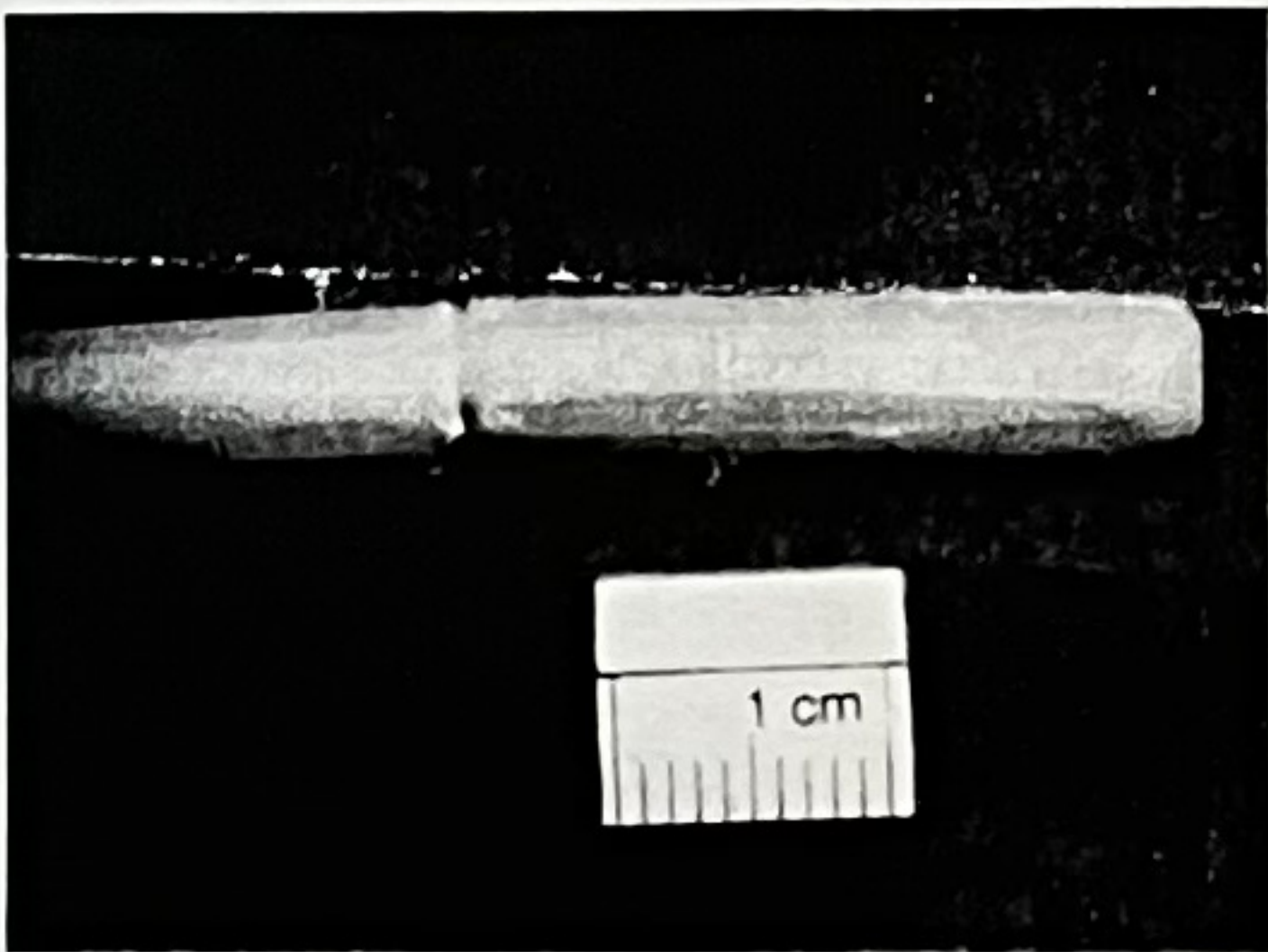


Figure 2. The tip of a tube exchanger after several uses, showing numerous shaved-off areas.

Later, in the course of an unrelated demonstration of the use of tube exchangers, a double-lumen tube and tube exchanger of the same types and sizes used in our patient were being manipulated, and a plastic chip similar in appearance to our patient's foreign body appeared in the tube (Figure 1). The double-lumen tube contains a hard "Y"-shaped casting to which are cemented the truly double-lumen portion on one side and the blue and the clear segments labeled "tracheal" and "bronchial" on the other. This casting presents a sharp edge inside the double-lumen portion which, upon removal of a tube exchanger, can shave off a wafer of the tube exchanger with no palpable resistance. In fact, closer examination of the tip of the tube exchanger revealed at least three distinct flat excoriations where wafers had previously been shaved off (Figure 2).

The Cook tube exchanger is a very valuable aid. In exchanging endotracheal tubes it provides a stiff guide with a reasonably soft tip and the added benefit of an inner lumen for bag or jet ventilation of the patient. Its use in changing a double-lumen tube has been previously described (2). We use it also during extubation in cases

of a possibly difficult airway, so that, if the upper airway is lost, the patient can be jet-ventilated until an airway is reestablished (3,4). The exchanger can even be left in place for an extended period if necessary, if the airway is at risk (5). The present demonstration that the material of the tube exchanger can be shaved off into the patient's tracheobronchial tree is a sobering one. We caution our colleagues to use the Cook tube exchanger in a double-lumen tube only after carefully choosing the sizes of the two devices so that the fit is not tight, and preferably without ever backing the tube exchanger out of the double-lumen tube. We also venture to suggest that the tube exchanger should be manufactured from a more elastic material that will not shave off as easily.

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Here We Go Again

To the Editor:

Laster et al. (1) report that they measured specific gravities of liquid anesthetics. Not so. They measured densities of liquid anesthetics (g/mL). Specific gravities are determined by establishing the ratio between two densities, the denominator usually being water in our specialty.

Failure of anesthesiologists to recognize the fundamental difference between density and specific gravity, as attested to by the article by Laster et al., perpetuates a widespread and important misunderstanding. That the two are not synonymous is not just academic. It is important in, for example, attempting to anticipate the direction and extent of spread of local anesthetic solutions injected into cerebrospinal fluid.

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Dr. Eger was invited to respond, but chose not to.

Epidural Phenol Administration for Iliopsoas Hypertonicity

To the Editor:

Anesthesiologists have unique skills that may be effectively utilized to control chronic spasticity secondary to neurologic trauma. I described some regional anesthetic options when anesthesiologists are consulted to reduce severe hip flexor hypertonicity/spasticity (1). This correspondence describes the use of epidural phenol for three patients with severe hip flexor hypertonicity.

Patient 1 was a 47-yr-old female with T6 paraplegia and unilateral phasic iliopsoas hypertonicity producing pain, interrupting sleep,