

It is well known that a strong sympathetic stimulus will shift blood volume from the systemic or high-pressure to the pulmonary or low-pressure vascular bed.<sup>14</sup> Thus, this patient may be thought of as having experienced a sudden increase in pulmonary blood volume far larger than could have been produced by any external transfusion. Both of these factors together—by no means a rare combination in situations of this type—account fully for the observed fulminating pulmonary edema.

In conclusion, we report an unusual reaction to the injection of 0.4 mg naloxone in a patient who had received 136 mg morphine 11 hours earlier. The reaction was a precipitous widespread activation of the sympathetic nervous system, which induced pulmonary edema in accordance with the history of the patient and his hemodynamic status at the time of the naloxone injection.

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## Plastic Particulate Contaminants in the Medicine Cups of Disposable Non-spinal Regional Anesthesia Sets

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The past several years have seen the increased use of disposable regional anesthesia sets. The actual advantage of these sets over reusable goods has not been well documented. The disposable trays are convenient to use, and most anesthesiologists feel confident in the sterility and general cleanliness of the contained

material. It is supposed that the cost of such equipment is less than that of the reusable variety. Previous reports<sup>1,2</sup> have documented some problems with disposable equipment. We have identified another possible hazard in disposable epidural and nerve block trays—that of particulate contaminants in the medicine cups of the trays.

## METHODS

The trays examined were selected at random from the stock supplied us at our institution. Abbott Epidural, Abbott Nerve Block, Pharmaseal Epidural, and Travenol Epidural sets were included in the series. The trays were opened as they would be in clinical practice, except that surgical gloves were not worn, to insure no particles of powder from the gloves fell into the tray. In each tray, the cup designed to hold the local anesthetic was removed, and its outside carefully wiped with a damp sponge and inspected to

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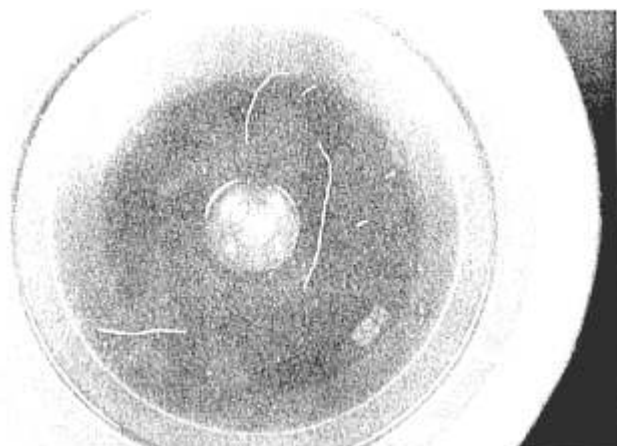


FIG. 1. Plastic shavings and particulate matter as found in anesthetic receptacles.

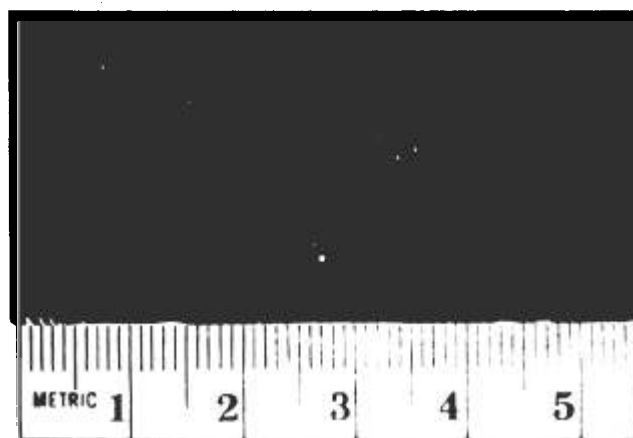


FIG. 2. Plastic debris from a single cup, removed and placed on a black background.

assure there were no particles still clinging to the outer surface. Each cup was then examined against a black background using direct and indirect light. The plastic particles, which were grossly visible clinging to the inside, were counted. The results are presented in table 1. The numbers of grossly visible particles present ranged from 26 to 42. Sizes varied widely, from long shavings of tray material to the more numerous smaller particles, apparently of the same material (figs. 1 and 2). In the Abbott Epidural sets, the back pad designed to protect the catheter is packed in the medicine cup. Debris from it could be easily identified in the cups. In all cases, particles were adherent to the cups and could not be completely removed by dry wiping with the gauze sponge in the set or by tapping the inverted cup on a hard surface. In all cases, the particles could be observed floating in the anesthetic agent when it was added to the cups. We were able to draw grossly visible particles into a syringe through an 18-gauge needle.

DISCUSSION

Other problems with disposable regional anesthesia equipment have been documented. DiGiovanni<sup>1</sup> has shown that mass-produced spinal needles may not have uniform stylets and can introduce skin plugs into the underlying tissue. Eng<sup>2</sup> has recently reported the

breaking of a disposable introducer. There is some evidence to indicate possible toxicity of implanted plastic polymers. Oppenheimer has demonstrated an increased incidence of fibrosarcomas in rats in the area of implanted plastic polymers.<sup>3</sup> Certainly, many plastics are capable of generating a foreign-body reaction. Should inadvertent subarachnoid or intravenous injection of the test dose of an epidural anesthetic occur, these particles could be deposited intrathecally or intravenously, respectively, with unknown consequences.

We have adopted the practice of not using the enclosed medicine cup in disposable epidural trays. Rather, we either draw the local anesthetic agent directly into the syringe it will be injected from, or add our own sterile glass or stainless steel medicine cup to the set.

In summary, we have identified plastic particulate contaminants in the medicine cups of disposable epidural and nerve block trays. We feel that the presence of these particles represents a possible hazard if they are injected with the anesthetic agent. This hazard is not associated with disposable spinal trays, because they do not contain medicine cups. Because of these findings, we suggest these medicine cups not be used, and that an alternate method of containing the local anesthetic agent be used.

TABLE 1. Results

	Number of Trays Examined	Mean Number of Particles	Range
Abbott Epidural	12	38.3	22-54
Abbott Nerve Block	12	42	16-72
Pharmaseal Epidural	5	40.8	27-55
Travenol Epidural	5	26.8	13-40

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