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First Wartime Use of Surgical Anesthesia

To the Editor:—We would like to thank Dr. Tverskoy for his information concerning the use of ether anesthesia by Russian surgeon Pirogoff in July, 1847, during the Caucasus War.¹ Pirogoff's career has recently been explored in some detail by Secher.²

We would also like to clarify that the intent of our article³ was to precisely establish the first wartime use of surgical anesthesia. That initial use was made by American physicians beginning in March, 1847, during the Mexican-American War. That a Russian surgeon made similar, extensive use of anesthesia within months of its appearance on the battlefields in Mexico is further testimony to the speed with which the application of anesthesia to surgery spread around the world in the months following Morton's October, 1846, demonstration.

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Venous Air Embolism and Cesarean Sections

To the Editor:—Dr. Younker and his colleagues are to be complimented for the management of venous air embolism (VAE) during the course of a Cesarean section.¹ Again, it must be emphasized that VAE is not restricted to neurosurgical procedures being performed on patients in the sitting position.² VAE can occur with a gravitational gradient as small as 2.5 cm *via* an organ or organ system rich in draining veins or venous sinuses.³ A number of reports concerning VAE in obstetrics appeared in the French medical literature in the early half of the 19th century.⁴ Our concern with the recent paper by Younker *et al.* is their statement that the precordial Doppler air bubble detector "be reasonably restricted to cases at risk." This means that the largest group of patients undergoing cesarean sections would not be monitored for VAE, since more than half of the cesarean sections in North America were performed under regional anesthesia.^{5*} Under these conditions, where the iatrogenic relative hypovolemia may not always be completely corrected, and since a lower mean intrathoracic pressure is seen under spontaneous ventilation when compared to the controlled mode, the likelihood of venous air entrainment is enhanced.

The authors¹ describe the ability of the Doppler to

give warning of minor embolic phenomena before they become serious, and, although there may be a correlation between hemodynamically significant air emboli and their detection by end-tidal capnography, why should one wait until the VAE is significant before treatment is started? While the Doppler may be unable to differentiate between VAE and thromboembolism once cardiovascular collapse has occurred, it would appear to be more logical to detect the VAE before collapse occurs to begin correct therapy.

We feel that, in patients undergoing cesarean sections under regional anesthesia, the VAE monitor of choice is the precordial Doppler. We would also suggest that pre-operative placement of a multi-orificed air aspiration catheter is indicated in those cases where significant risk of VAE can be identified.⁵ These wire-guided catheters⁶ are easy to insert from the antecubital fossa, and allow for the immediate, rapid aspiration of air when the Doppler air bubble detector is activated.

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In reply:—We appreciate very much the comments offered by Dr. Robinson and Dr. Albin. Their welcome discussion of both precordial Doppler monitoring and appropriately positioned multi-orificed central venous catheters in the management of parturients undergoing cesarean section with regional anesthesia significantly broadens the scope and intent of our original article.

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Safety of Continuous Epidural Infusions

To the Editor:—We read with interest the case report by Lin *et al.*¹ regarding neurologic sequelae after accidental injection of toxic substances into the epidural space. We recognized the potential for this disaster prior to our initiating continuous epidural opiate infusions, and have taken steps to minimize the potential for such an occurrence.

We agree with the authors' recommendations for decreasing such accidents, and offer further suggestions:

1. We use a special solution administration set (#2C1503 Travenol Laboratories Inc., Deerfield, Illinois) which has no injection ports and makes a Leur lock connection with the epidural catheter. In addition, we securely tape this connection.

2. All patients treated with epidural morphine post-operatively are sent to one of two hospital wards where the nursing staff is familiar with epidural opiate analgesia and the equipment involved.

3. Any manipulations of the tubing or catheter are performed by a member of our department.

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Safe, Continuous Epidural Infusions

To the Editor:—Drs. Lin, Becker, and Shapiro¹ present a timely report on neurologic changes following accidental drug injection through continuous epidural catheters.

One way that accidental injection of a continuous epidural catheter can be prevented is by the use of rigid tubing without any ports designed for continuous pressure