

relaxants to mask inadequacies of regional anaesthesia, and all failing to test their hypothesis.⁴ The time is long overdue to review the design of experimental protocols in this very difficult area of nociception and clinical outcome, and to throw away the deceptive crutch of muscle relaxants, as some of us have done, with great satisfaction for major intrathoracic and abdominal surgery and ultra-early ambulation.⁵ Clearly, there is always a need for brief use of a short-acting muscle relaxant, such as succinylcholine, while diathermy-cautery is being used directly on the muscles of the abdominal or chest wall, but that is the only concession that should be made to reliance on the integrity of regional blockade for effective muscular relaxation, a quiet operative field and ultra-early mobilisation.

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REPLY

Thank you for the opportunity to respond to the comments/criticisms raised by Dr. Bromage. My reply, not retort, to Dr. Carli¹ that "nothing was further from the truth," is valid.² The most stimulating event in surgery is the incision. In our experience, all patients undergoing aortic surgery under general anaesthesia respond to the incision and require more opioids or deeper inhalational anaesthesia.³ None of our epidural patients required additional opioids at the time of incision. To me, this is the acid test and demonstrated that the epidural was working and the block extended to the xyphoid process. Pancuronium may mask motor responses to inadequate segmental analgesia, but all anaesthetic drugs mask response to pain in some way.

We did not verify the height of the block before or after surgery. We relied on patient comfort as the measure of success as I am sure Dr. Bromage does in his clinical prac-

tice. Demonstration of a segmental level of blockade does not guarantee success as frequently demonstrated at caesarean section. Postoperatively, it may be impossible to demonstrate segmental block using bupivacaine 0.1% in our geriatric patient population. In fact, we reduced the concentration of bupivacaine from 0.125% to 0.1% because of sometimes persistent motor block. Analgesia continued, the patients were comfortable, and this was the aim.

If I were to repeat this study, the one change would be to demonstrate a T5 block before induction of anaesthesia. I am sure we achieved this level, but not to verify it leads to unanswerable questions.

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Combined spinal/epidural in neonates and children

To the Editor:

I have two concerns regarding the technique of Drs Williams *et al.* regarding the use of combined spinal and epidural anesthesia in the awake neonate and infant.¹ First is the recommendation of performing an epidural block after a spinal anaesthetic. The authors failed to mention the possibility of total spinal block from the passage of local anaesthetic through the hole in the dura.²

Second, I wonder about the advisability of performing extensive surgical procedures without airway protection although the authors previously described the use of spinal anesthesia as the sole anaesthetic for repair of gastrosciscis³ and closure of meningomyelocele.⁴ The maintenance of spontaneous ventilation may be further compromised by the surgical procedure as well as the need for supplemental intravenous sedation. The authors state that extubation may not be possible with the combined technique. We performed continuous caudal epidural anaesthesia with chloroprocaine combined with general anaesthesia in 25 neonates and

infants⁵ undergoing similar surgical procedures. Anaesthesia consisted of either isoflurane 0.2% or nitrous oxide 70% in oxygen. The tracheas were extubated in 23 of 25 patients in the operating room. A similar experience in 14 neonates and infants was reported by Murrell *et al.* using lumbar epidural anaesthesia combined with general anaesthesia.⁶ Although the spinal block allows the epidural catheter to be placed without concern for patient movement, both caudal⁷ and lumbar epidural catheters⁸ can be placed in the awake neonate, if necessary.

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REPLY

We did encounter one episode of unexpectedly high spinal blockade after dosing the epidural catheter.¹ This has occurred several times in our experience after caudal anaesthesia without previous lumbar puncture. Possible causes include high epidural blockade vs direct or indirect subarachnoid injection of local anaesthetic. Several factors argue against transport of local anaesthetic through a hole in the dura. The tip of the epidural catheter is located in the mid to low thoracic area and local anaesthetic is injected

60–90 min after lumbar puncture. In addition, the pressure differential between the subarachnoid and epidural spaces does not favour flow into the subarachnoid space.

We agree that both caudal and lumbar epidural blocks can be performed in awake infants. However, we feel that performance of the blocks is easier in the non-struggling anaesthetised child. We have observed, in both adults and children, that subarachnoid block provides a denser block to begin surgery. The epidural catheter is very effective at supplementing and prolonging the original subarachnoid block.

We do not believe that intubating the trachea is necessary for these cases. Induction of general anaesthesia, laryngoscopy and placing an endotracheal tube is not a guarantee against aspiration. Our goal is to allow the child to remain appropriately alert with intact airway reflexes. There are times when either the infant's surgical status or level of consciousness, requires endotracheal intubation and general anaesthesia. However, our contention is that an awake, responsive, and spontaneously breathing infant is the best physiological infant monitor.

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Is intrathecal midazolam safe?

To the Editor:

I read with many interests the laboratory investigation done by Bahar *et al.*¹ who concluded that intrathecal midazolam in rats provides "segmental spinal anaesthesia sufficient to permit laparotomy" and concluded that "this 'balanced anaesthesia,' ... could find wide application in abdominal and lower limb surgery."¹ The authors cannot be unaware of intrathecal midazolam effects in patients scheduled for intraabdominal surgery published by investigators at Leeds University.² Hypertension was experienced after manipulations of the peritoneum and the bowel and when the colon was handled.² Thus, there is evidence that intrathecal midazolam alone cannot provide surgical anaesthesia in man.

Wide clinical use of spinal injections of new drugs raises the question of its lack of neurotoxicity. Bahar *et al.*¹ state positively and quote several reports of neurotoxicological assessments of intrathecal midazolam in animals. From the cited reports, one cannot conclude a lack of toxicity since high incidences of neurotoxic