with DMD to malignant hyperthermia (MH) when exposed to triggering agents. Richard's report of 61 uneventful general anaesthetics in 43 patients with DMD¹ is countered by recent case reports of cardiac arrest and MH during general anaesthesia in patients with DMD.^{2,3}

We conducted a retrospective study to investigate our experience in providing general anaesthesia to patients with DMD. The anaesthesia and recovery room records of all patients with DMD who underwent surgery between the years 1980 and 1990 were reviewed. Most of the surgical procedures were tendon transfers, releases and posterior spinal fusions. Only those patients with a muscle biopsy confirmed diagnosis were included. Induction technique, anaesthetic agents and the use of muscle relaxants were recorded. In addition, any clinical sign or laboratory changes suggestive of MH were sought.

We administered 84 general anaesthetics to 36 patients. The patients' ages at the time of surgery ranged from 5 to 21 yr (mean 11.2 ± 4.6 yr). The induction techniques were as follows: 52% received inhalational induction with halothane, 45% received *iv* induction using thiopentone, propofol, midazolam or ketamine and one patient received a nitrous oxide/narcotic technique. Except in one patient anaesthesia was maintained with a halogenated volatile agent. One patient received succinylcholine and nondepolarizing muscle relaxants were used in 31%.

None of the patients developed signs or symptoms suggestive of MH. The uneventful perioperative course of our patients parallels Richard's experience and is quite different from that of Sethna *et al.*⁴ Despite our uneventful experience with the administration of MH triggering agents to patients with DMD, the relationship between DMD and MH remains unclear and the experience of previous investigations should not be overlooked.

Anthony Peluso MD
Adam Bianchini MD
Department of Anesthesiology
Newington Children's Hospital
181 East Cedar Street
Newington, Connecticut 06111

REFERENCES

- 1 Richard WC. Anaesthesia and serum phosphokinase levels in patients with Duchenne's pseudohypertrophic dystrophy. *Anaesth Intensive Care* 1972; 1: 150-3.
- 2 Kelfer HM, Singer WD, Reynolds RN. Malignant hyperthermia in a child with Duchenne muscular dystrophy. *Pediatrics* 1983; 71: 118-9.
- 3 Brownell AKW, Paasuke RT, Elash A, *et al.* Malignant hyperthermia in Duchenne muscular dystrophy. *Anesthesiology* 1983; 2: 180-2.

- 4 Sethna NF, Rockoff MA, Worthen MH, *et al.* Anesthesia-related complications in children with Duchenne muscular dystrophy. *Neurology* 1986; 36 (suppl. 1): 152.

Axillary block

To the Editor:

I would like to comment on several aspects of the study "Axillary brachial plexus block using a peripheral nerve stimulator: single or multiple injections," by Dr. Lavoie *et al.*¹

First, I wish to congratulate the authors on their work. Second, the authors claim that this study was "double-blind." Assessment of the blocks may have been "blinded," but the performance of each block certainly was not. In addition, how was the patient blinded? Editors, reviewers and investigators are fixated on prospective, randomized, double-blind study designs. This is often difficult, if not impossible, to do with regional anaesthetic techniques and is not necessarily desirable. What is important is that this study was prospective, randomized and the same endpoint (i.e., muscle twitch at 0.5 m.a.) was used on every patient. The fact that the endpoint that was accepted as indicating proper needle position was constant, provides objective evidence that there was no attempt, deliberate or otherwise, to influence the results of this study during the performance of the blocks. Blinded assessment assures that there is not an opportunity to direct the study results during this phase only. Finally, it is not entirely clear how the axillary brachial plexus blocks were performed from the manuscript. The authors claim that "stimulation of two nerves inside the axillary sheath was not performed" (Discussion - Line 11). This does not seem compatible with the study design (Methods: G-1 and G-2).

Scott A. Lang MD FRCP
Saskatchewan

REFERENCE

1. Lavoie J, Martin R, Tétrault J-P, Côté DJ, Colas MJ. Axillary plexus block using a peripheral nerve stimulator: single or multiple injections. *Can J Anaesth* 1992; 39: 583-6.

REPLY

We appreciate the interest of Doctor Lang in our paper. We consider that our study was double-blind because the patient did not know what aspect of his axillary block was studied specifically (all the patients had at least one nerve stimulated) and the anaesthetist who did the block was not the one who evaluated it. We considered the musculo-cutaneous nerve as being outside the axillary sheath. Consequently no group had stimulation of this

nerve alone, because there was no reason for single injections outside the axillary sheath. On the other hand, there is a rationale for single injection near the three other nerves (median, radial or ulnar) which are presumably located inside the axillary sheath. As you say, patients in Group 1 (four nerves stimulated) had more than one injection inside the axillary sheath.

René Martin MD
Sherbrooke, P.Q., Canada

Modified nasal cannula to monitor $ETCO_2$

To the Editor:

In the sedated spontaneously breathing patient undergoing a regional anaesthetic technique, monitoring the respiratory wave form and end-tidal CO_2 provides an indication of the patient's ventilatory status. Methods of monitoring end-tidal CO_2 during regional anaesthetic techniques or monitored anaesthesia care have been documented in the

literature.^{1,2} Transcannula end-tidal CO_2 monitoring has been shown to be a reliable means of monitoring ventilatory status.³ Commercially available cannula for the simultaneous sampling of CO_2 from one nostril during administration of O_2 to the other nostril are available (Brathwaites Olivier Medical Inc.). This effective monitoring system can easily be made by modifying a standard set of nasal prongs to provide a simple, reliable and inexpensive set of nasal cannula for end-tidal CO_2 monitoring (Figure). The tubing connecting the nasal prongs is partially cut to allow insertion between the prongs of a plug that will seal and divide the two parts. The rubber nipple from the tab of a packed cell bag works well. Next, one arm of the nasal cannula tubing is tied off at its proximal end. A 14 g cathlon catheter is inserted snugly into the open distal end of the tubing to form a Luer-Lok[®] connection and seal. Finally, the CO_2 sampling tube is attached to the 14 g catheter. This arrangement will allow O_2 administration through one nostril and CO_2 sampling from the other. We believe these modifications provide a simple, practical and inexpensive alternative to commercial divided nasal cannula. Although $ETCO_2$ levels and respiratory rate may be effectively monitored using this technique, problems such as occlusion due to water droplets, kinking or displacement of the tubing may occur.

D. Zimmerman MD
R.G. Loken BSC (HONS) MD FRCPC
Department of Anaesthesia
Foothills Hospital
Calgary, Alberta

REFERENCES

- 1 Pressman MA. A simple method of measuring $ETCO_2$ during MAC and major regional anesthesia. *Anesth Analg* 1988; 67: 905-6.
- 2 Goldman JM. A simple, easy and inexpensive method for monitoring $ETCO_2$ through nasal cannulae. *Anesthesiology* 1987; 67: 606.
- 3 Louwsma DL, Silverman DG. Reproducibility of end tidal CO_2 measurements in sedated patients receiving supplemental O_2 by nasal cannula. *Anaesthesiology* 1988; 69:A268.

FIGURE