Anesthesiology
61:353, 1984

Observations Made in the Adductor Pollicis May Not Be Applicable to Other Muscle Groups

To the Editor:—"Characterization of the Train-of-Four Response in Fast and Slow Muscles: Effect of *d*-tubocurarine, Pancuronium and Vecuronium," by Day *et al.*,[1] offers interesting information about the difference between train-of-four inhibition and twitch depression produced by several neuromuscular blockers acting on different muscle types (fast *vs.* slow muscles). I would point out that the adductor pollicis muscle in humans is a slow muscle, consisting of 80 ± 9% type 1 or slow fibers,[2] and not a fast muscle as stated by the authors. Many muscles of importance to the anesthesiologist (*i.e.*, diaphragm, intercostals, vocal cord musculature, and abdominal wall musculature) are, in fact, a mixture of fast and slow fibers. Therefore, I question whether information obtained from a slow muscle such as the adductor pollicis (the muscle used most frequently in investigation of neuromuscular blockade) legitimately can be extrapolated to muscles of mixed fiber content or to fast muscles. Secher *et al.*[3] were able to compare the effect of *d*-tubocurarine on the soleus (slow) and gastrocnemius (fast) muscles of six healthy human subjects and found that *d*-tubocurarine affects human muscles in direct proportion to slow muscle fiber content. However, this study did not look at any muscles that are of direct interest to the anesthesiologist.

Animal studies can shed only partial light on this question, and Day *et al.* did state that "the extrapolation of data across muscle types and between different species may present difficulty in interpretation with regard to mechanism of action or the assessment of muscle function after drug administration." Studies in anesthetized humans that compare evoked response in adductor pollicis to responses in other more clinically relevant muscle groups may shed more light on this question.

STANLEY WEBER, M.D.
Research Fellow in Anesthesia
Department of Anesthesia
Hospital of the
University of Pennsylvania
3400 Spruce Street
Philadelphia, Pennsylvania 19104

REFERENCES

1. Day NS, Blake GJ, Standaert FG, Dretchen KL: Characterization of the train-of-four response in fast and slow muscles: Effect of d-tubocurarine, pancuronium, and vecuronium. ANESTHESIOLOGY 58:414–417, 1983
2. Johnson MA, Polgar J, Weightmen D, Appleton D: Data on the distribution of fibre types in thirty-six human muscles: An autopsy study. J Neurol Sci 18:111–129, 1973
3. Secher NH, Rube N, Secher O: Effect of tubocurarine on human soleus and gastrocnemius muscles. Acta Anaesthesiol Scand 26:231–234, 1982

(Accepted for publication April 24, 1984.)

Anesthesiology
61:353–354, 1984

Management of Pain after Thoracotomy: A Technique of Multiple Intercostal Nerve Blocks

To the Editor:—Recently Murphy[1] produced continuous pain relief following cholecystectomy using intercostal nerve blockade with a catheter placed in one intercostal space. O'Kelly and Garry[2] also used this technique to provide thoracic analgesia in a patient with fractured ribs. We used this method after thoracotomy in four patients who underwent thoracic surgery for cancer of the lung.

Toward the end of surgery and while the thorax was still open, an indwelling catheter was inserted in the region of the angle of the rib and walked to the lower edge of the rib into the intercostal space below the one opened for surgery. The blockade was maintained by topping-up with a local anesthetic solution (bupivacaine 0.25%, 20 ml) every 4 h in the first 24 h after surgery. All the patients showed a decrease in sensation to pinprick in the thoracic segments contiguous to the one where the intercostal cannula was inserted. On an average the sensation of three dermatomes were blocked, while the sensation in the segments of the opposite side of the thorax was normal.

After every block, the intensity of pain decreased (fig. 1). Furthermore, no analgesic drug was required in the

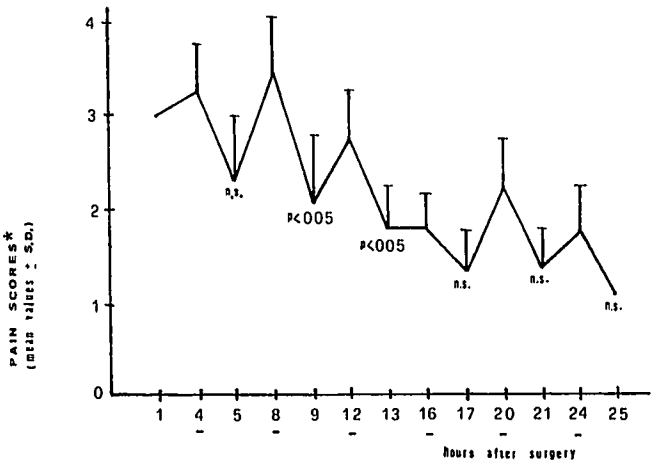

FIG. 1. Pain scores during the first day after surgery. —— = injection; * = pain scores: 0—nil, 1—mild, 2—moderate, 3—severe, 4—very severe.

24 h after surgery. Arterial blood pressure and heart rate did not change. The respiratory rate constantly decreased after the injection of the local anesthetic solution, which correlated with the decrease of pain scores.

Even if the very small size of our study population is insufficient to document the safety and the advantages of this technique over standard analgesic approaches, we believe that continuous intercostal analgesia after thoracotomy can be achieved by the insertion of a single catheter into an intercostal space and by topping-up with a local anesthetic solution. The unilateral dermatomal distribution of the sensory block of only three thoracic segments is an evidence of the medial and paravertebral spread of the anesthetic solution.[3,4]

LUIGI RESTELLI, M.D.
PIERGIACOMO MOVILIA, M.D.
LEONARDO BOSSI, M.D.
Second Service of Anaesthesia and Pain Relief Unit

CARLO CAIRONI, M.D.
Second Department of Surgery

Legnano General Hospital
Via Candiani 2
20025 Legnano (Milan)
Italy

REFERENCES

1. Murphy DF: Continuous intercostal nerve blockade for pain relief following cholecystectomy. Br J Anaesth 55:521–524, 1983
2. O'Kelly E, Garry B: Continuous pain relief for multiple fractured ribs. Br J Anaesth 53:989–991, 1981
3. Moore DC, Bush WH, Scurlock JE: A roentgenographic anatomic study of technique and absorption in humans. Anesth Analg 59:815–825, 1980
4. Bromage PR: Physiology and pharmacology of epidural analgesia. Anaesthesia 28:592–622, 1967

(Accepted for publication February 24, 1984.)