A NOTE ON THE ANAESTHETIC EFFECT OF SUCCINYLCHOLINE IN CLINICAL SITUATIONS

MICHAEL KEERI-SZANTO, M.D.*

SINCE THE NOW CLASSICAL EXPERIMENT of Smith and co-workers,¹ confirmed more recently by Shea and co-workers,² it has been universally accepted that the muscle relaxants have no anaesthetic action whatsoever when applied by themselves. This thesis has been further strengthened by lawsuits against anaesthetists by patients who succeeded in convincing juries that they underwent surgery paralysed but not anaesthetized and whose suffering was found to be worth many thousand dollars.

During recent work on various intravenous anaesthetic supplements to nitrous oxide-relaxant anaesthesia, we have encountered somewhat comparable situations in our own practice. Since it is our sincere hope that this series will not increase further and since we believe that these observations are of some general interest, we submit them to our readers at this time.

In the anaesthetic setup where these incidents occurred, the subjects were scheduled for routine abdominal surgery, cholecystectomy, hysterectomy, appendicectomy, and the like. They were premedicated with an oral barbiturate and with intramuscular phenothiazine and scopolamine. Induction of anaesthesia was accomplished by inhalation of a mixture of N₂O 5 L. and O₂ 2 L. per minute and the concurrent intravenous administration of increments of some narcotic. Following the disappearance of the eyelid reflex, endotracheal intubation was performed with the aid of suxamethonium, the level of anaesthesia was adjusted by additional increments of the intravenous drugs, and a satisfactory surgical field was maintained by varying the rate of a succinylcholine drip. The pre and postoperative courses of our patients were uniformly favourable from the objective standpoint. Since this series served for the evaluation of intravenous anaesthetics, the patients were questioned in particular detail postoperatively.

To the question, what was the last thing they recalled before going to sleep, two patients replied that they remembered the incision; they did not volunteer this fact earlier in the interview. They described the sensation as comparable to a heavy scratch and they did not recall any feeling of anxiety or distress even on direct questioning. They were able to furnish convincing proof that they were more than partially conscious up to the moment of incision.

A third patient, an intelligent and high-strung woman of 32 years of age, presented a different problem. This lady stated on her arrival in the recovery room and during subsequent interviews that she has been conscious during her abdominal hysterectomy. She was greatly distressed and she required several sessions of "abreaction" and explanation to be semi-placated. She received during a 150-minute intervention the equivalent of 350 mg. meperidine intravenously,

*Department of Anaesthesia, Notre-Dame Hospital, Montreal.

N₂O 2 L. plus O₂ 1 L. per minute with controlled respirations, and 500 mg. of succinylcholine chloride over 100 minutes of the intervention. In describing her experience she fully convinced us that she was indeed conscious for the great part of her operation, yet she complained very little of pain, only of the anxiety caused by being unable to communicate. Immediate review of her anaesthetic chart showed a completely stable pulse and blood-pressure during the intervention. It goes without saying that there was no muscular sign of incomplete anaesthesia once the induction was over, and this in spite of the rather low dose of relaxant employed. Her skin was uniformly dry throughout and her pupils remained constricted during the entire procedure: yet she clearly recalled the anaesthetist lifting her eyelid and looking her in the eye.

Thus far, this would be no more than an exercise in humility by reporting outstanding failures of our anaesthetic efforts were it not for the fact that all three patients were completely oblivious, even after direct questioning, of their intubation. The last patient recalled being extubated and the fact that she could not remember when the tube was inserted into her trachea was the principal argument that helped to convince her that she was unconscious on and off during her operation after all. We are thus confronted with three instances of established consciousness and memory before and very shortly after intubation with complete loss of memory for the intervening period. Since hyperventilation and controlled respiration were established sooner, the only variation that coincided in time with our observation was the intravenous administration of 50 mg. suxamethonium (Brevdil) and the production of transient complete muscle paralysis.

We interpret this observation as confirmation and extension of the work by Shea and others² and by Morpurgo and others.³ It may also furnish an alternative explanation to Gray and Geddes' thesis⁴ that hyperventilation potentiates anaesthesia by decreasing the sensory input to the brain. This diminished sensory input might be due to the muscular paralysis necessary for hyperventilation, or at least for the beginning of hyperventilation, not to the decreased pCO₂ caused by hyperventilation or to the mechanical events of the hyperventilation itself. It would also furnish a rationale for the practice of our British colleagues who insist upon complete curarization of their subjects and who prefer to use massive doses of antidotes postoperatively rather than trying to get by on the minimum necessary dose of muscle relaxants.

SUMMARY

Three instances of abdominal surgery are reported where the subjects furnished proof of memory just before and after, but not during, endotracheal intubation. This finding is interpreted as evidence that under clinical conditions muscle relaxants do possess some anaesthetic action.

RÉSUMÉ

Rapport de trois cas de chirurgie abdominale où les sujets se souviennent des événements précédant et suivant l'intubation endotrachéale, mais non la mani-

pulation elle-même. Ces données indiquent que, employés dans des conditions cliniques, les curarisants possèdent un certain pouvoir anesthésique.

REFERENCES

1. SMITH, S. M.; BROWN, H. O.; TOMAN, J. E. P.; & GOODMAN, L. S. *Anesthesiology* 8: 1 (1947).
2. SHEA, L. T., DAVIDSON, G. M., & DAVIS, J. *Med. J. Australia*, 656 (1954).
3. MORPURGO, C. V., SPINELLI, D., & MARGARIAGA, M. *Second World Congress of Anaesthesiologists* (1960).
4. GEDDES, I. C., & GRAY, T. C. *Lancet* *ii*: 4 (1959).