SYNCURINE* IN ENDOTRACHEAL INTUBATION †

PHILIP J. BAILEY, M.D., AND FRANK J. MURPHY, M.D.

San Francisco, California

Received for publication April 10, 1950

INTRODUCTION

The use of an agent, syncurine, that materially assists in preparing the patient for endotracheal intubation has been investigated at this hospital in 500 unselected cases.

Syncurine, brand decamethonium bromide (C10), a synthetic neuromuscular blocking agent, is a white crystalline substance standardized by physicochemical methods. Unlike d-tubocurarine chloride, syncurine is not antagonized by prostigmine sulfate.

King (1) stated that d-tubocurarine is a bis-tetrahydroisoquinoline alkaloid containing two quaternary nitrogen atoms and that conceivably its action is caused by two such groups at some optimal distance apart.

Barlow and Ing (2), by investigating the curare-like action of polymethylene bis-quaternary ammonium salts, found that a substance containing 10 carbons possessed potent neuromuscular blocking properties. This is the chemical substance (C10) syncurine. Hewer (3) reported that when using syncurine, muscular relaxation began in two to three minutes, reached a peak in four to eight minutes and that the duration of action was from fifteen to twenty-five minutes. The return of muscle tone and respiration was abrupt, the tidal exchange becoming normal in three minutes after the onset of recovery. He also reported that he had encountered no side effects such as bronchospasm or fall in blood pressure.

It would appear then that if syncurine is a potent neuromuscular blocking agent, capable of producing rapid onset and recovery, it might be particularly suited to preparing the patient for endotracheal intubation.

Because the untoward effects of endotracheal intubation may all be traced to improper or imperfect preparation, it may be said that the preparation of the patient before the actual intubation is of more importance than the actual placing of the tube.

* Decamethonium bromide (C10) supplied through the courtesy of Burroughs Wellcome & Company.
† From the Department of Anesthesiology, University of California Hospital, San Francisco, California.
It perhaps would not be amiss to state briefly what are considered to be the optimal conditions for endotracheal intubation. 1. A well relaxed musculature facilitates positioning the patient’s head as well as providing an unobstructed view of the glottic aperture. This latter condition is indeed a necessary objective since it enables the anesthetist to choose an endotracheal tube of the appropriate diameter, thus eliminating the need for trial and error selection. 2. The agent or agents used in the preparation for the event should be such that there is a minimum of reaction to insertion of the tube. By reaction is meant straining, “bucking” and other manifestations not so apparent (4). 3. With the technic and agents used, one should be able to predict a reasonably consistent result.

Should the above conditions be achieved, it should be possible to effect a smooth, atraumatic endotracheal intubation.

PROCEDURE

Owing to the extensive use of electrocautery at this hospital, experience gained in the use of syncurine has been limited almost entirely to intravenous anesthesia, using various agents. The procedures have been carried out on patients ranging from 10 to 80 years of age.

Premedicants are administered one hour before operation and usually consist of morphine sulfate, 10 mg., with scopolamine, 4 mg., or the equivalent. These dosages may be slightly more or less, depending upon the age and physical status of the patient.

We frequently use a mixture consisting of 20 cc. of pentothal sodium, 2.5 per cent, to which has been added 250 mg. of nembutal sodium in 5 cc. (5). The first 5 cc. of this mixture is injected slowly in order to assess the effect on the patient, thus providing a clue as to the total dosage that may be required. Additional amounts of the mixture are administered slowly until the patient has lost consciousness, then oxygen is administered by mask to prevent any degree of hypoxia. It is well to note that this part of the procedure is important and must be maintained up to the time that intubation is effected.

Having injected sufficient of the mixture to produce unconsciousness, 3 mg. of syncurine is administered through the same needle at the rate of 1 mg. per second. This rate does not appear to be critical, but was chosen for the purpose of assessing the capabilities of the drug.

The depth of anesthesia is then ascertained, and should additional amounts of the pentothal-nembutal mixture be required, they are given. A certain period of time must elapse from the moment the syncurine is injected until intubation is begun in order that the drug may produce its effect. Since this time interval is of great importance, one must on no account be tempted to hurry the procedure. After the syncurine has been injected, a minimum of three minutes is required before intubation is performed.
RESULTS

The dosage of 3 mg. of syncurine was chosen by trial and error. It was found that, like any other agent, the amount required was subject to individual variation. Less consistent results were encountered using a smaller dosage of 2 to 2.5 mg. Amounts of syncurine in excess of 3 mg. appeared to serve no more useful function since our main interest was in producing adequate relaxation for intubation.

Not infrequently intercostal paralysis was encountered, resulting in an inadequate tidal exchange, but this in itself presents no special problem, since respiratory exchange may be supplemented by manual inflation of the lungs with 100 per cent oxygen up to the time intubation is begun.

The effect of 3 mg. of syncurine appears to become evident in a matter of three minutes or slightly more. Relaxation of the muscles of the neck and jaw is excellent, thus providing a necessary condition for placing the patient in position. One of the outstanding effects of syncurine is its ability to sustain the vocal cords in abduction. It is thought that this effect is of importance in estimating the size of the glottic aperture so that the anesthetist may readily select an endotracheal tube of the proper diameter. In addition, it is our clinical impression that there is less reaction, seen as "bucking" or straining, when the tube is inserted. Attenuation in reaction to insertion of the tube is clinically important in that trauma to the larynx and trachea is minimized. Whether syncurine is capable of lessening vagal reflexes is a matter for further investigation.

COMMENT

The consistent ability of syncurine to assist in setting the stage for endotracheal intubation may be the result in part of the fact that its predicability stems from its synthetic nature in that it is standardized by physicochemical technic rather than the less exacting methods of bio-assay.

As is the case with other curarizing agents, endotracheal intubation is made possible without resorting to an undesirable and unnecessarily deep plane of anesthesia. In this series of cases we have not observed undesirable side effects of syncurine, manifested by bronchospasm or changes in the integrity of the cardiovascular system.

Although syncurine is compatible with pentothal sodium (6), we have not as yet employed these drugs as a mixture in the same syringe. It is thought that since the individual variation of patients to the effects of the barbiturate derivatives appears to be the rule rather than the exception, more reliance is to be placed on an individualized dose of the barbiturate, followed by administration of syncurine.

SUMMARY

A new synthetic muscle relaxant, syncurine, has been clinically tested as an agent to facilitate endotracheal intubation.
The results in 500 cases have been gratifying. No untoward effects of the drugs used or the technic have been noted.

REFERENCES

POSTGRADUATE TRAINING IN ANESTHESIOLOGY

The New York State Society of Anesthesiologists, in cooperation with the American Society of Anesthesiologists, is offering postgraduate training in anesthesiology to any physician in this state who is engaged in full or part time practice of anesthesiology. Instruction is individualized and informal and covers fundamental aspects of clinical practice. Training will be given in or close to the applicant's own community on a flexible time schedule. There is no tuition fee. Interested physicians may write to

S. G. HERSHEY, M.D.,
New York State Society of Anesthesiologists
137 West 11th Street,
New York 11, New York