ANESTHESIA FOR ELECTROCONVULSIVE THERAPY •

RAINALD J. M. STEVEN, M.B.,† RALPH M. TOVELL, M.D.,† JAMES C. JOHNSON, M.D.‡
AND ENRIQUE DELGADO, M.D.§

Hartford, Connecticut

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The introduction of convulsive therapy for the treatment of certain mental disorders in 1934, although a great step forward, immediately posed certain problems which, we believe, were not satisfactorily answered until recently. The use of metrazol® to induce the convulsive state was associated with an extremely unpleasant prodromal period. Because of its unpleasantness many patients refused to continue treatment. Convulsions occurred whose violence produced an appreciable number of fractures and dislocations both of the spine and long bones. When it was shown that satisfactory convulsions could be produced instantaneously by electrical stimulation, many believed that the objection to the unpleasant prodromal period had been overcome, although the complications of fracture and dislocation remained. It is known now that this assumption was not entirely true. Many patients remained as disturbed by the prospect of electroconvulsive therapy as they had by the metrazol induced convulsions. It has been our aim to eliminate both the psychic objection of the patient and the danger of bodily harm, feared by so many psychiatrists. The introduction of succinylcholine derivatives as short-acting muscle relaxants provided us with the opportunity to do so. Prior to the introduction of these agents, other muscle relaxants including curare, flaxedil® (gallamine) and decamethonium had all been used, as had spinal anesthesia, to modify the violence of the convulsions. They all possessed the marked disadvantage of being prolonged in action far beyond the time needed for muscular relaxation. Thus if they were to be used safely, the dosage was of necessity strictly limited and modification of the convolution only slight. Larger dosage produced respiratory depression necessitating both careful watching of the patient, the use of prostigmine as an antidote and occasionally assisted or artificial respiration. This made the method time-consuming and, in the eyes of some, more dangerous than the complications it was supposed to prevent. Fatalities were

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† Department of Anesthesiology, Hartford Hospital.
‡ Department of Psychiatry, Hartford Hospital.
§ Institute of Living, Hartford, Connecticut.
also associated with the use of these agents, as some patients failed
to respond to resuscitative methods.

The use of succinylcholine salts is based on their extremely short-
lived action. Recovery from their muscle relaxant or paralyzing ef-
fects usually occurs within five minutes of injection. The dosage of succinylcholine required for each patient is dependent partially upon
the amount of muscular tissue to be relaxed and the cholinesterase con-
tent of that musculature. The length of time that paralysis or relaxa-
tion lasts is more dependent upon the amount of “pseudocholine-
sterase” in the circulation, as succinylcholine salts are hydrolyzed by
“pseudocholinesterase.” Prolonged paresis following the use of suc-
cinylcholine has been found to be associated with low “pseudocholine-
sterase” values in the circulating plasma (1). In our experience up
to this time, we have not encountered any instance of prolonged paresis
following the use of succinylcholine.

Pentothal® sodium anesthesia has been considered a necessary com-
plement to the use of succinylcholine salts. Its use eliminates com-
pletely any unpleasant prodromal effects of the therapy and the ad-
ministration of succinylcholine. The muscular fasciculations that ac-
company the injection of the latter drug combined with the total paraly-
sis induced can be extremely frightening and unpleasant for the con-
scious patient undergoing treatment. As we stated earlier, we have
endeavored to eliminate all fear from this method of therapy. Certain

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patients still object to it but rather more from the social stigma attached to its use than any fear of the actual treatment. Another consideration that may enter into the lack of fear with which our patients approach treatment is the use of single rooms for the actual convulsive therapy. In this way, no patient sees any other patient undergoing treatment.

All patients admitted to the psychiatric service, or attending on an outpatient basis, if they are considered suitable candidates for electroconvulsive therapy have electrocardiographic tracings made and complete roentgenograms of the spine. All reports of such investigations are taken into account by the anesthesiologist when determining the dosages of pentothal sodium and succinylcholine dichloride to be used. Age, height and weight are recorded upon the special charts used for recording these treatments (fig. 1), together with the physical diagnosis and the psychiatric diagnosis. In this way, it is possible for the anesthesiologist to form a fairly complete picture of his patient’s physical status before treatment is begun. All rooms in which treatment is undertaken are equipped with piped oxygen outlets and a bag and mask which may be used for inflation of the lungs. Wall suction for removal of excessive secretions or any vomitus, if the patient should vomit, is available. A laryngoscope and endotracheal tubes are kept in the unit for emergency use. All therapy is given in the morning and patients do not receive any breakfast or refreshment until they have been treated. No premedication is used, unless it is found by experience that a patient has profuse secretions in which case atropine sulfate, 0.4 mg. is given subcutaneously a half hour before treatment. Any patient, who is unduly disturbed by the prospect may receive a barbiturate, usually seconal, 0.1 Gm., approximately one and one half hours before treatment.

Method

The patient is asked to lie down with his feet toward the head of the bed. Pentothal sodium in 2.5 per cent solution is administered intravenously until he is just asleep, 6 to 8 cc. (150 mg. to 200 mg.) usually being required and rarely more than 10 cc. (250 mg.). The syringe is detached from the needle and another containing the estimated dose of succinylcholine dichloride is attached and injected. The psychiatrist applies the electrodes on the head band and following the cessation of fasciculation, the patient’s lungs are inflated several times with pure oxygen. Free inflation of the lungs upon compression of the rebreathing bag is taken as a sign of complete relaxation. The onset of relaxation is rapid in young muscular subjects and very much slower in older arteriosclerotic subjects in whom the circulation time may be prolonged.

A gag is placed between the patient’s teeth, care being taken to ensure that the lips and tongue are not caught in any way, and the stimulus administered. The initial muscular contraction is usually followed shortly by a modified clonic convulsion. It has been noted that there is a
different mode of spread of the convulsion in these patients. Whereas formerly, there was an intense tonic convulsion with opisthotonos, followed by severe clonic contractions of the trunk muscles and proximal muscles of the limbs, there is now a much milder tonic contraction of the muscles of the distal part of the leg followed by clonic contractions of the muscles of the feet, hands and face, possibly spreading to the remainder of the body. For other patients, spread of the convulsion is from the head and neck downward. During this period, inflation of the lungs with oxygen is resumed. We have noted that clonic movements of the lower jaw rarely result in its closure so that there is little, if any, danger of the tongue or lips being injured. When the convulsion ceases, the patient is turned on his side with one knee drawn up and a pillow behind his back to allow any secretions to run out of his mouth. Artificial respiration is continued until the return of the patient’s own respirations. We have observed that the swallowing reflex usually precedes

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<td>AGE DISTRIBUTION OF THE PATIENTS INCLUDED IN THE SERIES FROM THE HARTFORD HOSPITAL</td>
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the return of respiration by a few moments. During the period of recovery, the sideboards on the bed are raised and the door of the room is open so that one nurse may watch two or more patients.

STATISTICAL DATA

In the year ending August 31, 1953, 2,375 treatments were administered in the Hartford Hospital to patients who had received pentothal sodium and succinylcholine dichloride to produce anesthesia and muscular relaxation immediately before the electrical stimulus.

An analysis has been made of the last 1,761 treatments in the Hartford Hospital. The oldest patient was 81 years of age and the youngest 14 years. The age distribution, covering 260 patients, is shown in table 1. The relationship of the number of patients to the number of treatments received is illustrated in figure 2. It will be noted that this covers only 250 cases because patients still continuing treatment were not included in this particular analysis. Similarly, this figure includes only 1,730 treatments. The minimal number of treatments has been one and the maximal twenty-eight.

The distribution of the succinylcholine dichloride dosage is seen in
figure 3. The minimal dose used has been 10 mg. and the maximal 100 mg. A dose of 40 mg. is, however, by far the most commonly used.

The distribution of the pentothal sodium dosage in shown in figure 4. There are two very evident peaks at 200 mg. and 250 mg., but the curve is somewhat flatter than that showing succinylcholine dichloride dosage distribution. Only 1,758 administrations are accounted for on this chart because some highly agitated patients were treated twice on the same day and no pentothal sodium was required for the second treatment. The minimal dose has been 50 mg. and the maximal 700 mg.

One patient received three treatments without anesthesia, pentothal sodium being given in the postconvulsive phase to lessen her rest-

lessness in the recovery period. It was impossible to restrain her long enough to undertake successful venipuncture prior to treatment on these three occasions, although later therapy was continued in the manner described in this paper.

One patient, case 1, received four treatments uneventfully but when taken to the operating room for the performance of a vaginal hysterectomy suffered a cardiac arrest when the operation had been in progress for fifty-five minutes. Heart action was again started and she made a relatively uneventful recovery.

One patient, case 2, received one treatment successfully but immediately after induction of anesthesia for a second treatment, vomited
a large amount of bile-stained fluid, part of which was aspirated. In spite of a vigorous tracheobronchial toilet and resuscitative measures, pulmonary edema developed and he died five hours later. His attending physician considered that he had been in a precarious state from the point of view of myocardial weakness for some time and although this may have been the precipitating factor in his death, it cannot definitely be listed as a fatal complication of this method of treatment.

Figure 3. Distribution chart of the dosage of succinylcholine dichloride in relation to number of patients.

At the Institute of Living, 809 treatments have been given under the supervision of one of us (E. D. G.). The total number of patients treated was 72, the mean age being 45.7 years. The oldest patient in this series was 77 years of age and the youngest 22 years. The minimal number of treatments has been two and the maximal thirty-five. In general, these patients have received a somewhat greater number of treatments than those at the Hartford Hospital.

The minimal dosage of succinylcholine dichloride used has been 15 mg. and the maximal 50 mg. As reported above, a dose of 40 mg. is
most commonly used. The minimal dosage of pentothal sodium used has been 150 mg. and the maximal 400 mg.

Many patients in this series had previously received electroconvulsive therapy but had been forced to discontinue it for varying reasons including bony injury due to the treatment. Introduction of this technique has enabled them to resume treatment with considerable benefit.

Adderley and Hamilton (4) reported in January 1953 that the injection of succinylcholine caused a rise in blood pressure before the convulsion. In their opinion, this rise was of such a degree as to render void the benefits of the use of succinylcholine from the point of view of the cardiovascular system, and to necessitate the use of a ganglionic blocking agent, either tetra-ethyl ammonium bromide or hexamethonium iodide, to prevent it. The dosage of pentothal sodium used was of the

![Diagram](image-url)

**Fig. 4.** Distribution chart of the dosage of pentothal sodium in relation to number of patients.

order of that reported in this paper but the average dose of succinylcholine was 60 to 75 mg. Furthermore, the patients’ lungs were inflated with oxygen and 5 per cent carbon dioxide, a practice that is viewed with disfavor by the authors of this paper.

We have attempted to duplicate their results but have failed to show any significant rise in the blood pressure following the administration of succinylcholine dichloride. In a series of 24 patients the average blood pressure before treatment was 161.7 mm. systolic and 95.6 mm. diastolic; following the administration of pentothal sodium, it fell to 148.8 mm. systolic and 91.5 mm. diastolic; after giving succinylcholine dichloride and inflating the lungs with oxygen, the average blood pressure was 155.5 mm. systolic and 97.7 mm. diastolic. Immediately after
the convulsive seizure ceased, the mean blood pressure was 187.3 mm.
systolic and 109.6 mm. diastolic, falling in one minute to 174.5 mm.
systolic and 104.1 mm. diastolic. The mean blood pressure following
the injection of succinylcholine dichloride, although somewhat higher
than that after pentothal sodium, was still lower than the average blood
pressure before treatment. This investigation is continuing and we
hope to obtain a sufficient number of readings to make the series sta-

tistically significant.

COMMENTS

Several observations should be made upon this method of treatment.
The most important is the elimination of hypoxia or anoxia. Few pa-
ients ever become cyanotic when this method is used and every effort
is made to ensure full oxygenation throughout. It is hoped that this
may be of some assistance to psychiatrists and neurophysiologists in
explaining why this treatment is beneficial, as it is one of the factors
that has always had to be taken into account in the past. Its elimina-
tion narrows down the search for important factors, to the patient's
psychiatric condition and to current characteristics. These may be
varied to meet the needs of patients. Secondly, the occurrence of frac-
tures and dislocations has been reduced to zero. We have not had a
single case of fracture of one of the vertebrae or long bones during
treatment by this method. Further, the absence of a severe convulsion
with cyanosis and the consequent strain upon the myocardium has en-
abled us to treat many patients formerly considered unsuitable for this
type of therapy. Thirdly, there is no fixed standard dose of pentothal
sodium or succinylcholine dichloride that can be used for all patients.
The dose must be modified to suit individual circumstances and may even
have to be changed during a course of treatment as the patient may
progress. Pentothal sodium has been found to exert a depressing
effect upon the development of the clonic convolution in certain patients
and has had to be reduced to an absolute minimum whereas, in general,
succinylcholine has less tendency to depress the convolution. Other
patients have proved refractory to succinylcholine dichloride and re-
quired doses out of proportion to their physical make-up. A smaller
dose of pentothal sodium, somewhat more rapidly injected, has proved
more satisfactory than a larger dose over a longer period. At the first
treatment it is usually possible to establish some estimate of a patient’s
tolerance to pentothal sodium, and treat him accordingly during the
remainder of the course of treatment. Fourthly, although the patients
are lightly restrained during the period of the electrical stimulus, there
is usually little necessity for it. It has not been possible to maintain
an airway in the patient’s mouth during this brief period as jaw flexion
at this moment may be sufficiently strong to loosen some of the patient’s
teeth on a hard airway. Fifthly, if inflation of the lungs with oxygen
is resumed during the clonic convolution, under certain circumstances
the clonus is prolonged. Whether such clonus is normally self-limiting owing to the hypoxia produced is an assumption we have not been able to verify. Sixthly, prolonged and over-vigorous inflation with oxygen during the recovery period may delay the resumption of spontaneous respiration. If the patient is allowed to breathe room air at the first sign of return of respiratory activity, full muscular activity appears to follow more rapidly. Patients are always carefully watched, however, to ensure that their respiratory exchange is adequate before they are left in charge of a nurse. The degree of restlessness in the recovery period varies considerably and appears to be somewhat greater in men than in women. Seventhly, we have been able to confirm, by our own experience, two signs associated with this method of treatment, which are usually indicative that a mild convolution will follow. One is the presence of an intense pilomotor reaction immediately following the electrical stimulus (2) and the other is the failure of the pupil to contract if it is inspected immediately following the stimulus (3). If the pupils contract promptly, the patient rarely, if ever, undergoes any form of convolution.

It is the firm impression of the psychiatrists we have worked with that the patient's improvement parallels the production of a successful convolution, however mild it may be. Whether this is attributable to spread of some unidentified neurological stimulus over the entire surface of the brain, of which the convolution is the motor evidence, or whether it is the result of the metabolic products of muscular contraction released by the convolution or to some other factor entirely, we cannot say.

Finally, the amnesia associated with this method of treatment, although complete for the actual treatment, is not as marked as it was with other methods. This is thought to be a definite advantage as it enables the patients to maintain better contact with their surroundings and does not produce confusion comparable either in degree or duration to that seen before the use of pentothal sodium and succinylcholine.

Complications

Complications associated with the use of this method have been remarkably few. Some patients have complained of soreness of the throat and neck muscles, apparently associated with the use of succinylcholine salts but this has not been troublesome. It has been necessary to use an oropharyngeal airway in some patients to prevent the development of cyanosis and to allow adequate inflation. There have been one or two instances of mild laryngospasm in the recovery period which was easily overcome and several patients have exhibited severe coughing, probably attributable to a small amount of secretion lodged upon the vocal cords. In a few patients secretions have been a problem requiring suction to remove them and one patient with bronchiectasis
has required occasional suction to maintain a clear airway. Hiccups in the posttherapy period are probably associated with the use of pentothal. One patient was treated in her room, inadvertently, where oxygen was not available. Artificial respiration did not suffice to prevent cyanosis but did maintain some degree of respiratory exchange until spontaneous respirations returned. Upon recovery, she complained of a somewhat more severe headache than usually followed her treatments. She had no other apparent ill effects.

There have been no fractures or dislocations associated with this treatment with the exception of dislocated jaws as a result of excessive yawning during the administration of pentothal sodium.

**Illustrative Cases**

**Case I.** A 66 year old white widow was admitted to the Hartford Hospital on November 11, 1952, with the chief complaints of urinary frequency, incontinence and abdominal discomfort after meals. On examination she was found to be cachectic and emphysematous, with a third degree procidentia of the uterus. A diagnosis of malnutrition, depression, generalized arteriosclerosis, senility and procidentia was made. Laboratory investigations revealed a leukocyte count of 28,320, a hematocrit of 57 per cent and a nonprotein nitrogen value of 132 mg. per 100 cc. Urine culture showed 4 plus *B. coli*. Roentgenological investigation demonstrated an essentially negative chest and a barium enema revealed megacolon of unknown etiology.

Psychiatric consultation was requested; the psychiatric service thought that she had a chronic depression and strong mourning reaction following the death of her husband four years before. Although she made no overt suicidal attempts, withdrawal from all activities and slow starvation were considered an attempt to fulfill her wish to die. Electroconvulsive therapy was advised in addition to continuance of full supportive therapy.

Electrocardiogram showed mild left axis deviation, digitalis effect and an otherwise borderline abnormal record. Roentgenograms of the entire spine showed some hypertrophic changes throughout and some bony demineralization. The latter was not considered a contraindication to electroconvulsive therapy. Four treatments were given uneventfully, although small doses of both pentothal sodium and succinylcholine dichloride were used, in keeping with her age and weight. Her mental state improved considerably following treatment.

On December 22, 1952, she was taken to the operating room for the performance of a vaginal hysterectomy and repair. The hematocrit at this time was 41.5 per cent and she was considered a much improved risk. Fifty-five minutes after the start of the operation, her pulse and blood pressure suddenly disappeared and cardiac arrest was diagnosed. The left chest was immediately opened and the heart began to beat again as soon as it was palpated. Her condition improved rapidly. The operation was terminated in as short a time as possible, no attempt being made to complete it. During this time she received 1,000 cc. of whole blood and a blood volume estimation performed in the recovery room showed an excess of 300 cc. of erythrocytes. The amount of bleeding prior to cardiac arrest had been estimated at 500 cc.

The patient made a relatively uninterrupted recovery. Gynecological examination showed a satisfactory anterior repair although both the enterocoele and
rectocele were still present. The neurologists were of the opinion that she had no neurological deficit attributable to cardiac arrest. She was discharged on January 22, 1953, much improved after a hospital stay of seventy-two days.

Case 2. A 73 year old white man was admitted to the Hartford Hospital in April 1953. He had undergone a Mikulicz procedure with resection of the sigmoid colon in 1951, the residual colostomy being closed two months later. A diagnosis of adenocarcinoma of the sigmoid colon without regional metastases was made at that time. Two years later in March 1953, he was readmitted to the hospital for investigation; the chief complaints were indigestion, abdominal cramps and poor bowel evacuation. Roentgenological investigations were negative as were laboratory studies. A large ventral hernia was noted. A diagnosis of parkinsonism and arteriosclerosis was made. He returned in April 1953, with essentially the same complaints. A diagnosis of depression was made and a trial of electroconvulsive therapy was advised. Electrocardiogram and roentgenological examination of the spine were normal. He received one treatment without incident. Two days later, he was to receive a second treatment but immediately following the injection of pentothal sodium and succinylcholine dichloride, he vomited large quantities of bile-stained fluid. His mouth, pharynx and tracheobronchial tree were vigorously aspirated and following the introduction of an endotracheal tube the tracheobronchial tree was flushed with saline solution, as there was no doubt in the anesthesiologist’s mind that the patient had aspirated some part of the vomited material. In retrospect, the psychiatrist, who was present throughout, considered that distention was present and the patient probably had an extension of the original carcinomatous process with partial obstruction.

His immediate recovery from this episode following administration of oxygen was satisfactory. Two hours later, however, he was ashen, with severely cyanotic nail beds and coarse rhonchi in both lung fields, restless and in obvious cardiac collapse. Despite continued resuscitative measures, he died five hours after the administration of anesthesia. Autopsy was not permitted. A final diagnosis of pulmonary edema, chronic myocarditis, generalized arteriosclerosis and parkinsonism was made. Although his medical advisers thought that this man was in a precarious balance, likely to suffer a myocardial infarction at any time, it is impossible to escape the fact that had he not been anesthetized, he would not have died at that time.

Psychiatric Discussion (J. C. J.)

Both of these case histories illustrate the poor risk patient to whom the psychiatrist is willing to give electroconvulsive therapy, if the anesthesiologist will accept him. The need for careful evaluation of each patient’s physical status is demonstrated by these 2 cases.

A further example, typical of such individuals, was the following case in which electroshock therapy was a life-saving measure.

Case 3. An 80 year old white man with a previous history of depression and memory loss was readmitted to Hartford Hospital with a present history of depression, withdrawal, refusal of food and secondary emaciation. His mental status was one of regression in thought and behavior, with markedly depressed mood. Physical examination and laboratory studies in addition to the finding of
emaciation revealed the following pertinent facts: generalized arteriosclerosis, blood pressure 140 mm. systolic and 86 mm. diastolic, basal metabolic rate +31, emphysematous changes in the lungs, dorsal kyphosis, osteoporosis and hypertrophic degenerative changes throughout the spine. The electrocardiogram showed sinus tachycardia, nodal premature contractions and borderline myocardial abnormality.

Following the administration of only two electroshock treatments without any untoward reaction, his mood became elevated, he began to eat spontaneously, and was improved sufficiently after nine days to be returned to his home.

It has also been noted that since the use of this method was instituted, there has been a progressive drop in the average number of treatments required to alleviate emotional disturbances formerly requiring a long series. This has been true particularly in instances in which psychotherapy has not been utilized because the patient’s mutism, profound agitation, or other factors made such an approach impossible or ineffectual. The following cases are examples.

Case 1. A 48 year old white woman was admitted to the Hartford Hospital in a profoundly depressed mood, with marked psychomotor retardation, and practically complete mutism. Three months before admission she had received twelve electroshock treatments in a State Hospital following a period of excitement and confusion. She had remained relatively well following this hospitalization for approximately six to eight weeks. At the end of that period she became progressively depressed. Physical examination and laboratory studies revealed no pathologic change clinically. She was considered a good candidate for further electroshock therapy and received seven such treatments, with resulting elevation of mood, more spontaneity of behavior, and increased sociability. She was discharged after nineteen days of hospitalization. A follow-up visit six weeks after discharge revealed continued improvement.

Case 5. A 59 year old white woman was admitted to the Hartford Hospital in a stuporous condition with a history of having ingested an unknown quantity of sleeping pills. There was a history of increasing family discord over the past year, followed by the development of a marked paranoid trend toward her family. The suicidal gesture was apparently precipitated by an altercation with her husband. She regained consciousness without any physical sequelae of the episode, but presented a somewhat negativistic and resistive attitude accompanied by a depressed mood. She received only two electroshock treatments, with a striking response in elevation of mood, increased cooperation and general improvement. It was thought that this was superficial and would probably be short-lived. However, the improvement was maintained until her discharge nine days after admission. Arrangements were made for follow-up and out-patient electroshock therapy as indicated. None has proved to be indicated because of continued good adjustment at home.

The following 3 cases are sufficiently similar in diagnostic category to be reported as a series. They were all women, aged 28, 37 and 52 years respectively, with acute onset of frank paranoid delusions and bizarre behavior. One was admitted following an attempt to burn down her house in response to her hallucinations. Each received only six
electroshock treatments with complete remission of overt symptomatology, and follow-up study has disclosed maintenance of the remission. The average hospital stay was fourteen days. These cases are typical of the short hospital stay and the few treatments required in these particular categories since institution of this technique. This change was sufficiently striking that some attempt has been made to investigate the possibility of some central action of succinylcholine dichloride on the function of cerebral tissue. These studies have not been completed. There are indications of electroencephalogram that low voltage fast activity is increased or appears following injection of succinylcholine dichloride, but the significance of this factor has not as yet been determined.

One major advantage of this technique that we believe may indirectly benefit the patient is the lowering of the anxiety level in the therapist. The assurance of a complete lack of initial thrust, absence of the crunching sound that presages a fracture, and complete control of respiration has indeed been a relieving experience for our staff members. With reduction of anxiety in both the patient and the physician the work at hand has understandably been easier and smoother. In addition, the pleasant cooperation between two such diverse departments as anesthesiology and psychiatry has led to mutual general understandings of benefit to both.

**Summary**

The use of anesthesia for electroconvulsive therapy is discussed, with special reference to muscle relaxants. A method, using pentothal sodium and succinylcholine dichloride, is described. Its use in 3184 instances at both the Hartford Hospital and the Institute of Living (Hartford) is reported. An attempt has been made to analyze the last 2,573 treatments given to 332 patients. One death following anesthesia is reported.

Certain signs described as associated with this form of anesthesia are corroborated, but the authors have failed to substantiate a claim that succinylcholine causes a rise in blood pressure.

The advantages that accrue from the use of this method include the elimination of hypoxia or anoxia and fractures and dislocations; the ability to treat patients formerly considered unsuitable for electroconvulsive therapy, and the reduction of anxiety in both the psychiatrist and the patient. Although these new methods of therapy for patients receiving electroconvulsive treatment have extended the selection of patients to include debilitated cardia
cades and those suffering from osteoporosis, there is still a need for discernment in their selection.

Two cases are presented from the point of view of the anesthesiologist and a psychiatric discussion with several case histories is included. It is thought by members of both departments that the method repre-
sents a considerable advance over previous attempts to achieve muscular relaxation and is the best that can be attained at this time.

REFERENCES


NEW ENGLAND SOCIETY OF ANESTHESIOLOGISTS

The following dates and places have been chosen for the meetings of the New England Society of Anesthesiologists during the coming year.

October 1, 1954—Hanover, New Hampshire
December 3, 1954—Boston, Massachusetts
February 4, 1955—New Haven, Connecticut
April 1, 1955—Boston, Massachusetts