CHEMICAL RHIZOTOMY (INTRATHecal ALCOHOL) FOR PARAPLEGIC CLONUS

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The management of patients with transection of the spinal cord is most discouraging. Nevertheless, some paraplegic patients (even though they have complete paralysis of the legs) are taught to walk with a tripod gait aided by leg braces and crutches. However, this rehabilitation is often delayed or prevented by a sustained clonus or "spasms" of the lower extremities. Ordinarily, this condition is treated surgically by rhizotomy, a rather extensive procedure with many drawbacks and frequently with uncertain results. However, until recently it was the only treatment which could be offered to a patient. In 1948, Shelden and Bors (1) suggested the use of subarachnoid block, using large volumes of alcohol instead of operation, and reported excellent results in their patients. Later, Cooper and Hoen (2) also suggested the same procedure. During the last year, in an attempt to avoid surgery, the anesthesia department at Charity Hospital has been asked to perform the block. We feel that the procedure can rightfully be called "chemical rhizotomy." Inasmuch as anesthesiologists are called upon to perform these blocks and the technique is one which is not well established, we are presenting this report so that others may profit from our experiences and avoid our errors.

In the paraplegic patient, although pathways between the upper and the lower motor neurons are severed, the lower motor neurons remain active and give rise to contractures and undesirable involuntary reflexes. These reflexes consist of various types of spasms of the muscles of the lower extremities. The term "mass reflex" has been applied to them. Often the muscles of the abdomen and the back take part in these spasms. These spasms are uncontrollable and should be eliminated because they impair physiotherapy and retard or prevent rehabilitation. More often than not, they are painful. The pain is of such severity that opiates often are necessary for relief. The spasms and the contractures also enhance the development of trophic ulcers which are difficult to treat without correcting the predisposing condition. All of these factors combine to depress the average patient and to give him a feeling of hopelessness. Such patients become disinterested, lose their appetite, and run a general downhill course to a

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† Accepted for publication November 10, 1954.
fatal termination. Usually at this point of physical exhaustion, relief is sought as a last resort by surgical intervention. Many surgeons prefer to avoid operation if they can. Chemical rhizotomy appears to be a satisfactory substitute for surgery. It is simpler and safer than operation. Two cases are presented to outline the technique employed, the results, and the complications.

Case 1. L. E. C., a 20-year-old white single female, was admitted to Charity Hospital on November 24, 1953, for relief of muscle spasm due to a paraplegia resulting from a fracture dislocation at T11 and T12 sustained in an automobile accident February 19, 1950. The spastic paralysis was accompanied by fecal and urinary incontinence. In August, 1953, walking exercises with the aid of long leg braces and crutches were prescribed. However, rehabilitation was delayed because she developed sustained ankle clonus whenever she stood on her feet. There was no associated pain. We were consulted concerning the advisability of performing an alcohol block. We felt it should be attempted because there had been no improvement in her motor power for so long.

The procedure was performed in the operating room. Breakfast was withheld. Nembutal® 100 mg. was administered orally 45 minutes prior to call. The preparations made and materials assembled were the same as for spinal anesthesia. A blood-pressure cuff was applied and an intravenous infusion of 1,000 ml. of 5 per cent dextrose in distilled water was started. Vasopressors were at hand in the event hypotension developed. The patient was placed in the prone jackknife position with the peak of her spine at L3. The back was prepared and draped with sterile towels. Lumbar puncture was performed at the fourth lumbar interspace, using a 22-gauge 8 cm. needle. Five ml. of 1 per cent procaine was first introduced and the effect of the spinal block upon the ankle clonus was determined. It disappeared within 7 minutes. Blood pressure and pulse remained unchanged. After 15 minutes, 10 ml. of spinal fluid was withdrawn and 10 ml. of 95 per cent ethyl alcohol was injected slowly into the subarachnoid space at the rate of 2 ml. per minute. The needle was withdrawn after the alcohol was cleared with 0.2 ml. of 1 per cent procaine. The patient was allowed to remain in jackknife prone position for 45 minutes, then placed in horizontal prone position on a roller and returned to the ward, where she was placed in the horizontal supine position. She was kept supine and in bed the remainder of the day. The clonus disappeared after the procaine injection and has not reappeared at any time since. There were no complications of the lumbar puncture. Physiotherapy was resumed and she was discharged on December 26, 1953, much improved. On June 6, 1954, she was readmitted to the hospital for pyelonephritis. When seen at this time she was progressing in her rehabilitation and the clonus had not recurred. Furthermore, the patient appeared to be progressing well in developing an “automatic bladder.”

Case 2. T. H., a 23-year-old white married female, was admitted to the hospital on June 1, 1954, complaining of “muscle spasms” resulting from a transection of the spinal cord at the level of T7 sustained in an automobile accident in October, 1952. In December, 1952, she began having “mass muscle spasms” which caused her thighs to be flexed on her abdomen and her legs on her thighs. These mass spasms also caused severe pain in the chest anteriorly and posteriorly above the level of T7. The contractions were more severe when
the patient was in the supine position, but they also occurred when she was walking and frequently caused her to fall. The patient had a “cord bladder” and controlled her bowels with the aid of enemas. Spasms caused involuntary micturition.

We were consulted on the advisability of performing an alcohol block. On June 15, 1954, the patient was taken to the operating room for the injection. The procedure used was similar to that employed in Case 1. The position was the same, but the lateral approach (in the third lumbar interspace) was used because the space between the spinous processes did not permit easy passage of a 22-gauge needle. Again 5 ml. of 1 per cent procaine, then 10 ml. of 95 per cent alcohol was used. No hypotension or other complication appeared. The spasms diminished but did not disappear completely. The pain was less. Within 48 hours following the block, the “mass spasm” recurred and the patient stated that it was as severe as it was before the block. On June 18, 1954, the procedure was repeated, using 15 ml. of 95 per cent alcohol. Again the spasms and the pain diminished. The following day the patient did not look or feel well. She complained of tingling of the fingers of both hands, of pain above the level of the transaction, of stiffness of the neck, and of headache. In addition, she developed nausea and vomiting which persisted for several days. She stated that she still had spasms and the pain, although no spasms could be elicited by usual stimuli. The patient’s skin was hot and clammy. The temperature was 103 F. A diagnosis of meningismus was made and she was treated symptomatically. Within 2 days, the temperature had returned to normal and all symptoms of meningeal irritation disappeared. No antibiotics or chemotherapeutic agents were used. All visible spasms had disappeared but the patient experienced slight twitches of the abdominal musculature, not associated with pain. One week following the second block, the patient was allowed to resume physiotherapy.

She continued to complain of the occasional spasm in her abdomen. She could perceive it but it could not be detected by the examiner’s hand. Two weeks later, a third block was attempted. This time the patient was turned on her back after the injection with the body slightly inclined and the head dependent. After this block, all the spasms disappeared. However, she did develop meningismus, fever, and nausea as in the previous block with the identical postanesthetic course. After 10 days, she was able to resume physiotherapy and was discharged. Examination 2 months later revealed no return in spasm and considerable improvement of mental attitude.

**Discussion**

This procedure differs radically from the classical segmental injections used to relieve pain in patients without paralysis and in which small volumes of alcohol are used. Alcohol is lighter than spinal fluid and the patient should be placed in position with this in mind. Straining and stirring should be avoided to prevent the alcohol from being forced cephalad. Only patients who have loss of bladder control who have shown no signs of improvement of motor function for over a year should be treated. This block should not be used in the patient who has not lost sexual function. Whenever possible, absolute alcohol
should be used. However, if absolute (anhydrous alcohol) is not available, 95 per cent alcohol may be used.

Shelden and Bors (1) have shown that paraplegics with spastic or atonic bladders are helped by subarachnoid alcohol block, and that those with previously hopeless incontinence eventually may develop a satisfactory “automatic bladder.” The bladder and the bowel incontinence give the anesthesiologist license to use larger amounts of alcohol (10 to 15 ml.) than are used in the segmental spinals for pain due to cancer and other causes, since he need not fear loss of sphincter tone. Without the large volumes of alcohol, the anterior roots cannot be inactivated. Therefore, incontinence enables the physician to perform the block, and the block, in turn, may improve the incontinence.

Case 1 illustrates the relative simplicity of this block; case 2, however, emphasizes that this procedure is neither without fault nor innocuous. This patient’s first block did not afford relief. The second block caused a moderately severe meningismus which caused the patient apprehension and discomfort for 3 days. Nevertheless, both patients eventually were benefited.

**Summary**

1. The use of chemical rhizotomy (massive intrathecal alcohol injection) by the anesthesiologist for the treatment of paraplegic clonus is described.

2. Two cases are presented to indicate the technique employed and the management of the patient during and after the injection.

**References**