Current Comment

STUART C. CULLEN, M.D., Editor

Localized-Convulsion Electroconvulsive Treatment

Dr. T. George Bidder, of University Hospitals in Cleveland, Ohio, notes that the chief concern of the therapist who administers electroconvulsive treatment (ECT) to the poor risk patient is attenuating a convulsion to a degree which minimizes the stresses imposed on the skeletal and cardiovascular systems. This, of course, can be attained by giving a sufficiently large dose of succinyldicholine chloride (SDC). However, if the dose of the drug is too large skeletal muscle paralysis, sufficient to mask any evidence of a seizure, will be produced. The degree of paralysis obtained with a calculated dose of SDC (*i.e.*, 1 mg./kg. body weight) and therefore the intensity of the convulsion can vary considerably from patient to patient. Thus, with the first convulsion, where the patient's response is dependent upon a calculated dose of the muscle relaxant, considerable uncertainty prevails concerning the intensity of the skeletal muscle activity which will occur.

The simple technique, which this communication describes, removes this uncertainty and insures that only a small convulsion will occur if the electrical parameters are adequate to produce a seizure. In principle, this technique involves occlusion of the arterial supply to a muscle mass prior to injection of the SDC. By this means, the muscle mass is "protected" from paralysis by the drug and responds with convulsive movements when a seizure occurs in the motor cortex. The dose of SDC is made large enough so that total paralysis of all other skeletal muscles is produced. Thus the "protected" musole unit serves as an indicator of whether the motor cortex has, or has not, fired off.

The technique is as follows: all patients treated are given atropine sulfate (1.0–1.5 mg.) subcutaneously or intramuscularly not less than 30 minutes prior to the treatment. A blood pressure cuff is then applied around the knee joint so that the *inflated* section lies in the popliteal fossa. The cuff is positioned proximal to the head of the fibula so that no pressure is exerted on the lateral popliteal nerve, as illustrated. Care should be taken so that the cuff does not bulge or come loose when inflated. Thiopental is then injected intravenously and the needle left in place. The blood-pressure cuff is inflated to a reading of 250 mm. of mercury, or to 25 mm. above the systolic pressure. The cuff is inspected to be sure that it is holding securely. SDC is then injected. When the depolarizing muscle twitchings have ceased, or 1.5–2.0 minutes after injecting the SDC, the current is applied. When the tonic phase of the convulsion appears, the blood-pressure cuff is deflated and removed. If a motor seizure does not appear in the protected leg, amperage and/or time are increased and the current is reapplied. The cuff is not deflated until a seizure occurs.

Full atropinization, *i.e.*, an adequate dose given early enough to take effect, provides important protection against much of the intense cholinergic stimulation produced by the thiopental, by the stimulatory phase of SDC's action and by the seizure itself. This premedication is particularly indicated, with the larger doses of SDC used in this technique, to prevent or minimize arrhythmias which can be induced by this agent. With elderly patients, in whom acute glaucoma may be precipitated with the atropine, consultation with an ophthalmologist is advisable.

In a few cases, depolarizing muscle twitches are observed in the "protected" calf indicating that some SDC is getting through. Usually this is not enough to prevent appearance of convulsive movements. Sometimes, occluding the contralateral popliteal artery on subsequent treatments will be more satisfactory.

It is necessary to keep the cuff fully inflated until one is sure that a seizure has occurred. In many patients, deflation of the cuff is followed by depolarizing muscle twitching in the "protected" calf. Apparently this is due to circulating SDC which has not

been "fixed" in myoneural junctions and is therefore available for paralyzing the "protected" muscle. If the interval between release of the cuff and the onset of a convulsion is too long, sufficient paralysis may take place so as to prevent the seizure's being apparent.

After the first controlled convulsion has been achieved, the dose of SDC on subsequent treatments can be progressively reduced by 5 mg. increments until mild convulsive movements can be detected in the "unprotected" leg. Such a titration procedure has at least two advantages. First, it prevents unnecessarily excessive dosage of SDC. Second, it is a safeguard in case the blood pressure cuff became deflated or unwrapped prematurely. With large excesses of SDC, all muscles will be paralyzed and the motor component of the seizure may be obliterated. However if the patient has been titrated as recommended above, a satisfactory, though small, seizure will occur.

The dose of SDC necessary to obliterate convulsive muscle activity completely in the "unprotected" extremities has ranged from 85 to 150 mg. In view of the sensible admonitions in the literature against overdosing with SDC, cardiac rate and rhythmicity have been monitored and, in some of the patients getting the larger doses, blood pressure responses have been assessed. However, in the patient premedicated with adequate doses of atropine, no untoward reactions to these relatively large doses have been encountered in this series. The duration of apnea accompanying these doses is very little, if any, prolonged beyond that occurring with smaller doses which are sufficient to produce significant attenuation of the motor component of the seizure.

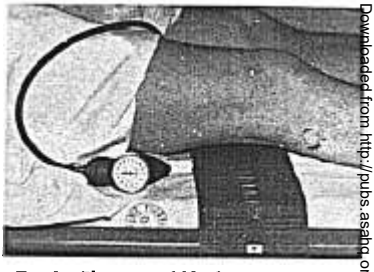

FIG. 1. Placement of blood pressure cuff. Inflatable section of cuff is placed in popliteal fossa proximal to head of fibula and lateral popliteal nerve.

The dose of SDC employed in the initial treatment is determined by two considerations: the patient's muscle mass and the dangers inherent in underestimating the dose and thereby getting convulsive movements in the "unprotected" muscles. In patients weighing 60 kg. or less, a minimum dose of 85 mg. of SDC is administered. If it is essential that no convulsive movements occur in the "unprotected" muscles or if the patient weighs more than 60 kg., the initial dose can be increased to 100 mg. or more.

Although designed primarily for the poor-, or special-risk patient, this technique has been employed for all patients receiving ECT at this hospital in the past year. During this period, 1,165 treatments have been administered to 152 patients. Nineteen patients, aged 70–79 years were given a total of 130 treatments; 5 patients in the 80–85 year age group received a total of 19 treatments.

Radiation Exposure

Drs. Francis Le Tard and Charles D. Belleau of the Ochsner Foundation Hospital in New Orleans have determined the amount of radiation to which the anesthesiologist is exposed during a period of one year.

Method. Roentgen-ray badges were worn constantly by six Fellows in anesthesiology on the breast pocket of their scrub suits for one year. No lead apron or other protective device was employed during this time. Additional, separate badges were worn for each of the following procedures: pneumoencephalography and ventriculography, cystography, bronchography, angiography, hip nailing, and cholangiography. The badges were analyzed periodically. (The maximum permissible dose