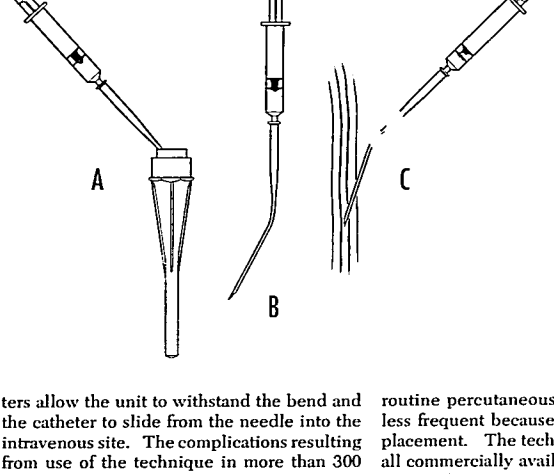

FIG. 1. Angulation of external catheter intravenous unit for easy insertion. *A*, using the unit protective cover to angle the tip without breaking sterility; *B*, the resultant 20–40 degree angle prior to insertion; *C*, insertion of the needle tip and external catheter into the vein prior to advancing the catheter.

ters allow the unit to withstand the bend and the catheter to slide from the needle into the intravenous site. The complications resulting from use of the technique in more than 300 cases were same as those which occur in routine percutaneous venous insertions but less frequent because of the ease of catheter placement. The technique can be used with all commercially available units and is easily mastered.

Thiamylal Anaphylaxis

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The following report concerns a patient who developed hives, bronchial spasm, facial edema, and shock shortly after induction of anesthesia. Fortunately, prompt treatment reversed the ominous chain of events, and he had an uneventful recovery. Skin testing with thiamylal (Surital), *d*-tubocurarine (Tubocurarine chloride), and succinylcholine (Quelicin), the drugs used prior to collapse, revealed that it was thiamylal which caused the reaction.

REPORT OF A CASE

The patient, a 44-year-old electrician, was first admitted to the Little Rock Veterans Administration Hospital in October 1972, for cervical diskectomy and fusion. In 1964 he had sustained an injury to his neck, with resultant pain and weakness in his upper extremities. Cervical diskectomy had been performed in 1964 and again in 1965; however, his symptoms persisted. Details of the anesthesias are unknown. He also had a bilateral inguinal herniorrhaphy in 1970, excision of an eyelid lesion in April 1972, and a right inguinal herniorrhaphy in

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May 1972. Anesthesias for these three operations consisted of sodium thiopental for induction, succinylcholine to facilitate tracheal intubation, and maintenance with halothane, nitrous oxide and oxygen, and *d*-tubocurarine. No untoward reaction was reported until 12 hours after the last hernia operation, when he developed a rash with severe pruritus which persisted for about a week. This was treated with diphenhydramine. Other medications at that time were pentobarbital given orally for sleep, and meperidine preoperatively and every 3–4 hours postoperatively for pain. The attending physician believed that the rash was caused by meperidine. The patient had taken a variety of medications for chronic pain, including Phenaphen, Empirin Compound with codeine, Darvon Compound, diazepam, and various barbiturates. During the present hospitalization, medications consisted of aspirin, chloral hydrate, propoxyphene, and diazepam. All were taken orally, and no unusual response was noted.

The patient was an alert, cooperative, healthy-appearing man whose only abnormal physical findings were tenderness in the neck, subjective loss of grip strength, and hypoactive deep tendon reflexes in the upper extremities. Normal values were obtained for the hemogram, urinalysis, BUN, blood sugar, electrolytes, total protein and albumin, chest roentgenogram, and ECG. A cervical myelogram showed diffuse spondylosis at C6 and C7.

The morning of the scheduled operation, the patient received fentanyl, 0.1 mg, droperidol (Innovar), 5 mg, and scopolamine, 0.4 mg. Preparation for anesthesia included: 1) infusion of 5 per cent dextrose in Ringer's lactate solution via a 16-gauge teflon needle; 2) application of a blood pressure cuff and stethoscope over a brachial artery; 3) attachment of an ECG monitor. The blood pressure was 140/80 mm Hg and pulse rate 80/min. *d*-Tubocurarine, 3 mg, was given iv, followed immediately by thiamylal sodium, 250 mg. The latter was administered slowly until the lid reflex disappeared. Following this, succinylcholine, 60 mg, was given iv. After 2 minutes an additional 40 mg was given because of inadequate relaxation. After the second dose of succinylcholine, relaxation was adequate, the trachea was intubated with a 10-mm Murphy orotracheal tube, and the cuff inflated. A 0.1 per cent infusion of succinylcholine was started, along with 1.5 per cent halothane in a 50 per cent nitrous oxide–oxygen mixture. Ten minutes after the start of anesthesia, the lungs suddenly became difficult to ventilate, blood pressure could not be detected by auscultation, and the ECG showed marked ST-segment elevation, brief periods of AV dissociation, and a marked bradycardia of 30–40/min.

Mephentermine, 30 mg, was quickly administered iv and halothane and nitrous oxide discontinued. Ventilation was maintained with pure oxygen. Since prolonged expiration and wheezing continued, and the blood pressure was still not obtainable by auscultation, methoxamine, 6 mg, and aminophylline, 250 mg, were given by rapid iv injection. Aminophylline, 250 mg, was also given by slow infusion. Five minutes later the systolic blood pressure was heard at 50 mm Hg. At this time diphenhydramine, 50 mg, and atropine, 0.5 mg, were given iv. This was followed by an increase in systolic blood pressure to 90 mm Hg and a diminution in the ST-segment elevation on the ECG. Since the bronchospasm remained severe, isoproterenol, 0.1 mg, was given iv, with immediate improvement of ventilation, an increase in blood pressure to 130/80 mm Hg, and an increase in pulse rate to 120/min.

An erythematous rash over the patient's trunk and extremities and marked periorbital edema were noted. Dexamethasone, 12 mg, was given iv. Following this, the trachea was extubated and pure oxygen was given by mask. Respiratory stridor was minimal at this point, and it soon disappeared as consciousness returned.

The patient was placed in the recovery room, where he was observed closely. Within three hours the periorbital edema had subsided and the wheezing had diminished. After an uneventful recovery period of two days, he was discharged in satisfactory condition.

Two weeks later the patient returned to the hospital, and the following skin tests were done in his left forearm: 1) Intradermal skin test with 0.05 ml of a 2 mg/ml solution of succinylcholine (Quelicin). 2) Intradermal skin tests with 0.05 ml of a 2 mg/ml solution of thiamylal sodium (Surital). 3) Intradermal skin test with 0.05 ml of a 0.3 mg/ml solution of *d*-tubocurarine chloride pentahydrate (Tubocurarine chloride). 4) Intradermal skin test with 0.05 ml of physiologic saline solution.

Three control subjects also received the same injections in the forearm.

The patient showed no reaction to injection of saline solution or succinylcholine. He developed an immediate wheal-and-flare reaction to the injection of thiamylal. Within 10 minutes the wheal was more than 1 cm in diameter, with pseudopod formation, and the flare was about 4 cm in diameter. This reaction persisted for more than 45 minutes. The three control subjects showed no response to the injection of thiamylal. The patient also developed an immediate wheal-and-flare reaction after the intradermal injection of *d*-tubocurarine. This was somewhat less marked than the reaction to thiamylal, the wheal being about 8 to 9 mm and the flare about 3.5 cm in diameter. All three of the control subjects developed similar, though less extensive, responses to injection of *d*-tubocurarine. The patient showed no change in vital signs throughout the period of skin testing. Later the same day the patient was given injections of succinylcholine, 0.5 ml of 2 mg/ml solution, subcutaneously, and *d*-tubocurarine, 0.5 ml of 0.3 mg/ml subcutaneously (ten times the doses received in the morning) to exclude the possibility of allergy to more than one agent. No reaction to these injections was observed within one hour.

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Discussion

From the results of skin testing, the authors and a consulting allergist concluded that the patient had manifested a severe allergic reaction to thiamylal (Surital). Although the patient had a similar but less marked reaction to *d*-tubocurarine (a known histamine liberator), the same reaction occurred in the control subjects. Subcutaneous injection of ten times the intradermal dose of *d*-tubocurarine caused no untoward response, excluding it as the causative drug. The patient showed no positive reaction to succinylcholine; however, prior to skin testing an allergy to succinylcholine could not be ruled out. Jerums[1] reported a case of anaphylaxis to succinylcholine and demonstrated skin sensitivity to this drug, but not to thiopental.

To our knowledge, a severe allergic reaction to thiamylal has not been reported. There are, however, several case reports of thiopental anaphylaxis. Davis[2] published a case report and referred to several others. We support the cautions that he cites: 1) anaphylaxis may occur without warning, and the possibility should be suspected in patients with an allergic history; 2) satisfactory use of barbiturates orally does not ensure that barbiturates will be tolerated intravenously; 3) anaphylactic treatment must be readily available to patients who receive barbiturates intravenously; 4) patients who sustain severe drug reactions should wear "Medic Alert" identification to avert future mishaps.

Reports of reactions to barbiturates given intravenously are rare, but their true incidence is not known. We suspect that severe anaphylactic reactions may be misdiagnosed and that mild allergic reactions may be unobserved or casually dismissed. It should be noted that barbiturates had been given several times in the past to this patient, not only orally but also intravenously, without report of ill effects other than the skin rash after his most recent anesthesia. This patient probably is also sensitive to thiopental; future skin tests are planned to determine this. Should he require an operation in the future, he has been given a warning, verbally and in writing, not to take barbiturates.

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References

1. Jerums G, Whittingham S, Wilson P: Anaphylaxis to suxamethonium. Br J Anaesth 39:73–76, 1967
2. Davis J: Thiopentone anaphylaxis. Br J Anaesth 43:1191–1193, 1971

The Effects of Innovar on Functional Residual Capacity and Total Chest Compliance in Man

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Innovar produces rigidity of the chest wall in some patients by enhancing skeletal muscle tone. Abdominal muscles may also contract after administration of this drug.[1,2] These are expiratory muscles, and an increase in their tone may result in active exhalation[3] and a decrease in functional residual capacity (FRC). The question we have tried to answer in this study, "Does Innovar decrease FRC?", is clinically important, since a decrease in FRC may impair arterial oxygenation.[4,5]

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Method

Six informed male patients, free of respiratory disease, consented to the study. They received Innovar intravenously at a rate of 1 ml/min (total dose 10 ml/70 kg body weight, or less if clinically noticeable muscle rigidity

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