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Barbiturates Combined with Local Anesthetics

FATALITIES from reactions to local anesthetics have been reported since the first introduction of these drugs to clinical medicine. Physicians appear to have been nonchalant about the lethal potentials of these drugs, perhaps because the deaths seem to occur at infrequent intervals. What is not realized is that deaths occur sporadically in many areas simultaneously, and that the mortality actually is much higher than it appears from the incidental, seemingly infrequent deaths within the experience of the individual physician. In addition, many fatal and nonfatal reactions occur which are not reported and therefore pass unnoticed. The number of fatalities or near-fatalities is unknown, and will remain so because physicians not thoroughly familiar with these drugs often are not aware of tragic experiences they barely miss. Therefore, it is gratifying to observe an increasing awareness of the lethal potential of these drugs. Much of the credit for this can be given to those anesthesiologists who have waged a vigorous campaign during the past decade to emphasize the lethal nature of the drugs when they are not used with caution. The occasional user is the one least aware of the hazards of the systemic effects of local anesthetics, although seasoned workers have had their difficulties, too.

The fact that systemic reactions are due to high plasma levels is now universally accepted. The effects of high plasma levels on the central nervous system have been emphasized, and attention has been drawn to the convulsions which follow rapid absorption of the drug. Less emphasis has been placed upon the fact that the action of local anesthetics on the nervous system is biphasic; stimulation occurs initially, followed by depression. Indeed, the depressant effects have been utilized for the treatment of epilepsy by Bernhard and Bohn,[1] in electroshock therapy by Usubiaga,[2] and for convulsions resulting from tetanus, by Godman and Adriani.[3] Central excitation may be short-lived. Certain areas of the brain may be undergoing excitation while neurons in other parts are depressed.

The classic experiments of Tatum,[4] showing that barbiturates antagonize the convulsive manifestations of cocaine, led to their adoption and widespread use, not only for treatment of convulsions, but also for prophylaxis. The prophylactic use of sedative doses of barbiturate to counteract convulsions was ineffective; their use for this purpose has been abandoned. Although they continue to be used for their anticonvulsant effects this use has recently been challenged. Moore and Bridenbaugh[5] advocated oxygen as an antidote and suggested the use of muscle relaxants to overcome the convulsive effects. Although the threshold intravenous convulsive doses of local anesthetics are not altered by inhalation of oxygen, the relief of any attendant anoxia is without a doubt beneficial, since the minimal convulsive dose is decreased by anoxia.[6] However, the excitation of the nervous system continues during the paralysis produced by the neuromuscular blocker. Whether continued excitation injures the neurons is debatable.

The conjecture that barbiturates may augment the depression of cardiovascular activity resulting from the local anesthetic has been

verified. Zepernick, Adriani and Hyde[6] observed that the myocardial depressant dose of a local anesthetic was decreased in animals pretreated with sodium thiopental. In this issue of ANESTHESIOLOGY Richards, Smith and Katz describe experimental results of the simultaneous use of pentobarbital and lidocaine. The cardiovascular effects on the atria of rats were dose-related. Small doses sufficient to obtund central excitation did not cause a decrease in myocardial contractility, while larger doses significantly affected the mortality rate. Godman and Adriani[3] used thiopental and procaine simultaneously in the treatment of convulsions due to tetanus. The thiopental was administered by intravenous drip in quantities sufficient to abolish consciousness. Their studies were performed on patients before the electroencephalogram and strain gauges were available for clinical use, but if blood pressure and pulse are acceptable criteria, no serious cardiovascular effects were observed.

One must concede that both forms of treatment have drawbacks. The question regarding the treatment of systemic reactions due to local anesthetics is of increasing importance, owing to the widespread use of lidocaine as an antiarrhythmic agent in patients with myocardial disease. Besides, the rise in popularity of an old technique, the so-called "intravenous regional anesthesia," is also of some concern. The slipped tourniquet or its premature release have not been uncommon, and systemic reactions have resulted. Regretfully, the practice of using local anesthetics intravenously is widespread among those who are not fully aware of the lethal effects of these drugs. Those who encounter difficulties and rely upon relaxants to treat the convulsions are, as a rule, apt to treat a reaction due to a drug about which they know little with another drug about which they know even less. The risk of asphyxia from respiratory failure is real when the inexpert use neuromuscular blockers. Therefore, the cautious use of a barbiturate appears to be the safer procedure, even though the myocardium, already depressed by lidocaine, is additionally depressed by the barbiturate. The use of vasopressor drugs, which have a positive inotropic effect, combats this response should it occur.

The fact remains, then, that despite the widespread new uses to which local anesthetics are put, they are lethal substances which should be treated with the utmost respect by the occasional user not familiar with all phases of their pharmacologic behavior.

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