THE USE OF THE ARTIFICIAL KIDNEY IN ACUTE INTOXICATION BY HYPNOTIC DRUGS

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IN the last few years the artificial kidney has been used successfully in the treatment of acute poisoning by the hypnotic drugs, glutethimide (Doriden†), barbiturates, and bromides.[1,2] In 1958, Schreiner[1] outlined the basic conditions in acute poisoning which are necessary for effective hemodialysis. The poison molecule must be readily diffusible from plasma water and well distributed within accessible body-fluid compartments. The toxicity of the molecule must be proportional to the concentration of the drug in the serum and to the duration of bodily exposure. Furthermore, the amount of poison removable by dialysis must be a significant addition to the amount that can be successfully removed by the slower physiologic mechanisms.

In practice, we adhere to the principle that the patient who has taken an overdose of hypnotics should be given conservative treatment if the coma is light and if he is observed closely for a gradual improvement as judged from the vital signs and the neurologic examination. However, hemodialysis is justified in any one of three conditions:[2] (1) when the amount of poison ingested or the initial concentration of poison in the blood is unquestionably known to be in the fatal range, (2) when the patient's condition is deteriorating, and (3) when prolonged coma would be harmful as in the debilitated or elderly patient. Therefore, the acceleration, by dialysis, of recovery from coma is justifiable since a reduction in morbidity in turn reduces the mortality rate.

Eight patients with hypnotic drug intoxication have been dialyzed at Cleveland Clinic Hospital since 1957. The intoxications had been caused by the ingestion of glutethimide (one patient), secobarbital sodium (one patient), phenobarbital (one patient), barbiturates of unknown type (three patients), and a combination of barbiturate and glutethimide (two patients). Eleven dialyses were performed in the eight patients and excellent results were obtained in seven patients. One patient was dialyzed two times and one patient three times.[2] The latter patient, who died, had ingested barbiturates, glutethimide, reserpine, and oxanamide. She was treated with two consecutive dialyses upon admission; the third dialysis was administered because of persistent coma five days following the first dialysis. Approximately 10 hours after the last dialysis the patient died of bilateral bronchopneumonia. Schreiner[1] reported a case of acute barbiturate poisoning in which three dialyses were performed. Several hours after the first dialysis, which had caused

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dramatic improvement, the concentration of barbiturates in the patient's blood was greater than the initial concentration, and the clinical condition was worse than initially. This course was attributed to recovery of an atonic bowel and consequent absorption of residual barbiturate. The patient underwent two more dialyses on the first and third days following the initial dialysis, after which there was an uneventful recovery. In retrospect it is believed by Nakamoto and Kolff[2] that the patient, who died, should have been given three dialyses in rapid succession, to decrease the level of coma quickly and thus perhaps avoid the complication of pneumonia.

Hemodialysis should be the most effective method to relieve bromide intoxication. The artificial kidney removes bromide rapidly from the circulating blood, and replaces it with chloride, unlike the natural kidney, which does not distinguish between bromide and chloride.[3,4] Relief of bromide intoxication usually is achieved by conservative measures in from one to several weeks. However, in Schreiner's[1] patient, relief of a semicomatose, psychotic state was accomplished in 18 hours after a six-hour dialysis in which the concentration of sodium bromide in the blood decreased from more than 350 mg. per 100 ml. to approximately 40 mg. per 100 ml.

Conclusion

In treating acute intoxication from hypnotic drugs, we do not underestimate the value of the conservative approach with regard to the maintenance of an adequate airway, electrolyte and fluid balance, and support of the blood pressure and respiration. However, when the proper conditions for hemodialysis are present, we believe that, rather than use of the conservative approach alone, one treatment or several consecutive treatments with the artificial kidney offer the patient a better chance of survival.

References

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