

## SPECIAL COMMUNICATION

# Brain Resuscitation

ENRIQUE C. G. VENTUREYRA AND LESLIE P. IVAN

All those related to the medical profession are familiar with the term "resuscitation" which usually means restoration of normal cardio-respiratory activity in someone who has suffered from the effects of severely impaired functions of these two organs.

The concept of "brain resuscitation" has emerged during the past few years and to the best of our knowledge the term was probably first coined by SAFAR (1977). This term is used more freely by anesthetists. Neurosurgeons, when they relieve otherwise fatal herniations of the brain, are not in the habit of calling the effort resuscitation. Since, in our opinion, the term brain resuscitation focuses attention on a set of measures in an acute catastrophic situation, we would like to support its use.

With the increase of severe head injuries in most major cities in North America, neurosurgeons have had to face new challenges in the management of these patients. Many of these patients sustain severe head injuries with or without skull fractures and are rendered deeply unconscious at the time of the injury. These facts are well documented by BRUCE et. al., in an excellent review (1978). The patient arrives at the neurosurgical unit deeply unconscious and hypoxic usually with multiple fractures and shock; the cortical and brain stem functions severely depressed. Impending tentorial herniation with pupillary changes and signs of brain stem compression are commonly observed. After establishing an airway, replacing blood loss and examining the nervous system, the patient is assessed by C T scanning or cerebral angiography. Intracranial pressure monitoring has become common and its importance is known to all who use the facility routinely.

Even with a knowledge of fluid and electrolyte therapy and the use of corticosteroids and mannitol it is often impossible to maintain acceptable ICP. A significant number of these patients survive in poor quality and some will die in spite of all efforts.

In the recent past the management of these patients has been more aggressive before the intracranial pressure gets out of hand. After the initial CT scan or angiographic assessment the patients have been paralyzed and maintained with controlled respiration. Arterial blood gasses were monitored, fluid balance maintained and large doses of intravenous corticosteroids as well as hypertonic solutions administered. Under the direction of an anesthetist a

thiopental sodium drip was started. Boluses of thiopental were administered when the endotracheal tube was inserted and when sudden rises in intracranial pressure were observed. In most instances and perhaps because of the early therapy, control of intracranial pressure was much easier. A number of patients, however, required deep barbiturate coma with "suppression bursts" or a flat EEG to control the situation. In some cases this mode of therapy was needed for as long as two to three weeks.

In our experience during the past year, patients responded to this treatment, and in the most difficult cases the intracranial pressure came under control quickly. This fully supports what has been found by others (Bruce et al., 1978). After reversal of the barbiturate coma we have observed full neurological recovery in severe head injuries and surprisingly good outcome in others who were thought to be hopeless on arrival. Because of these rewarding results we would like to encourage other neurosurgeons to treat severe head injuries with this aggressive therapy.

We believe that brain resuscitation is a useful concept and implies all measures taken to prevent deterioration of the injured brain due to mechanical forces or encephalopathies of various etiologies. The object of the therapy is the reduction of brain bulk and the controlled and reversible suppression of brain activity and metabolic functions. Deep barbiturate coma with controlled respiration and continuous ICP monitoring places the injured brain at slow pacing or absolute rest. In this suspended state

of functioning, a more adequate and acceptable recovery of the injured brain appears possible. The results of this aggressive medical treatment are better both in terms of mortality and quality of survival than the results of other treatments including radical decompressions still used by many neurosurgeons.

For all these reasons, we believe that talking about brain resuscitation is fully justified. Barbiturate coma with continuous intracranial pressure monitoring appears to be the most promising method that may save the brain from destruction.

We hope that these remarks will generate some discussion.

#### REFERENCES

- BRUCE, D. A., SCHUT, L., BRUNO, L. A., WOOD, J. H., SUTTON, L. N., (1978). Outcome Following Severe Head Injuries in Children, *J. Neurosurg*: 48, 679-688.
- SAFAR, P., (1977). Brain Resuscitation *Critical Care Medicine*, Las Vegas, Nevada, February 20, 1977.