Atracurium Besylate:

By Bonnie Garrison, CCRN, BSN, EMT

Does it have a place in the helicopter drug box?

In the past three years, medical management for closed head injured patients with increased intracranial pressure (ICP) has undergone many changes. Recently, a relatively new non-depolarizing neuromuscular blocker, atracurium besylate, is effectively being utilized (in conjunction with other agents) for these patients.

Atracurium is a non-depolarizing skeletal muscle relaxant with a minimal histamine release (less than tubocurarine or metocurine), and hemodynamic changes are minimal within the normal dose range of 0.3 to 0.6 mg/kg IV. Therefore, we should not see the hypotension effects and it could be considered safer for patients with asthma or significant cardiac disease. Since it is non-depolarizing, the muscle twitching that is seen with some paralyzing agents is suppressed with this agent. This would help decrease the initial ICP increase that one can see with the initiation of paralyzation. Just the concept alone of paralyzation and sedation has shown to effectively lower ICP levels as well.

Maximum neuromuscular blockade will occur within 25 minutes of injection and 95 percent recovery occurs within 60-70 minutes after injection. Time to paralysis onset decreases and duration of maximum effect increases with increasing doses. The duration of blockade is ⅓ to ½ that of tubocurarine, metocurine, and pancuronium (Pavlon). The recovery time is more rapid than the above agents also. Atracurium is inactivated in the plasma and elimination half-life is approximately 20 minutes. If one needs to reverse the blockade, utilization of an anticholinesterase agent (i.e. neostigmine, edrophonium, pyridoxamine) in conjunction with an anticholinergic agent (i.e. atropine) is effective. Atracurium should only be utilized when the patient has been adequately sedated.

There are certain agents that can enhance the blocking action, such as certain anesthetics (i.e. halothane), certain antibiotics (i.e. aminoglycosides, polymixins), lithium, magnesium salts, procainamide, and quinidine.

Adverse effects include skin flush within normal doses. Above 0.6 mg/kg, side effects seen are hypotension, rash, itching, flush. The overall incidence rate is 0.8 percent. Atracurium is not to be mixed with alkaline solutions.

Our policy for closed head injured patients demonstrating increased ICP is as follows:

1. Administer lidocaine 100 mg IV to decrease the hypertensive effects of intubation. This will be given prior to intubation.
2. Morphine Sulfate IV (doses will vary depending on amount needed to adequately sedate patient).
3. Atracurium 0.4-0.5 mg/kg IV for paralyzation.
4. Intubation with hyperventilation and 100 percent O_2.

Our hospital has utilized this policy for the past year and, so far, the results are promising. We are initiating a research project to study whether or not ICP levels significantly decrease with this policy. Feel free to call with any comments or questions.

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References

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2. *Adjuncts To Anesthesia, Non-depolarizing Neuromuscular Blockers*, 1985; pp. 1139-1142.

Haldol (haloperidol)

Adult IV does: 3-5 mg over 1 minute
Onset: 10 minutes
Peak effect: 30-45 minutes

Haldol™, a butyrophenone, was introduced for the treatment of psychoses in 1958. It calms and induces sleep in excited patients. Although less sedating than the phenothiazine class of antipsychotics, it produces a lower incidence of hypotension, tachycardia and autonomic side effects. Extrapyramidal side effects are dose related, and reversed with diphenhydramine. Hypotension has been reported when Haldol is administered to patients with alcohol-induced CNS depression.

Although the FDA has not approved Haldol for IV use, "use of an FDA approved drug for unlabeled indications is within the perogative of the physician." A study of parenteral haloperidol in 81 adult patients with traumatic injury, intoxication, medical illness and psychiatric disorders, found it to be extremely rapid and without adverse hemodynamic, respiratory or acute neurologic side effects. A 10 mg IV dose produced a calming effect within five minutes.

Morphine (morphine sulfate)

Adult dose: 2-10 mg
Onset: immediate
Duration: 2-3 hours

Morphine produces analgesia, drowsiness and mental clouding. In addition to relief of distress, some patients experience euphoria and, if the situation is favorable, sleep may ensue. Drowsiness is dose related and must be weighed against the risks of respiratory depression and histamine induced vasodilation and hypotension. Effects of the myocardium are not significant. Narcotics should be avoided in the setting of hemorrhage or volume depletion. Adverse side effects are reversable by the administration of Narcan™ (naloxone), antihistamines, or elevation of the legs and the infusion of fluids. Adverse effects may be minimized by the administration of small doses of morphine in frequent increments (i.e. 2-5 mg q 30 minutes).

Valium (diazepam)

Adult IV dose: 2-10 mg (5 mg per minute slow push)
Onset: 1-5 minutes
Duration: 15 minutes-1 hour

In 1960, a benzodiazepine was reported to produce "taming" of a number of animal species. Relating this effect to human therapeutic needs led to the observation that benzodiazepines block EEG arousal