

## Use

Vecuronium is occasionally used instead of pancuronium (q.v.), to provide sustained muscle paralysis. Atracurium (q.v.) is a better alternative where only short term paralysis is required.

## Pharmacology

Vecuronium bromide is a competitive non-depolarising muscle relaxant that came onto the market in 1980, as an alternative to pancuronium. The duration of action is not as long as that provided by a comparable dose of pancuronium. Vecuronium is slightly more expensive than pancuronium, but generates even less histamine release, and produces few or no adverse cardiovascular effects. It is rapidly taken up by the liver and partially metabolised prior to excretion, largely in the bile. Some of the metabolites, such as 3-desacetyl-vecuronium, which retain considerable neuromuscular blocking activity, are mostly excreted in the urine. The normal plasma elimination half life in adults is 30–60 minutes, but considerably (and sometimes unpredictably) longer than this in infancy, especially when high dose treatment is used. Renal failure seems to have relatively little clinical effect on the duration of neuromuscular blockade, but 25% of the drug is renally excreted and atracurium may be the best drug to use in a baby with severe renal failure requiring paralysis. Concurrent treatment with an aminoglycoside may double the length of time this blockade lasts, making atracurium a better drug to use for short term paralysis. Treatment with magnesium sulphate may have a similar effect. The manufacturers recommend an initial test dose of 10–20 micrograms/kg. Placental transfer is limited, and doses of up to 100 micrograms/kg given to mothers requiring Caesarean delivery seem to have no significant clinical effect on the baby.

Rocuronium a more recently introduced analogue, has similar properties. A dose of 600 micrograms/kg IV is commonly employed. Paralysis is achieved as quickly as with suxamethonium (30 seconds), and much quicker than with vecuronium (120 seconds), but the duration of action of rocuronium and vecuronium are similar. The manufacturers have not yet endorsed neonatal use. Atracurium has an even slower onset of action (180 seconds).

## Treatment

**First dose:** 100 micrograms/kg IV will cause prompt respiratory paralysis. Take a blood gas sample 20–30 minutes later to check for CO<sub>2</sub> accumulation. A restless baby who appears to be 'fighting the ventilator' may have been contributing to his own ventilation because of inadequate artificial ventilatory support, in which case paralysis will only exacerbate the problem.

**Further doses:** Most babies continue to comply with the imposed ventilator rate as they wake from the first paralysing dose (especially if a moderately fast rate and a relatively short inspiratory time (<0.7 secs) is used) but a few require prolonged paralysis. The standard repeat dose is half the initial dose IV (or IM) every 2–4 hours as necessary, but some larger and older babies seem to require a higher maintenance dose. Babies who are paralysed should always be sedated as well.

## Antidote

Give a combination of 10 micrograms/kg of glycopyrronium (or 20 micrograms/kg of atropine) and 50 micrograms/kg of neostigmine IV, as outlined in the monograph on glycopyrronium.

## Supply and administration

**Vecuronium:** This comes as a powder in 10 mg vials, with water for reconstitution. They cost £4.20 each. Dissolve the powder with 5ml of sterile water (as supplied) to give a solution containing 2 mg/ml. Further dilute 0.5 ml of this solution with 0.5 ml of 0.9% sodium chloride or 5% dextrose in a 1 ml syringe to obtain a preparation containing 100 micrograms in 0.1 ml for accurate neonatal administration. Vials can, if necessary, be kept for up to 24 hours after reconstitution but, because the vials contain no preservative, material not used promptly is best discarded.

**Rocuronium:** This comes in 5 ml vials containing 10 mg/ml of rocuronium bromide. They cost £3.20 each. Take 0.1 ml and dilute to 1 ml with 0.9% sodium chloride or 5% dextrose to obtain a solution containing 100 micrograms in 0.1 ml for accurate neonatal administration.

## References

- Meretoja OA, Wirtavouri K, Neuvonen PJ. Age-dependence of the dose-response curve of vecuronium in pediatric patients during balanced anesthesia. *Anesth Analg* 1988;**67**:21–6.
- Gravlee GP, Ramsey FM, Roy RC, *et al*. Rapid administration of a narcotic and neuromuscular blocker : a haemodynamic comparison of fentanyl, sufentanil, pancuronium and vecuronium. *Anesth Analg* 1988;**67**:39–47.
- Scheiber G, Ribeiro FC, Marichal A, *et al*. Intubating conditions and onset of action after rocuronium, vecuronium, and atracurium in young children. *Anesth Analg* 1996;**83**:320–4.
- Martin LD, Bratton SL, O'Rourke P. Clinical uses and controversies of neuromuscular blocking agents in infants and children. *Crit Care Med* 1999;**27**:1358–68.
- Playfor S. Neuromuscular blocking agents in critically ill children. *Paediatr Perinat Drug Ther* 2002;**5**:35–46.