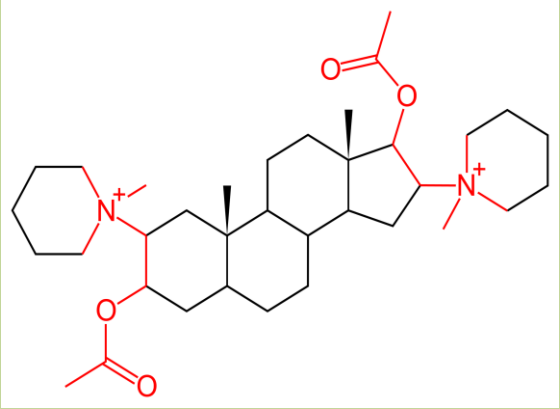
Recalled to Life: Prolonged action of pancuronium in a neonate suggesting death: reversal using neostigmine.

Harbon SCD, Thompson JP, Coulson JM.
NPIS (Cardiff), Cardiff and Vale UHB, Cardiff, UK.

Case Report:

A male neonate born at 24 weeks + 2 gestation, required transfer to a tertiary centre at 25 days of age for a laparotomy due to a necrotic bowel complicating a severe Gram negative infection. Prior to transport, the neonate received pancuronium. Twelve hours after surgery there were no noticeable movements. 'Brain-stem death testing' was undertaken.

Subsequently staff realised that the child had been given ten times the correct dose of pancuronium: receiving 540 micrograms. The National Poisons Information Service was contacted and advised that the child remained stable from a cardio, respiratory and metabolic perspective and was currently intubated, ventilated and receiving ionotropic support.



Pancuronium

Treatment:

Regarding pancuronium overdoses in neonates, there was no medical scientific literature on neonatal overdose immediately available. The on-call consultant was contacted and advised administering neostigmine and atropine. The neonate received 0.02mg/kg neostigmine 26 hours post overdose. He developed bradycardia within four minutes of administration of the neostigmine which subsequently responded to 11 micrograms of atropine.

Return of spontaneous movements was noticed within 20 minutes of receiving neostigmine. Continuing care was provided for underlying sepsis. The child made a good toxicological recovery and was discharged from hospital.

Discussion:

Pancuronium is a non-depolarizing neuromuscular blocking agent, which acts on the neuromuscular junction nicotinic receptors. Neostigmine is a competitive acetylcholinesterase inhibitor that prolongs the action of acetylcholine at the neuromuscular and ganglionic nicotinic receptors. The temporal relationship between the return of spontaneous movement and the onset of bradycardia following neostigmine are suggestive of a pharmacological antagonism.

The half life of pancuronium is estimated to be between 89-161 minutes. It is cleared through the biliary (11%) and renal (40%) routes. This is thought to be doubled during renal failure and cirrhosis and biliary obstruction. Pharmacokinetics in the premature neonate are not well described. At the time of enquiry approximately ten 'half lives' should have elapsed, suggesting that the half life was considerably prolonged in this case.

Conclusion:

Careful consideration of toxicological causes should be considered before brain stem death is concluded.

Image: https://commons.wikimedia.org/wiki/File:Pancuronium%E2%80%93acetylcholine_comparison.svg