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Effect of rocuronium on duration of ventilation after organophosphorus insecticide poisoning – A pilot randomised controlled trial

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Objective: Organophosphorus (OP) insecticide self-poisoning causes >100,000 deaths every year. 35% of patients in developing countries require intensive care and ventilation. We aimed to collect preliminary data on whether addition of the competitive nicotinic antagonist rocuronium to standard therapy for OP poisoned patients requiring intubation and ventilation might be clinically feasible and lead to reduced duration of ventilation.

Methods: A pilot three-arm dose response phase II trial was set up to compare bolus doses (0.3 mg/kg) of rocuronium bromide titrated to produce >95% inhibition or 50% inhibition of Neuromuscular junction (NMJ) function, measured using acceleromyography, plus standard treatment, with standard treatment alone. Patients receiving bolus rocuronium then received infusions of rocuronium (1.5 mg/kg/h) for a maximum of 120 h (due to safety reasons). Eligible patients had clinical features of anticholinesterase poisoning and reduced consciousness requiring intubation and ventilation, with NMJ function conserved to >50% of normal. The primary outcome was duration of intubation; secondary outcomes included dose of atropine required and case fatality. Plasma butyrylcholinesterase (BuChE) activity was measured in patients.

Results: Forty-five patients (89% male) were recruited and randomised, of which 64% were profenofos poisoning cases: rocuronium to 95% NMJ inhibition (n=15), to 50% NMJ inhibition (n=14), and control (n=16). The groups were similar at baseline. Median (IQR) duration of ventilation was longer in the rocuronium 50% (278 [182 to 391 h) and Roc>95 (264 [214 to 377.5] h) arms compared to the control arm (106 [59.4 to 161.8], p=0.0429 and p=0.0128 respectively). Case fatality was 9/45 (20.0%); it was non-significantly higher in the rocuronium 50% arm (4/14, 28.6%) than in the rocuronium 95% (2/15, 13.3%) and control (3/16, 18.8%) arms (p=0.5840). BuChE activity remained severely inhibited for the duration of the study for most patients.

Conclusion: In this small feasibility study, we found no indication that rocuronium benefited ventilated OP-poisoned patients. However, as most patients were poisoned by profenofos which persists in the body, further research is required to assess whether this approach might work for OP insecticides that are more rapidly eliminated from the body.