Use of Dexmedetomidine during discontinuation of ventilation in the neuro-critically ill patient

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Background and Goal of study

Sedation for the neuro-critically ill patient presents an array of challenges. Dexmedetomidine (DEX) is a selective alpha-2-adrenergic agonist recently evidenced to have neuroprotective effects in vitro (1). The primary objective of our study was to evaluate whether DEX can prolong the ventilator-free time in stable patients with intracerebral pathology.

Materials and Methods

Adult patients mechanically ventilated who admitted in our multidisciplinary ICU as a result of traumatic brain injury (TBI), subarachnoid hemorrhage (SAH) or intracerebral hemorrhage (ICH,) meeting the standard criteria for discontinuation of mechanical ventilation, were enrolled in our randomized controlled trial. The infusion rates of DEX fluctuate between 0.5 and 1.5 mcg/kg/h. The Richmond Agitation Sedation Scale (RASS) and the Glasgow Coma Scale (GCS) was daily assessed. Illness severity scoring systems (APACHE II and SOFA) were calculated on the first ICU day. Ventilator-free days and vital parameters [mean arterial pressure (MAP), systolic arterial pressure (SAP), diastolic arterial pressure (DAP), heart rate (HR)] were recorded. Categorical data were analyzed using the chi-square test or Fisher's exact test. Normal continuous variables were compared using the Student t-test.

Twenty-six critically ill patients were randomized to receive DEX or not (median age 52 years old, 58% were females, 65% SAH, 27% TBI, 8% ICH). Median values for APACHE II and SOFA were 17 and 8 respectively. Dexmedetomidine significantly increased ventilator-free hours at 7 days following randomization compared to placebo (180.0 ± 45.6 hours vs 124.8 ± 55.2 hours, mean difference between groups 55.0hr (95%CI, 4.08 to 106.7 hours). During the DEX infusion lower incidence of agitation [23% (3/13) vs 54%(8/13), $p < 0.05$), attenuation of hemodynamic stress response to weaning (mean SBP 148.2 ± 15.3 mmHg, mean MAP 84.7 ± 7.1 , mean HR 73.0 ± 16.0 bpm) and better respiratory pattern (mean tidal volume 525 ± 112 ml, mean respiratory rate 15 ± 3) were reported that can explain the retainableness of spontaneous ventilation. The RASS score was improved whether the GCS score remained unchanged.

Results and Discussion

The findings demonstrate that dexmedetomidine may be a safe adjunct in the neurocritical practice as the sedative is not associated with a decline in neurological functioning although it is effective in controlling stress response. However, the effects of the drug in cerebral hemodynamics has to be elucidated.

Conclusions

1. Ely EW et al. JAMA 2004; 291:1753–1762.