Electrocardiographic and Electrophysiologic Effects of Dexmedetomidine on Children

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Background: Dexmedetomidine (DEX) is a highly selective alpha-2-adrenergic agonist approved for
short-term sedation and monitored anesthesia care in adults. Its effects on the electrocardiography
and cardiac conduction tissue are not well described in the literature. Therefore, we aimed to
characterize the electrocardiographic and electrophysiologic effects of DEX in children.

Patients and Methods: Twenty children (11 boys and 9 girls) ages range between 8 and 17 years
undergoing electrophysiological study and ablation of the supraventricular tachycardia, had
hemodynamic and cardiac electrophysiologic variables measured before and during the administration
of DEX (1 microgram/kg IV over 10 minutes followed by a 10 minute continuous infusion of 0.5
microgram/kg/hour).

Results: A significant decrease in heart rate was seen after the administration of DEX, but the systolic-
diastolic-mean arterial pressures, respiratory rate, and end tidal carbondioxide did not change.
Corrected sinus node recovery times and baseline sinus cycle lengths, which are markers of sinus
node function, were both lengthened with the administration of DEX. Atrioventricular (AV) nodal
function, as evidenced by the Wenckebach cycle length, the ventriculo-atrial block cycle length, and
AV node effective refractory periods, were lengthened significantly. We also found that DEX increased
the atrial refractory period and diminished atrial excitability.

Conclusions: Dexmedetomidine significantly depressed sinus and AV nodal functions in pediatric
patients without significant ECG interval changes, except a trend towards lower heart rates. Although
no spontaneous AV nodal block and no clinically significant bradycardia were seen, we recommend
that DEX be used with caution in patients at risk for bradycardia and/or AV nodal dysfunction due to its
associated comorbidities.