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Alpha-2-agonists for sedation in children

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Clonidine and dexmedetomidine are highly selective alpha-2-agonists of the imidazole subclass. Clonidine which has been licensed since 1966 is 200 times more specific for alpha 2 receptors compared to alpha 1 receptors. It is most commonly known as antihypertensive drug, but its use has been extended to several off label applications over the years. Dexmedetomidine is a more recently approved drug with a specificity of 1600: 1 for alpha-2 receptors which makes it nearly a complete alpha-2 agonist. Both drugs bind to peripheral and central sites in the nervous system. Sedative and anxiolytic effects result from activation of alpha-2-receptors in the locus coeruleus of the brainstem, while analgesia is exerted through activation of alpha-2-agonists in the dorsal horn of the spinal cord.

Sedation produced by alpha-2 agonists resembles natural sleep with an EEG pattern similar to non-REM sleep. The key advantage of clonidine and dexmedetomidine is their ability to maintain respiratory drive. Cardiovascular effects are characterized by a mild decrease in heart rate and blood pressure. Furthermore alpha-2 agonists have been shown to be devoid of neurotoxic effects on the developing brain in animals and show beneficial effects when administered alongside with general anaesthetics. All these qualities make alpha-2 agonists nearly ideal sedatives for children and an interesting alternative to commonly used benzodiazepines. Numerous studies prove the effectiveness and safety of alpha-2-agonists in children. Current clinical applications are premedication in paediatric anaesthesia, sedation for non-invasive and invasive procedures, prevention and treatment of emergence delirium, analgesia, as an adjunct to general anaesthesia, sedation in the intensive care unit as well as treatment of withdrawal syndrome and delirium.

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