Dexmedetomidine for sedation and analgesia following tracheal reconstruction in children.

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Introduction: Dexmedetomidine (DEX) is a centrally-acting alpha-2 adrenergic agonist that is currently approved by the US FDA for short-term use (≤ 24 hours) to provide sedation in adults in the ICU. This drug has been shown to be efficacious in adult medical and surgical patients in providing sedation, anxiolysis, and analgesia. We report our use of DEX in children during a 5-8 day period of mechanical ventilation following complex tracheal reconstruction for subglottic stenosis.

Methods: After IRB approval and informed consent, 4 children, ages 2-4 years, undergoing tracheal reconstruction with planned mechanical ventilation for at least 5 days have been enrolled in this study. All patients received a combination of DEX, morphine, and midazolam by continuous infusion during which time hourly pain (FLACC) and sedation (UMSS) scores were recorded. Infusions were begun upon admission to the PICU following surgery at the following doses: DEX 0.5 µg/kg/hr, morphine 0.1 mg/kg/hr, and midazolam 0.1 mg/kg/hr. Additional “prn” doses of morphine and midazolam were administered for pain score >3 and sedation score <3. If prn doses were required more than 3 times per hour or during more than 3 consecutive hours, the dose of DEX was increased by 0.25 µg/kg/hr up to a maximum of 1.5 µg/kg/hr. Subsequently, morphine and/or midazolam were increased in increments of 0.25-0.05 mg/kg/hr according to the same criteria. Vecuronium 0.1 mg/kg was administered for excessive movement while the sedative/analgesic infusions were increased. If the pain score remained < 2 and/or the sedation score remained > 3 the morphine and/or midazolam infusions were decreased in increments of 0.25-0.05 mg/kg/hr. The goal was to reduce these infusions to as low as 0.025 mg/kg/hr before decreasing the DEX dose, ie, to maintain a DEX-based regimen for sedation/analgesia while minimizing the need for neuromuscular blockade.

Results: The mean hourly doses of DEX, morphine, and midazolam during mechanical ventilation are shown in Figure 1. The DEX infusion was increased to the maximum dose of 1.5 µg/kg/hr by day #3 in all patients. No patient developed bradycardia (HR < 60) or hypotension (< 75% of baseline BP). Occasional doses of vecuronium were required to maintain immobility.

Discussion: We have found that continuous infusion of DEX in combination with morphine and midazolam is efficacious in providing sedation/analgesia to children requiring prolonged mechanical ventilation following tracheal reconstruction surgery. Doses of DEX up to 1.5 µg/kg/hr have not been associated with adverse circulatory effects.

Figure 1. Hourly doses of DEX, morphine, and midazolam.

References: